METROLINX

DURHAM REGION

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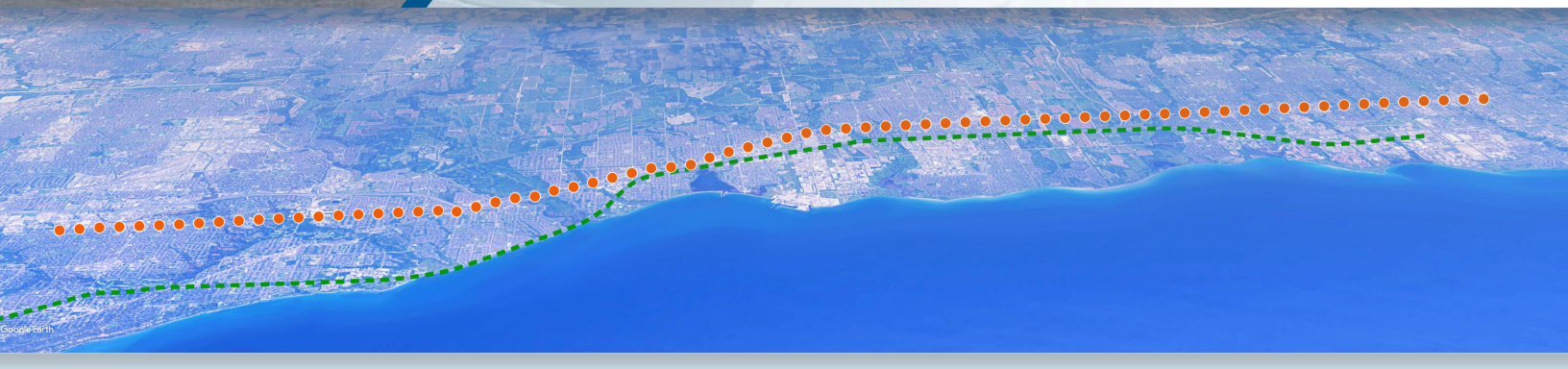
Durham-Scarborough Bus Rapid Transit Project

Environmental Project Report



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Glossary of Terms and Acronyms

AA	Archaeological Assessment
AASHTO	The American Association of State Highway and Transportation Officials
AAQC	Ambient Air Quality Criteria
ANSI	Area of Natural and Scientific Interest
AODA	Accessibility for Ontarians with Disabilities Act
AQIA	Air Quality Impact Assessment
AQMP	Air Quality Management Plan
BHR	Built Heritage Resources
BFI	Base Flow Index
BIA	Business Improvement Areas/Associations
BMP	Best Management Practice
BRT	Bus Rapid Transit
CA	Conservation Authority
CAAQS	Canadian Ambient Air Quality Standards
CCME	Canadian Council of the Ministers of the Environment
CFIA	Canadian Food Inspection Agency
CHBDC	Canadian Highway Bridge Design Code
CHER	Cultural Heritage Evaluation Report
CHL	Cultural Heritage Landscape
CHVI	Cultural Heritage Value or Interest
CLOCA	Central Lake Ontario Conservation Authority
CLOSPA	Central Lake Ontario Source Protection Area
CN Rail	Canadian National Railway
CNWA	Canadian Navigable Waters Act
CP Railway	Canadian Pacific Railway
COSEWIC	Committee on the Status of Endangered Wildlife in Canada

CPTED	Crime Prevention Through Environmental Design
CSPA	Corrugated Steel Pipe Arch
DBH	Diameter at Breast Height
DCDSB	Durham Catholic District School Board
DDSB	Durham District School Board
DFO	Department of Fisheries and Oceans Canada
DRCP	Durham Regional Cycling Plan
DROP	Durham Region Official Plan
DRT	Durham Region Transit
DSBRT	Durham-Scarborough Bus Rapid Transit
EA	Environmental Assessment
EAB	Emerald Ash Borer
EASR	Environmental Activity and Sector Registry
EBA	Event Based Area
ECCC	Environment and Climate Change Canada
EELRT	Eglinton East Light Rail Transit
ELC	Ecological Land Classification
EMMP	Environmental Mitigation and Monitoring Plan
EMS	Emergency Medical Service
EPR	Environmental Project Report
ESA	Ontario Endangered Species Act
ESC	Erosion and Sediment Control
FC	Friction Course
FHWA	Federal Highway Administration
FNHS	Functional Natural Heritage System
FRTN	Frequent Rapid Transit Network
FTA	U.S. Federal Transit Administration
FWCA	Fish and Wildlife Conventions Act
GGH	Greater Golden Horseshoe

GHG	Greenhouse Gases
GPDG	Gravity Pipe Design Guidelines
Growth Plan	A Place to Grow: Growth Plan for the Greater Golden Horseshoe
GTA	Greater Toronto Area
GTHA	Greater Toronto and Hamilton Area
ha	hectares
HADD	Harmful Alteration, Disruption, or Destruction
HCCA	Highland Creek Community Association
HCD	Heritage Conservation Districts
HDDS	MTO Highway Drainage Design Standards
HIA	Heritage Impact Assessment
HMA	Hot Mix Asphalt
HVA	Highly Vulnerable Aquifer
IAA	Impact Assessment Act
ICIP	Investing in Canada Infrastructure Program
IPZ	Intake Protection Zone
ITS	Intelligent Transportation Systems
km	kilometres
km/h	kilometres per hour
L/day	liters per day
LID	Low Impact Development
LOS	Level-Of-Service
LRT	Light Rail Transit
m	metres
mm	millimetres
masl	metre above sea level
mbgs	metre below ground surface
MBCA	Migratory Birds Convention Act
MECP	Ministry of the Environment, Conservation and Parks

MES	Most Exposed Side
MHSTCI	Ministry of Heritage, Sport, Tourism and Culture Industries
Minister	Minister of the Environment, Conservation and Parks
MNDMNRF	Ministry of Northern Development, Mines, Natural Resources and Forestry
MPP	Member of Provincial Parliament
MTAG	Municipal Technical Advisory Group
MTO	Ministry of Transportation
MTSA	Major Transit Station Area
NAP	Scarborough Neighbourhood Action Plan Committee
NAPS	National Air Pollution Surveillance program
NHIC	Natural Heritage Information Centre
NHS	Natural Heritage System
NVIA	Noise and Vibration Impact Assessment
NVMP	Noise and Vibration Management Plan
O. Reg.	Ontario Regulation
O.D.S.D.V	Oshawa Downtown Streetscape Design Vision
OLA	Outdoor Living Area
OGS	Oil/grit separators
OR	Openness Ratio
ORAA	Ontario Reptile and Amphibian Atlas
OWES	Ontario Wetland Evaluation System
PIC	Public Information Centre
Phase I ESA	Phase I Environmental Site Assessment
PM	Particulate Matter
PM2.5	fine particulate matter
POR	Points Of Reception
PPS	Provincial Policy Statement
PPV	Peak Particle Velocity
Project	The DSBRT Project

PSW	Provincially Significant Wetland
PTTW	Permit to Take Water
RER	Regional Express Rail
RMS	Root Mean Square
RNFP	Ravine and Natural Feature Protection
ROP	Durham Region Regional Official Plan
ROW	Right-of-Way
RTEF	Rapid Transit Evaluation Framework
RTP	Regional Transportation Plan
SAC	Spills Action Centre
SAG	Stakeholder Advisory Group
SAR	Species at Risk
SARA	Federal Species at Risk Act
SCR	Selective Catalytic Reduction
SCTMP	Scarborough Centre on the Move Transportation Master Plan Study
SGRA	Significant Groundwater Recharge Area
SOV	Single Occupant Vehicle
SP	Superpave
SRT	Scarborough Rapid Transit
SSE	Scarborough Subway Extension
SWM	Storm Water Management
SWOT	Strengths, Weaknesses, Opportunities and Threats
TAC	Transportation Association of Canada
TAG	Technical Advisory Group
TCDSB	Toronto Catholic District School Board
TDSB	Toronto District School Board
TMC	Traffic Movement Count
TMP	The Durham Region Transportation Master Plan
TNM	Traffic Noise Model

TPAP	Transit Project Assessment Process
TPZ	Tree Protection Zone
TRCA	Toronto and Region Conservation Authority
TRSPA	Toronto and Region Source Protection Area
TSLIP	Transportation Safety Local Improvement Project
TSP	Transit Signal Priority
TSS	Total Suspended Solids
TTC	Toronto Transit Commission
TTNHS	Targeted Terrestrial Natural Heritage System
UGC	Urban Growth Centre
UP Express	Union Pearson Express
UTSC	University of Toronto's Scarborough Campus
VOC	Volatile Organic Compound
VMS	Variable Message Signs
VPR	Voluntary Project Review
WHPA	Well Head Protection Area
ZOI	Zone of Influence

1. Introduction

1.1 Project Overview

The Durham-Scarborough Bus Rapid Transit (DSBRT) corridor is a crucial transportation corridor that connects Durham Region and Scarborough in Toronto. The DSBRT corridor is located in southern Ontario, mainly runs along the Ellesmere Road in Scarborough and Durham Region Highway 2 and forms the east end of the Greater Toronto and Hamilton Area (GTHA). The Metrolinx 2041 Regional Transportation Plan (RTP) for the GTHA (approved in March 2018) identifies the DSBRT Project (the Project) as a priority "In Development" project to upgrade the existing Durham Region Transit (DRT) PULSE Service to bus rapid transit along Highway 2.

The Project proposes approximately 36 kilometres of dedicated transit infrastructure, connecting downtown Oshawa, Whitby, Ajax, Pickering and Scarborough. This project builds on the existing PULSE service and will provide more dedicated transit infrastructure along Highway 2 and Ellesmere Road to connect to Scarborough Centre. The corridor has varied conditions and constraints with respect to traffic and land use. With rapid growth in the past decade, and an expectation for this growth to continue into the future, travel demand along the corridor will continue to increase and higher capacity transit will be needed to link communities and employment on both sides of the Toronto-Durham boundary. Transit infrastructure will include a range of design solutions in different segments of the corridor. The preliminary design concept, as shown in the **Appendix A1**, includes segments with buses operating with transit priority measures and segments with dedicated curbside or centre-median transit lanes. The design concept varies by segment based on available space, travel demand, and land use context.

This Environmental Project Report (EPR) has been prepared as part of the Transit Project Assessment Process (TPAP), as prescribed in Ontario Regulation (O. Reg.) 231/08 made under the *Environmental Assessment Act*. This EPR provides an assessment of potential impacts that the Project may have on the environment and outlines the mitigation measures and monitoring activities to be implemented. The TPAP is described in **Section 1.9**. The environmental and technical studies completed as part of the TPAP are appended to the EPR.

1.2 Purpose of the Transit Project

The Project forms a key part of the 2041 Regional Frequent Rapid Transit Network (FRTN)(Metrolinx 2018) that will ensure:

- Frequent 15-minute headway or better service, all day, seven days a week;

- Reliable service due to separation from traffic and the addition of signal priority measures;
- High speeds due to wider spacing of stops; and
- Efficient transfers between routes, enabling a traveller to get anywhere in the GTHA easily and reliably without looking at a schedule.

1.3 Vision for Transit in the Corridor

The 2041 RTP for the GTHA identifies the DSBRT as a priority "In Development" project in advanced stages of planning and design. The Project is also a critical component of the FRTN. It contributes to the common vision for the Region to have a sustainable transportation system that is aligned with land use and supports healthy and complete communities. The system will provide safe, convenient and reliable connections, and support a high quality of life, a prosperous and competitive economy, and a protected environment. The Project is listed as a key priority action included in:

- Strategy 1: Complete the Delivery of Current Regional Transit Projects; and
- Strategy 2: Connect More of the Region with Frequent Rapid Transit through the FRTN to achieve the common vision for the region presented by the 2041 RTP.

1.4 Study Area

The Study Area includes the DSBRT corridor that encompasses along Ellesmere Road, from east of McCowan Road to Kingston Road in the City of Toronto, and along Highway 2 in Durham Region from Altona Road in the City of Pickering to Simcoe Street in the City of Oshawa. **FIGURE 1.1** illustrates the DSBRT corridor.

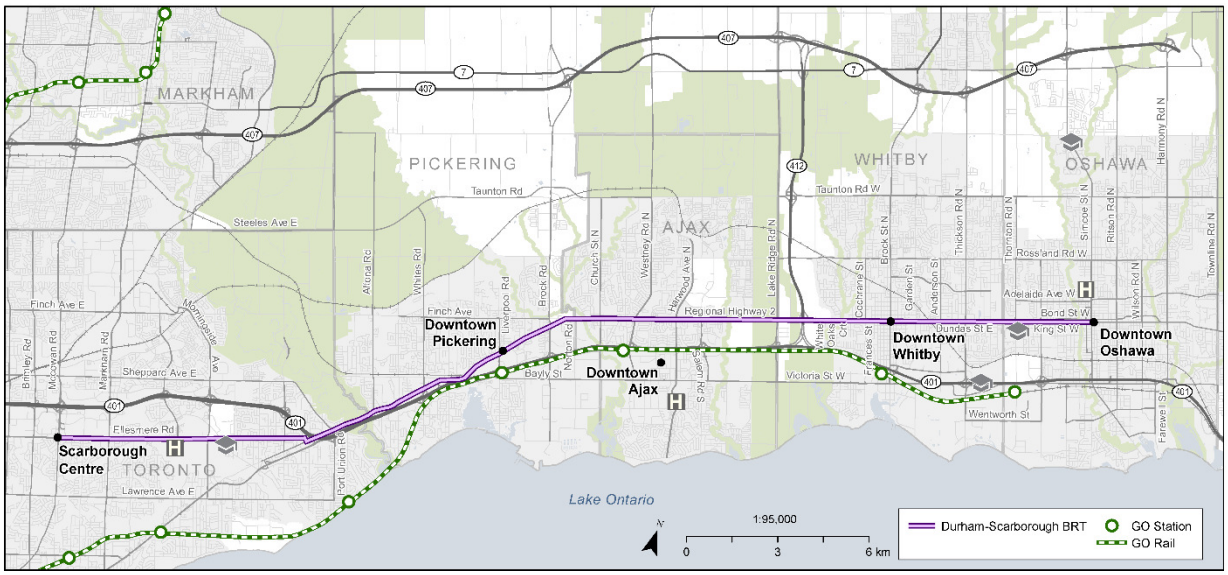


FIGURE 1.1. DURHAM-SCARBOROUGH BUS RAPID TRANSIT CORRIDOR

To consider environmental features that could impact, or be impacted by, the DSBRT Project, the Study Area was extended from the road rights-of-way for the technical and environmental studies. The boundaries of the environmental and technical studies are described below.

- **Traffic and Transportation:** The (Traffic) Study Area includes the DSBRT corridor and its immediately surrounding external road networks from Grangeway Avenue (west limit) to Simcoe Street in Downtown Oshawa (east limit).
- **Natural Environment:** The (Natural Heritage) Study Area for the detailed natural heritage field investigations focused on the footprint (including the road rights-of-way to the limits of construction as shown in the **Appendix A**) within and directly adjacent to the road right-of-way (ROW) and up to approximately 120 metres on either side of the centreline depending on the natural heritage requirements for each discipline.
- **Tree Inventory:** The (Arborist) Study Area includes the road rights-of-way and adjacent zones of influence in areas that have the potential to be impacted by the proposed development. Generally, this included up to 6 m beyond the road rights-of-way and adjacent zones of influence with the exception of lands within the City of Toronto Ravine and Natural Feature Protection (RNFP) boundary, which requires trees to be surveyed within 12 m of the zones of influence.
- **Groundwater:** The (Groundwater) Study Area is 100 metres on either side of the corridor from the centreline.
- **Cultural Heritage:** The (Cultural Heritage) Study Area is generally described as the existing road ROW and all properties adjacent to it along the DSBRT corridor as illustrated in the Preliminary Design (see **Appendix A**).
- **Archaeology:** The (Archaeology) Study Area is generally described as the existing road right-of-way of Ellesmere Road, Kingston Road, Dundas Street and Bond Street, including some intersections.
- **Socio Economic Environment and Land Use:** The (Socio-Economic Environment and Land Use) Study Area is 800 metres on either side of the corridor from the centreline.
- **Air Quality:** The (Air Quality) Study Area is 300 metres on either side of the corridor from the centreline.
- **Noise and Vibration:** The (Noise and Vibration) Study Area is 300 metres on either side of the corridor from the centreline.

1.5 Planning Context

1.5.1 Provincial

1.5.1.1 Metrolinx 2041 Regional Transportation Plan (2018)

The 2041 RTP for the GTHA (Metrolinx 2008) is a blueprint for creating an integrated, multimodal regional transportation system that will serve the needs of residents, businesses and institutions. The 2041 RTP outlines how governments and transit agencies will work together to continue building an integrated transportation system that supports a high quality of life, a prosperous and competitive economy, and a protected environment.

The 2041 RTP adopts the following Goals:

- Strong connections – Connecting people to the places that make their lives better, such as homes, jobs, community services, parks and open spaces, recreation, and cultural activities.
- Complete travel experiences – Designing an easy, safe, accessible, affordable and comfortable door-to-door travel experience that meets the diverse needs of travellers.
- Sustainable and healthy communities – Investing in transportation for today and for future generations by supporting land use intensification, climate resiliency and a low-carbon footprint, while leveraging innovation.

Central to the Goals and Objectives of the 2041 RTP is the creation of a 'people-centered' transportation system – one that improves people's lives by giving travellers attractive choices. As one of the key rapid transit projects, the DSBRT will complement the existing network, and continue the momentum of North America's largest rapid transit expansion program.

1.5.1.2 Provincial Policy Statement (2020)

The Provincial Policy Statement (PPS) is issued under Section 3 of the Planning Act and provides provincial direction for land use planning and development decisions in Ontario that concern matters of provincial interest. The PPS is a consolidated statement that works together with provincial land use plans to provide a policy direction to support the long-term vision of creating strong and complete communities, sustained economic prosperity, and a clean and healthy environment. In May 2020, the Ontario government released the amended PPS, which replaces the 2014 iteration.

The PPS framework guides the Project as it relates to efficient land use patterns, infrastructure and transportation systems, long-term economic prosperity, and natural heritage. Specifically, these policies support:

- Promoting efficient development and land use patterns which sustain the financial well-being of the Province and municipalities over the long-term (Provincial Policy Statement, 2020, Section 1.1.1.A);
- Promoting the integration of land use planning, growth management, transit-supportive development, intensification, and infrastructure planning to achieve cost effective development patterns, optimization of transit investments, and standards to minimize land consumption and servicing costs (Provincial Policy Statement, 2020, Section 1.1.1.E);
- Ensuring that necessary infrastructure and public service facilities are or will be available to meet current and projected needs (Provincial Policy Statement, 2020, Section 1.1.1.G);
- Requiring transit-supportive development and prioritizing intensification, including potential air rights development, in proximity to transit, including corridors and stations (Provincial Policy Statement, 2020, Section 1.4.3.E);
- Transportation systems should be provided which are safe, energy efficient, facilitate the movement of people and goods, and are appropriate to address projected needs (Provincial Policy Statement, 2020, Section 1.6.7.1);
- Efficient use should be made of existing and planned infrastructure, including through the use of transportation demand management strategies, where feasible. (Provincial Policy Statement, 2020, Section 1.6.7.2);
- As part of a multimodal transportation system, connectivity within and among transportation systems and modes should be maintained and, where possible, improved including connections which cross jurisdictional boundaries (Provincial Policy Statement, 2020, Section 1.6.7.3);
- A land use pattern, density and mix of uses should be promoted that minimize the length and number of vehicle trips and support current and future use of transit and active transportation (Provincial Policy Statement, 2020, Section 1.6.7.4);
- Planning authorities shall plan for and protect corridors and rights-of-way for infrastructure, including transportation, transit and electricity generation facilities and transmission systems to meet current and projected needs (Provincial Policy Statement, 2020, Section 1.6.8.1);
- New development proposed on adjacent lands to existing or planned corridors and transportation facilities should be compatible with and supportive of the long-term purposes of the corridor and should be designed to avoid, mitigate or minimize negative impacts on and from the corridor and transportation facilities (Provincial Policy Statement, 2020, Section 1.6.8.3);

- The co-location of linear infrastructure should be promoted, where appropriate (Provincial Policy Statement, 2020, Section 1.6.8.5);
- The promotion of economic development opportunities and community investment readiness (Provincial Policy Statement, 2020, Section 1.7.1.A);
- An efficient, cost-effective, and reliable multimodal transportation system that is integrated with adjacent systems and jurisdictions (Provincial Policy Statement, 2020, Section 1.7.1.G); and,
- Development and site alteration shall not be permitted on adjacent lands to the natural heritage features and areas, identified in policies 2.1.4, 2.1.5, and 2.1.6, unless the ecological function of the adjacent lands has been evaluated and it has been demonstrated that there will be no negative impacts on the natural features or on their ecological functions.

1.5.1.3 A Place to Grow: Growth Plan for the Greater Golden Horseshoe (2020)

A Place to Grow: Growth Plan for the Greater Golden Horseshoe (Growth Plan)(Ministry of Municipal Affairs and Housing 2020) is a long-term growth management framework for the region to ensure a strategic, comprehensive, and integrated approach to guide population and employment growth to 2041. The Growth Plan works towards building economically thriving and affordable communities through delineating strategic growth areas and aligning infrastructure investments and networks in order to serve those growth areas effectively and to promote the efficient use of land.

Growth Plan, 2020 Section 2.2.1 is focused on managing growth and outlines the vision for land-use planning and growth management for the Greater Golden Horseshoe. A primary objective of supporting future growth is to provide access to a range of transportation options that are easily accessible to support the realization of complete communities (Growth Plan, 2020, Section 2.2.1.4). The growth Plan notes that Urban Growth Centres (UGCs) will be planned:

- As focal areas for investment in regional public service facilities, as well as commercial recreational, cultural and entertainment uses;
- To accommodate and support the transit network at the regional scale and provide connection points for inter- and intra-regional transit;
- To serve as high-density major employment centres that will attract provincially, nationally, or internationally significant employment uses; and
- To accommodate significant population and employment growth.

Each UGC is assigned a minimum density target to achieve by 2031. To support these growth and density targets, Priority Transit Corridors and Major Transit Station Areas are planned.

The Growth Plan ensures a coordinated approach for future transportation investments and aims to achieve connectivity between transportation corridors and nodes regionally to encourage reduced reliance on private vehicles and minimize the associated greenhouse gas emissions to the greatest extent possible (Growth Plan, 2020, Section 3.2.2). Additionally, Section 3.2.3 of the Growth Plan states that public transit is the first priority for infrastructure investment and planning for the region in order to improve connectivity to UGCs, Major Transit Station Areas, and other major transit nodes. UGCs identified within the Study Area are Downtown Oshawa, Downtown Pickering and Scarborough Centre. Scarborough Centre is at the eastern end of the Scarborough Rapid Transit (SRT) line and at the hub of local and interregional surface transit lines.

When completed, the Project will connect two UGCs as identified in Schedule 2 of the Growth Plan. The Study Area also encompasses planned Strategic Growth Areas such as Regional Centres and Corridors, which are areas that are intended to accommodate higher densities along the route. Given that the Project is considered higher order transit, there is a potential for the Study Area to become a Priority Transit Corridor through an amendment to the Growth Plan, that would include the identification of Major Transit Station Areas (MTSAs) in the Study Area. A minimum density target of 160 residents and jobs combined per hectare is in place that must be achieved in MTSAs served by light rail transit or bus rapid transit.

1.5.1.4 Greenbelt Plan (2017)

The Greenbelt Plan (Ministry of Municipal Affairs and Housing 2017) was introduced in 2005 to support the Growth Plan and PPS to preserve natural environments and scenic landscapes that are considered ecologically and hydrologically significant. These areas include the Oak Ridges Moraine, the Niagara Escarpment, as well as some of the most productive farmland in Canada, referred to as the Agricultural System. The Greenbelt Plan identifies areas where growth and urbanization are not permitted in order to protect and preserve these ecologically and hydrologically significant areas. In addition, the Greenbelt Plan supports the efficient use of land and limits unmanaged growth to help deliver compact, complete communities that are transit supportive.

The Project will run adjacent to lands within the Protected Countryside and Natural Heritage System as identified in the Greenbelt Plan. According to Greenbelt Plan Section 3.2.2, Towns and Villages are not permitted to expand into the Natural Heritage System. Proposed infrastructure projects within the Protected Countryside are only permitted when appropriate infrastructure connections are provided to UGCs that anticipate significant growth and economic development (Greenbelt Plan, 2017, Section 4.2.1.1.b). The construction, expansion or extension of infrastructure shall minimize adverse impacts on the Greenbelt and shall avoid key natural heritage or hydrological features (Greenbelt Plan, 2017, Section 4.2.1.2.a-b).

The Province is currently undergoing consultation on growing the size of the Greenbelt (see ERO 019-3136 on the Environmental Registry), which may result in the addition,

expansion and further protection of Urban River Valleys. It is recommended that during detail design, the outcome of this consultation is reviewed for any changes.

1.5.2 City of Toronto

1.5.2.1 City of Toronto Official Plan (2019)

The City of Toronto Official Plan is in place to guide the growth and development of the City to the year 2031. The latest Official Plan consolidation that includes all currently approved and in effect amendments was released in February 2019, which replaced the previous iteration of the consolidated Official Plan in June 2015.

As part of the plan's growth strategy, the land use designations that are anticipated to absorb the majority of future population growth are: Mixed-use Areas, Employment Areas, Regeneration Areas, and Institutional Areas. Many properties that comprise the Centres and Avenues are designated as Mixed-Use Areas, which permit a variety of commercial, residential, institutional and open space uses. The Study Area encompasses Scarborough Centre, which is situated at the end of the Scarborough Rapid Transit Line. The vision and anticipated development for Scarborough Centre is covered in *Scarborough Centre Secondary Plan (2018)* and discussed in detail in **Section 3.6.4**.

1.5.2.2 City of Toronto Transit Network Plan (2016)

In March 2016, City Council adopted the report Developing Toronto's Transit Network Plan: Phase 1, which presented a comprehensive 2031 transit network plan based on the City's Rapid Transit Evaluation Framework's (RTEF) three city-building objectives of serving people, strengthening places, and supporting prosperity.

The 2031 Transit Network Plan includes the following key projects currently at various stages of planning and design:

- Scarborough Subway Extension;
- Relief Line South (now part of the Ontario Line);
- Waterfront Transit;
- Eglinton West and East LRT Extensions; and
- SmartTrack.

1.5.3 Durham Region

1.5.3.1 Durham Region Regional Official Plan (2020)

The Durham Region Regional Official Plan (ROP) builds on the direction of the PPS and Growth Plan to implement a coordinated approach to directing growth and development in Durham Region. A consolidated version was released in 2020.

The ROP imposes a regional structure that all local area municipalities must conform to. The regional structure delineates the urban area boundary, identifies regional centres and corridors and directs growth to these areas, as well as living areas, employment areas, and includes provisions regarding the greenlands system and the transportation system. The lower tier municipalities under Durham Region within the Project corridor are listed as below:

- City of Pickering;
- Town of Ajax;
- Town of Whitby; and
- City of Oshawa.

The goals of the ROP are centered on managing growth to support economic development and aligning infrastructure investments, accordingly, providing housing options in Urban Areas that accommodate the social and economic needs of current and future residents, creating complete and sustainable communities, and managing resources in the region responsibly. One of the primary directions that underpins realizing these goals is to improve transportation linkages within the Region, as well as connections to adjacent areas.

1.5.3.2 Durham Region Transportation Master Plan (2017)

The Durham Region Transportation Master Plan (the TMP) provides strategic planning policy direction to guide the development of programs and infrastructure required to manage expected long-term transportation demands in the Region. The primary directions of the TMP are to:

- Ensure that the transportation network supports compact, mixed-use land patterns; and,
- Strengthen the role of public transit in meeting travel demand, making walking and cycling more practical to promote sustainable travel choices, while improving goods movement and making strategic investments in the transportation system.

These strategic directions support the following goals that are relevant to the Project:

- Ensure direct, safe and accessible connectivity between existing transportation networks and new neighborhoods (Durham Region Transportation Master Plan, 2017, Section 3.4.1);
- Promote Transit Oriented Development to create clusters of compact, high-density development in close proximity to current and planned transit infrastructure to support achieving intensification targets, and to drive transit ridership to capitalize on infrastructure investments (Durham Region Transportation Master Plan, 2017, Section 3.4.3);

- Deliver a convenient and reliable transit system through providing service options for residents in urbanized areas within walking distance to residences or workplaces, enhance connections between rural areas and nearby population centres, and introduce transit to developing areas as early as possible through service agreements (Durham Region Transportation Master Plan, 2017, Section 4.4.1);
- Utilize Higher Order Transit Corridors such as Highway 2 and Simcoe Street to provide connectivity to major destinations like Regional Centres, Transit Hubs, and UGCs (Durham Region Transportation Master Plan, 2017, Section 4.4.6); and,
- Ensure new development will support sustainable travel through development regulations and approvals (Durham Region Transportation Master Plan, 2017, Section 7.4.10).

1.5.3.3 City of Pickering Official Plan (2018)

The City of Pickering Official Plan builds on the Durham Region Official Plan policy framework to set out the land use policy direction to guide the long-term growth and development of the City to the year 2031. The Official Plan identified following guiding principles in planning Pickering's future growth and development:

- To meet people's needs while ensuring environmentally appropriate actions;
- To become more self-sufficient while seeking broader connections;
- To support individual rights while upholding community goals;
- To welcome diversity while respecting local context; and
- To manage change while recognizing uncertainty.

Detailed discussion of land use policies for the Study Area within the Project is provided in **Section 3.6.4**.

1.5.3.4 Town of Ajax Official Plan (2016)

The Town of Ajax Official Plan conforms to the regional policy direction to manage physical, social and economic development and change within the Town over a 25-year period. The Official Plan establishes principles, goals and policies governing long-term growth in the Town.

1.5.3.5 Town of Whitby Official Plan (2018)

The most recent consolidated Town of Whitby Official Plan was approved in June 2018. The majority of the land situated along the corridor within the Town of Whitby is designated Residential and Major Open Space. The goal in residential areas is to create complete communities that are safe and attractive through developing and redeveloping

neighborhoods with a diversity of housing options and ancillary uses (Town of Whitby Official Plan, 2018, Section 4.4.1.1). Along Dundas Street East, there is land that is designated Mixed-use and Major Commercial, generally from the rail line west of Anderson Street to Garrard Road. The land use policies are discussed in detail in **Section 3.6.4**.

The corridor also encompasses Downtown Whitby, which is another intensification area that is primarily designated Commercial, and surrounded largely by medium to high-density residential uses, as well as institutional uses. A summary of the goals and objectives for this area is covered in *Downtown Whitby Secondary Plan (2017)*, which is an overview of the Downtown Whitby Secondary Plan.

1.5.3.6 City of Oshawa Official Plan (2019)

The City of Oshawa Official Plan is a policy framework that is in place to the guide the land use planning system to direct the physical development and redevelopment pattern of the City. The Official Plan proposes an overall development pattern for the City and provides guidelines for the preparation of Part II Plans, plans of subdivision, zoning by-laws, site plans and other measures which implement the Official Plan.

A UGC established through the Growth Plan for the Greater Golden Horseshoe is located on the corridor. The UGC is a Central Area that encompasses a Planned Commercial Centre, as well as a Planned Commercial Strip along King Street. Central Areas are intended to become the focal points of activity and development, interest and identity for residents.

The UGC is envisioned to serve as a major employment centre and is a primary focus area for major office uses and will accommodate a built form that is compact and affords residents the ability to access commercial, retail, institutional, recreational, cultural uses, and entertainment. Higher density residential uses, public services and the planned Central Oshawa Transportation Hub are intended to be located in the UGC.

The land use policies applicable to the DSBRT corridor are discussed in detail in **Section 3.6.4**.

1.5.4 Relevant Studies

1.5.4.1 Eglinton East Light Rail Transit TPAP

The Eglinton East Light Rail Transit (EELRT) project is a proposed eastern extension of Line 5 (Eglinton Crosstown LRT), which is currently under construction and owned by Metrolinx. In April 2019, City Council approved an alignment for the EELRT that would extend the Eglinton Crosstown LRT by 15 km from Kennedy Station through the University of Toronto Scarborough (UTSC) to Malvern with up to 21 stops and three connections to GO Transit.

1.5.4.2 Scarborough Subway Extension TPAP

The existing Scarborough Rapid Transit (Line 3) opened for service in 1985, providing rapid transit service in a fully exclusive right-of-way (ROW) between Kennedy Station – the terminus of Line 2 – and McCowan Road, north of Ellesmere Road.

The City of Toronto and TTC's 2017 Scarborough Subway Extension (SSE) Project was proposed as an extension of the Line 2. It included a proposed 6.2 km extension of Line 2 from Kennedy Station to the station at Scarborough Centre (one-stop only), via Eglinton Avenue, Danforth Road and McCowan Road. The study area for the 2017 SSE EPR was roughly bounded on the south by Eglinton Avenue East, Sheppard Avenue East on the north, on the west by the existing Line 3 and Brimley Road once north of Ellesmere Road, and on the east by Markham Road / Progress Avenue.

In August 2017, the SSE EPR was completed, and the Project was granted a Notice to Proceed, with no conditions, by the Minister of the Environment and Climate Change in October 2017.

In August 2020, an Addendum to the SSE EPR was prepared due to an amendment to the SSE consisting of an extension of the proposed alignment, two new stations and a revised station location at Scarborough Centre.

1.5.4.3 Lakeshore East GO Expansion TPAP

The Project involves the addition of a third railway track and associated bridge modifications and grade separations on the Lakeshore East Rail Corridor broadly between Guildwood GO Station and Pickering GO Station. This is currently a two-track section of the rail corridor and presents an operational challenge to increasing service and maintaining service reliability. Furthermore, the addition of a third railway track will support future service expansions as part of the transformational Regional Express Rail (RER) program.

1.6 Environmental Project Report Organization

This EPR documents the existing environmental conditions within the Study Area, the potential environmental effects of the Project through construction and operation, and recommended mitigation and monitoring measures. Consultation and future commitments are also documented. **Table 1.1** below summarizes the information that is required to be included in the EPR, as specified in pages 33-34 of the *Guide to Ontario's Transit Project Assessment Process* (MECP, 2014), and the associated section where the information is located.

TABLE 1.1. SUMMARY OF EPR REQUIREMENTS

EPR Requirement	Section of EPR
Statement of the purpose of the transit project and a summary of any background information relating to the Project.	Section 1.2
Final description of the transit project including a description of the preferred design method.	Chapter 2
Description of any other design methods that were considered once the project commenced the transit project assessment process.	Section 2.1
Map showing the site of the transit project	Section 1.4
Description of the local environmental conditions at the site of the transit project.	Chapter 3
Description of all studies carried out, including a summary of all data collected or reviewed and a summary of all results and conclusions.	Chapters 3 and 4
The assessments, evaluation and criteria for any impacts of the preferred design method and any other design methods that were considered once the TPAP commenced.	Chapter 4
Description of any proposed measures for mitigating any negative impacts the transit project might have on the environment.	Chapter 4
If mitigation measures are proposed, a description of the proposal for monitoring or verifying the effectiveness of the mitigation measures.	Chapter 8
Description of any municipal, provincial, federal, or other approvals or permits that may be required.	Chapter 7
Record of consultation.	Chapter 6 and Appendix K

1.7 Project Proponents

The DSBRT Project proponents are Metrolinx and Durham Region. A consultant team led by IBI Group and Parsons was selected to guide the study through the environmental assessment (EA) process. The team comprises technical specialists from a range of disciplines including:

- IBI Group – project management, civil engineering, streetscaping, architecture, traffic analysis, intelligent transportation systems (ITS), consultation with agencies, Indigenous Nations, stakeholders, and the public.
- Parsons – project management, civil engineering, structural design, traffic analysis, contamination assessment.
- LGL Limited – natural environment, tree inventory.
- Arcadis – noise and vibration, air quality.
- ASI – cultural heritage, archaeology.
- Golder Associates – geotechnical engineering.

1.8 Study Process

This study was conducted following the TPAP under Ontario Regulation 231/08: Transit Projects and Metrolinx Undertakings. This regulation allows proponents of all public transit projects to proceed with the TPAP rather than as traditionally done through Part II of the *Environmental Assessment Act*. The TPAP is a fully prescribed process in which the proponent must follow specified procedures and timeframes. The Minister of the Environment, Conservation and Parks (MECP) has 35 days to act. If the Minister does not act within the 35-day period, the transit project may proceed as planned in the Environmental Project Report. This integrated TPAP approach is illustrated in **FIGURE 1.2**.

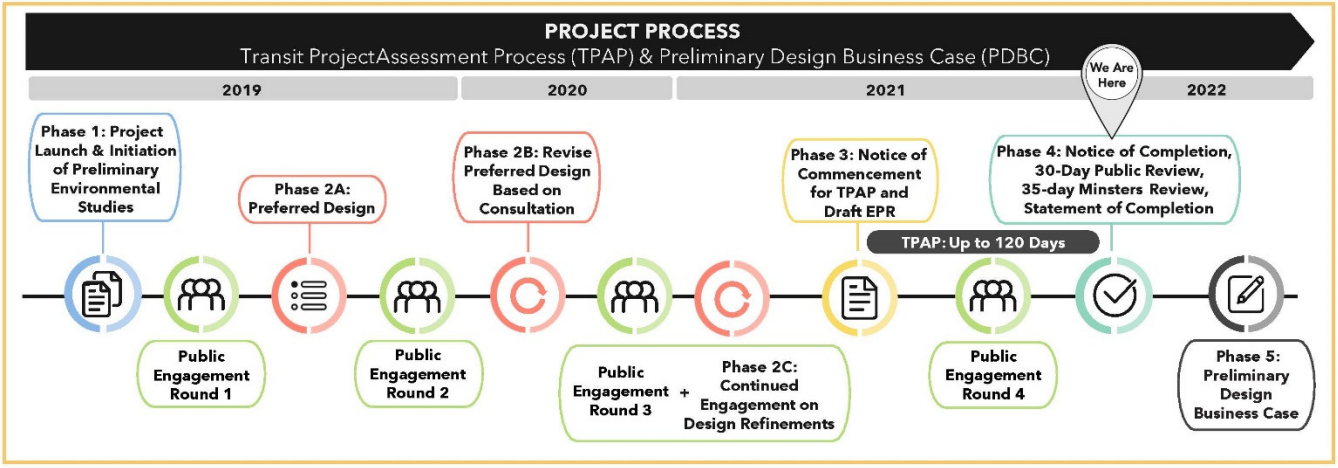


FIGURE 1.2. STUDY PROCESS

The study is structured into two stages: Pre-Planning and TPAP. A variety of Pre-Planning activities were undertaken prior to the issuance of the Notice of Commencement for the TPAP, including:

- Completion of technical studies, including transportation, natural heritage, cultural heritage, archaeology, Phase I ESA, air quality, and noise and vibration (as discussed in **Chapter 3** and **Chapter 4** of the EPR);
- Development of alternative design;
- Development of the recommended preliminary engineering design;
- Assessment of impacts and development of mitigation measures; and
- Preparation and implementation of a consultation program.

1.9 Transit Project Assessment Process

The TPAP is a proponent-driven, self-assessment process and does not require that a transit project be approved by the Minister of the Environment, Conservation and Parks

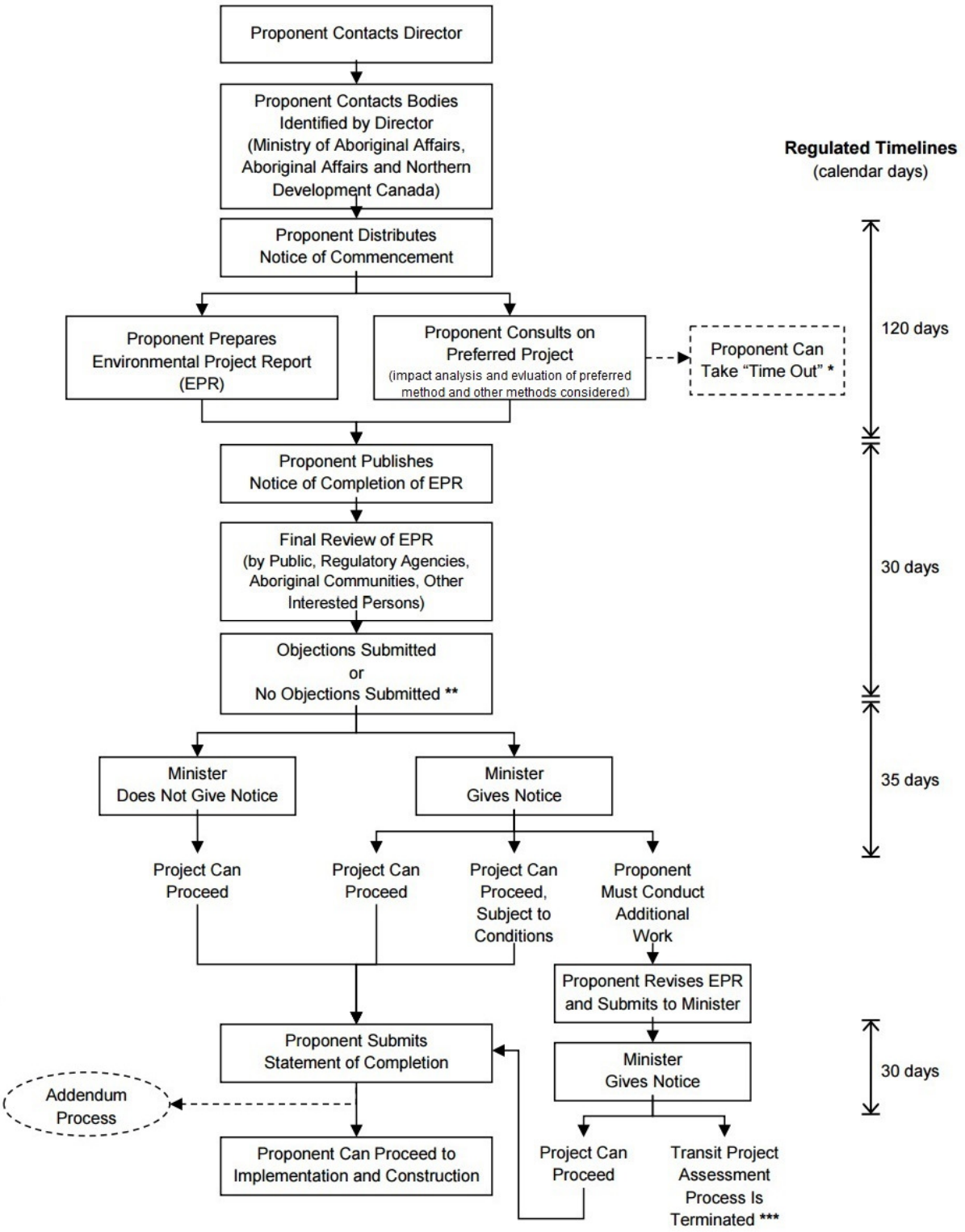
(Minister) before proceeding (MECP 2014). As per the regulation, the six-month TPAP is broken down into three distinct phases:

- The up to **120-day** consultation and Final EPR preparation period;
- The **30-day** public, stakeholder, regulatory agencies, and Indigenous Nations review period; and
- The **35-day** Minister review period.

The key steps in the TPAP are:

- Identify Indigenous Nations that may be interested in the transit project;
- Distribute Notice of Commencement;
- Consult with interested persons, including regulatory agencies and Indigenous Nations and document the process;
- Publish a Notice of Completion of the Environmental Project Report;
- Provide 30 days for the public, regulatory agencies, Indigenous Nations, and other interested persons to review the Environmental Project Report;
- Provide 35 days for Minister to act; and,
- Submit a Statement of Completion.

FIGURE 1.3 illustrates the comprehensive process as detailed by the MECP.



Source: Guide to Environmental Assessment Requirements for Transit Projects (2014)

FIGURE 1.3. TRANSIT PROJECT ASSESSMENT PROCESS

1.10 Objection Process, Minister's Review and Statement of Completion

If an interested person has concerns about a transit project, objections to the transit project can be submitted to the Environmental Assessment Branch for the Minister to consider during the 30-day review period. After the 30-day review period has ended, any objections received will not be considered, and the Minister has 35 days within which certain authority may be exercised.

Persons wishing to submit an objection for consideration by the Minister should provide the following information:

- Name, mailing address, organization or affiliation (where applicable), daytime telephone number, e-mail address (where possible);
- Contact details of the proponent including name, address and telephone number;
- Brief description of the proponent's proposed undertaking, including the location;
- Basis for why further study is required, including identification of any negative impacts concerning a matter of provincial importance that relates to the natural environment or has cultural or heritage value or interest, or a constitutionally protected aboriginal or treaty right that was not identified in the proponent's EPR; and
- Summary of how the person(s) objecting have participated in the Project's consultation process.

Whether or not there is public objection, the Minister may act within the 35-day period to issue one of the following three notices to the proponent:

- A Notice to proceed with the planned transit project as documented in its EPR;
- A Notice that requires the proponent to take further steps, which may include further study or consultation; or,
- A Notice allowing the proponent to proceed with the transit project subject to conditions.

The Minister may give notice allowing the proponent to proceed with its transit project, but can only act if there is potential for a negative impact on a matter of provincial importance that relates to the natural environment or has cultural heritage value or interest, or a constitutionally protected aboriginal or treaty right. The Minister has a regulated timeline of 35 calendar days to give notice. The proponent may then issue a Statement of Completion. The TPAP is completed when a proponent submits a Statement of Completion to the Director and the Regional Director of MECP, excluding any unforeseen circumstances that may require a change to the transit project.

1.11 Addendum Process

The regulation includes an addendum process for the proponents to make changes to a transit project after the Statement of Completion is submitted. This addendum process is intended to address the possibility that in implementing a transit project, certain modifications may have to be made that are inconsistent with the EPR.

If changes to the Project indicate that an EPR addendum is required, it must include the following information:

- A description of the proposed change;
- The reason for the proposed change;
- An assessment and evaluation of any impacts that the proposed change might have on the environment;
- A description of any proposed measure for mitigating any negative impacts that the proposed change might have on the environment; and
- A statement of whether the proponent is of the opinion that the proposed change is significant (or not), and the reasons for the opinion.

All changes that are inconsistent with the EPR require an addendum, but not all changes require a Notice of Environmental Project Report Addendum. If a proponent is of the opinion that the proposed change is not significant, the proponent must document the reasoning behind this opinion and keep a record of the addendum to the EPR with its project file/documentation.

2. Project Description

2.1 Design Criteria

2.1.1 Synthesis of Design Standards

The DSBRT will travel between Scarborough Centre and Downtown Oshawa along Ellesmere Road in Toronto, Kingston Road in Toronto, Pickering, and Ajax, continuing along Dundas Street in Whitby, and King and Bond Streets in Oshawa. The proposed corridor will require roadway modifications to accommodate the dedicated transit lanes as shown in **Appendix A1**. The DSBRT will travel at-grade following existing streets. Approximately 34 km will operate in dedicated transit lanes, and approximately 2 km will operate in mixed traffic conditions. On-street bus turnaround routes will include an additional 2 km of mixed traffic conditions.

The key elements of the preliminary design for the DSBRT are summarized below. Design criteria are included in **Appendix A3**.

2.1.1.1 Road Classification and ROW Width

The ROW width of the existing streets has been developed based on Official Plans and Road Classification Maps published by the City of Toronto and Durham Region. In general, the Official Plan ROW width is 36 m along Ellesmere Road within the City of Toronto, and 45 m along Kingston Road within the City of Pickering and Town of Ajax. The ROW width is reduced and becomes non-uniform through constrained sections along the corridor, such as Pickering Village in the Town of Ajax and downtown Whitby. The preliminary design has been developed to be context sensitive where the Official Plan ROW width is narrower.

2.1.1.2 Proposed Design Speed

The proposed design speeds have been selected in accordance with the Transportation Association of Canada (TAC) design speed approach given site context, current posted speeds, surrounding area, roadway users, and estimated operating speeds. In general, the design speed ranges from 50 km/h to 80 km/h across the corridor. Within the City of Toronto, the proposed design speed has been developed following the current posted speed in consultation with the City of Toronto.

2.1.1.3 Roadway Proposed Design Standards

The road cross section was developed following existing applicable standards for all agencies with jurisdiction within the DSBRT corridor in consultation with the City of Toronto and Durham Region. The preliminary design includes transit lane width of 3.5 m with a raised curb island either outside the BRT lanes (City of Toronto) or between the BRT lanes (Durham Region). Other design elements which vary in response to the local

context and road owners include: through lanes, turn lanes, sidewalks, multi-use path (MUP), cycle tracks, and planting/furnishing zones.

2.1.1.4 Constrained Areas (Pinch Points)

The following locations were identified as pinch point segments during the Initial Business Case (2018). Each location was reviewed and consulted on in detail throughout the preliminary design development:

- City of Toronto – Ellesmere Road from Military Trail to Meadowvale Road;
- City of Toronto – Ellesmere Road from Meadowvale Road to Kingston Road;
- Town of Ajax – Kingston Road from Elizabeth Street (Duffins Creek bridge) to Rotherglen Road;
- Town of Whitby – Dundas Street West from Frances Street to Garden Street; and
- City of Oshawa – King Street and Bond Street from Thornton Road to Simcoe Street.

Project constraints include but are not limited to:

- narrow existing ROW;
- close proximity to building faces;
- sensitive environmental features; and
- areas of cultural heritage significance.

The preliminary design considered these locations and achieved a reasonable compromise to mitigate impacts to existing infrastructure while maintaining traffic and pedestrian safety, constructability and operational feasibility. For operations and maintenance of snow clearing vehicles, a minimum of 4.6 m pavement area between curbs is required. An assumed minimum pavement width of 5.0 m is included in the preliminary design in these areas.

2.1.1.5 Utility Strategy

There are existing utilities within and across the Project that will require relocation in order to address conflicts with BRT infrastructure and accommodate roadway widening. Utilities found within the proposed BRT stop locations will generally be relocated to minimize potential disruption to transit during maintenance and repair activities. Future road disruptions for lifecycle repairs will be reduced, as part of the road reconstruction works associated with BRT, by renewing underground infrastructure along with BRT-related road construction.

Potential impacts to surface and sub-surface utilities may include service disruptions to residents and businesses during construction. Impacts due to utility relocations can

potentially include access restrictions, road closures, sidewalk closures, traffic detours and delays. Depending on the proposed location of the relocated utilities, impacts to the public can be limited and minimized dependent upon available space within the road allowance. To minimize potential disruption due to utility relocations, construction staging will be considered during detail design.

Detailed utility relocation plans will be developed during detail design. During detail design, utility conflicts will be reviewed. The solutions proposed in the design will follow all applicable standards.

2.1.1.6 MTO Design Discussion

The DSBRT passes through areas of MTO-owned infrastructure as follows:

- Highway 401 entry and exit ramp (exit 390) for Kingston Road including the bridge structure for highway overpass;
- Highway 401 exit ramp (exit 392) for Sheppard Avenue / Port Union Road;
- Highway 401 entry and exit ramp (exit 394) for Whites Road; and
- Highway 412 entry and exit ramp (exit 1) for Dundas Street including the bridge structure for highway underpass.

The preliminary design includes these areas based on discussions with MTO staff and senior executive endorsement for design exemptions.

2.1.1.7 Streetscape Proposed Design Standards

The streetscape design will be further developed following existing applicable streetscape standards for all agencies with jurisdiction within the DSBRT corridor. Proposed street trees must meet clearance requirements form underground utilities and underground municipal infrastructure. See the preliminary design criteria in **Appendix A3**.

2.1.2 Rapid Transit Stops

2.1.2.1 Design Vision

To guide the development of the BRT stop design, a design vision was developed in consultation with Metrolinx, TTC and DRT. The design vision included the following features:

- **Design Excellence**: all elements to deliver a consistent elevated level of design and function appropriate for higher-order transportation;
- **Sustainable**: resilient, easy to maintain with high quality materials;
- **Safe**: uncluttered, clear sightlines and intuitive to use;

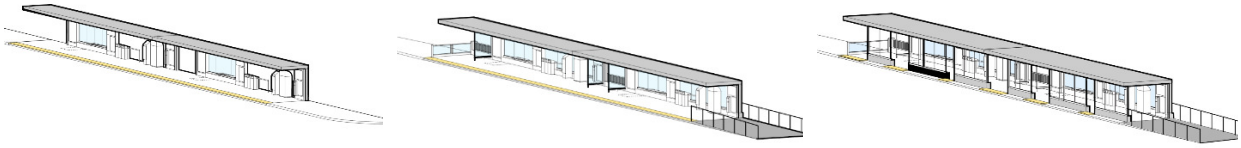
- **Accessible**: supportive of all types of active mobility and universal accessibility; and,
- **Placemaking**: an uplifting passenger experience that establishes a positive connection to the surrounding urban context.

These elements are included in the conceptual design, as described in **Appendix A2**.

2.1.2.2 Platform Layouts

In total, three platform layouts were developed for the BRT stop design as shown in **FIGURE 2.1**. There are two types of stops: curbside and centre-median BRT stops. Curbside and centre-median platforms function differently, which necessitated the development of two different designs. In addition, a pass-through version of the centre-median platform was developed at the request of DRT. The pass-through concept would only be applied in Durham Region.

The five features of the design vision were integrated into the design of the platform layout. As a result, the shelter design is modular, meaning it has the flexibility to be modified according to levels of service or number of passengers.



Curbside Platform | ***Centre-median Platform Open Canopy*** | ***Centre-median Platform Pass-through***

FIGURE 2.1. PLATFORM LAYOUTS FOR THE DSBRT

2.1.2.3 Platform Design Criteria

Design criteria were developed to form the basis of the BRT stop design. The design criteria include:

- Platforms are generally located at the far side of the intersection;
- Typical platform length of 40 m accommodates two 18 m articulated buses. Multiple bus types may serve the stop. At constrained locations, the platform may be reduced to 20 m in length;
- Preferred median platform width is 4.2 m with 3.6 m at constrained locations;
- An accessible walkway (1:20 slope) provides Accessibility for Ontarians with Disabilities Act (AODA)-compliant access to the centre-median platforms;

- At curbside locations, the platform may be reduced to 20 m long and 3.0 m wide;
- Buses are to stop at the far end of the platform. In the case of the pass-through design, fixed openings require bus driver accuracy and coordinated bus stop locations;
- Typical platform height for centre-median platforms is 356 mm above finished road surface to accommodate full-level boarding. Typical platform height for curbside platforms is 152 mm above finished road surface to match sidewalk height; and,
- The slope of the platform follows the GO Design Requirements Manual and is a maximum cross slope of 2% and a maximum longitudinal slope of 1%.

2.1.2.4 Design Approach

A number of principles informed the design approach. The principles include:

- **Legible design**: Create a hierarchy of design elements and organize the elements in a clear and rational manner. This will help make the platforms easy to navigate and seamless transitions to other modes of transportation;
- **Welcoming design**: Provide wide accesses and waiting areas with clear connections to the street and surrounding areas;
- **Sense of public ownership**: Create a high-quality and unique shelter design that provides a sense of identity and community pride. Incorporating cultural heritage features and public art into shelter elements can be considered during detail design to further increase the public's sense of ownership; and,
- **Maintenance**: Use materials that are robust and easy to maintain and wash (this is consistent with the vision of sustainability). The design also includes concealed fasteners and conduits to discourage vandalism. The platform will be free of obstacles to allow for easy snow removal. A maintenance program should be developed during detail design.

All elements of the DSBRT will be accessible. The stop design fosters a safe and secure environment by embedding principles from the Crime Prevention Through Environmental Design (CPTED) design approach.

To maintain clear sightlines and a clutter-free design, the lighting fixtures will be integrated onto the shelter canopy or roof. Lighting will also be used to emphasize the location of the vending and passenger assistance equipment, wayfinding and information signage, and the platform edge.

Cultural heritage is integral to some of the neighbourhoods in which the BRT stops will be located. Select BRT stop elements can be customized to highlight local cultural heritage features. These opportunities will be further explored in detail design, in consultation with the public, local heritage advisory committees, and municipal staff.

2.1.3 Intelligent Transportation Systems (ITS)

A preliminary Intelligent Transportation Systems (ITS) strategy for the DSBRT corridor has been developed to achieve the goals of providing safe, reliable, efficient, environmentally friendly, and attractive transit service in consultation with City of Toronto and Durham Region operations staff. Existing ITS infrastructure and user needs for the ITS strategy are reviewed to recommend desirable and optional ITS technologies for the main components including fare-purchase and payment, security features and traveler information devices. See details in **Chapter 4** and **Appendix B3**.

2.2 Preliminary Design

2.2.1 Overview of the Alignment

2.2.1.1 City of Toronto

The DSBRT will operate from Scarborough Centre to the Durham-Toronto boundary along Ellesmere Road and Kingston Road, as recommended in previous DSBRT studies and the 2041 RTP. Drawings in **Appendix A1** provide more details on the proposed design for the DSBRT infrastructure.

Starting at Grangeway Avenue, dedicated centre-median bus lanes are developed on Ellesmere Road while maintaining four lanes for general traffic (two lanes in each direction). From Grangeway Avenue to east of Morningside Avenue, the preliminary design proposes two general traffic lanes in each direction and two centre-median bus lanes for a total of six lanes. Two new traffic signals are proposed: one between 1960 and 1990 Ellesmere Road to align with the Centennial Recreation Centre access, and one at Mornelle Court.

Cycle tracks and sidewalks will be implemented on both sides of the road between Grangeway Avenue and Gander Drive / Dormington Drive. At Gander Drive, the north side cycle track is bi-directional to connect to the Meadoway Trail at Military Trail / Orton Park Road. The south side cycle track continues as uni-directional, with sidewalks on both sides to Orton Park Road. Continuing east from Orton Park Road through Morningside Avenue, a sidewalk is provided on the north side and a multi-use path on the south side to minimize impacts to the Highland Creek valley and other natural features. Note that the multi-use pathways and cycle tracks are located behind the curb and raised to the same height as the sidewalk.

To increase safety for all road users, a raised island is proposed on either side of the centre-median bus lanes or between the bus lanes. All unsignalized side streets and driveways will change to right-in/right-out access. To support changing travel patterns, signalized intersections will have a dedicated left-turn lane. U-turns and left-turns can be made from the dedicated left-turn lane during a protected left-turn signal phase, while all other traffic at the intersection has a red light. This operation supports safer traffic movements.

Between Morningside Avenue and Military Trail, buses will transition to the curb lanes maintaining four lanes for general traffic. A retaining wall is proposed along Ellesmere Ravine Park, and Morningside Park. This design will accommodate the future Eglinton East Light Rail Transit and realigned Military Trail. Buses will operate in mixed traffic and serve curbside stops at Military Trail.

From east of Military Trail to the intersection of Ellesmere Road and Kingston Road, dedicated centre-median bus lanes are developed on Ellesmere Road while maintaining two lanes for general traffic (one lane in each direction). A new signal is proposed at Muirbank Boulevard to facilitate left-turn and U-turn movements as well as pedestrian crossings.

Along Kingston Road, from the Ellesmere Road/Kingston Road intersection to Raspberry Road, dedicated centre-median bus lanes are developed while maintaining two lanes for general traffic (two lanes in each direction). The Ellesmere Road turn-around would remain as it is today. The Highway 401 Bridge has sufficient span to accommodate the preliminary design and does not need to be modified. The Project does not propose any changes to the structure over the Rouge River and the DSBRT will operate in mixed traffic from Raspberry Road to Altona Road.

2.2.1.2 Durham Region: City of Pickering

The DSBRT in Durham Region continues east from the Durham/Toronto boundary along Kingston Road in Pickering and Ajax, Dundas Street in Whitby, and King and Bond Streets in Oshawa, as recommended in previous DSBRT studies and the 2041 RTP. Drawings in **Appendix A1** provide more details on the proposed design for the DSBRT infrastructure.

Starting at the Durham/Toronto boundary, the first stop is at Altona Road with curbside platforms to provide better connections with local transit routes. Dedicated bus lanes are developed while maintaining four lanes for general traffic (two lanes in each direction). The eastbound bus lane is developed in the centre of the road between Altona Road and Rougemount Drive. The westbound bus lane transitions from centre-median to curbside between Rougemount Drive and Rosebank Road.

To increase safety for all road users, a raised island is proposed between the centre-median bus lanes. All unsignalized side streets and driveways will change to right-in/right-out access. To support changing travel patterns, signalized intersections will have a dedicated left-turn lane. U-turns and left-turns can be made from the dedicated left-turn lane during a protected left-turn signal phase, while all other traffic at the intersection has a red light. This operation supports safer traffic movements.

Between Fairport Road and Dixie Road, Kingston Road travels under CN Rail. A new structure is proposed, north of the existing bridge. Eastbound lanes will pass under CN Rail through the existing structure. Westbound lanes will pass under the CN Rail through the new structure.

From Rosebank Road to Notion Road, the preliminary design proposes two general traffic lanes in each direction and two centre-median bus lanes for a total of six lanes. Cycle tracks and sidewalks will be implemented on both sides of the road. Note that cycle tracks are located behind the curb and raised to the same height as the sidewalk.

2.2.1.3 Durham Region: Town of Ajax

In Ajax, starting just west of Elizabeth Street, the preliminary design proposes a wider crossing structure for Kingston Road over Duffins Creek. Throughout the design, existing bridges and culverts are indicated with a solid brown line and proposed bridges and culvert extensions are indicated with a dashed orange line.

From Elizabeth Street to Rotherglen Road, the proposed design includes one westbound general traffic lane, two eastbound general traffic lanes, and two centre-median bus lanes. The road will be widened from four lanes to five lanes. Traffic analysis was conducted to confirm the need for two eastbound lanes to meet future traffic demand. This proposed configuration will limit impacts to the historic Pickering Village. The design includes new accessible sidewalks on both sides of the street through Pickering Village.

To increase safety for all road users, a raised island is proposed between the centre-median bus lanes. All unsignalized side streets and driveways will change to right-in/right-out access. To support changing travel patterns, signalized intersections will have a dedicated left-turn lane. U-turns and left-turns can be made from the dedicated left-turn lane during a protected left-turn signal phase, while all other traffic at the intersection has a red light. This operation supports safer traffic movements.

Between Rotherglen Road and Westney Road, the right-of-way is wider. A cycle track is proposed on the north side of the street and a multi-use path on the south side. Note that cycle tracks and multi-use paths are located behind the curb and raised to the same height as the sidewalk.

From Westney Road to Lake Ridge Road, the preliminary design proposes two general traffic lanes in each direction and two centre-median bus lanes for a total of six lanes. Cycle tracks and sidewalks will be implemented on both sides of the road.

2.2.1.4 Durham Region: Town of Whitby

In Whitby, from Lake Ridge Road to Raglan Street, the preliminary design proposes two general traffic lanes in each direction and two centre-median bus lanes for a total of six lanes. The bus lanes can be added to the structure over Highway 412 through minor reconfiguration. From Raglan Street to Cochrane Street / Annes Street, the preliminary design proposes one westbound general traffic lane, two centre-median bus lanes, and two eastbound general traffic lanes for a total of five lanes. From Cochrane Street / Annes Street to Byron Street, the preliminary design proposes one general traffic lane in each direction and two centre-median bus lanes for a total of four lanes.

From Byron Street to Brock Street, the preliminary design proposes one eastbound dedicated transit lane and one eastbound general traffic lane through the Dundas Street and Brock Street intersection. Similar to the existing intersection operation, westbound transit and traffic will operate in one through lane with a dedicated westbound right turn lane at Brock Street. All left turns and right turns will be restricted at this intersection except the westbound right turn. Note that left-turns are restricted in the existing condition.

East of Brock Street, from Perry Street to Garden Street, the preliminary design proposes one general traffic lane in each direction and two centre-median bus lanes for a total of four lanes. From Garden Street to the Whitby-Oshawa boundary, the preliminary design proposes two general traffic lanes in each direction and two centre-median bus lanes for a total of six lanes.

To increase safety for all road users, a raised island is proposed between the centre-median bus lanes. All unsignalized side streets and driveways will change to right-in/right-out access. To support changing travel patterns, signalized intersections will have a dedicated left-turn lane. U-turns and left-turns can be made from the dedicated left-turn lane during a protected left-turn signal phase, while all other traffic at the intersection has a red light. This operation supports safer traffic movements.

A multi-use path is proposed on both sides of the road from Lake Ridge Road to McQuay Boulevard. East of McQuay Boulevard, sidewalks will be provided on both sides of Dundas Street to Garden Street.

East of Garden Street, Dundas Street travels under CP Rail. A new structure is proposed to accommodate the dedicated bus lanes on Dundas Street, plus a multi-use path on the north side and sidewalk on the south side.

2.2.1.5 Durham Region: City of Oshawa

From the Oshawa-Whitby boundary to Thornton Road along King Street, the preliminary design proposes two general traffic lanes in each direction and two centre-median bus lanes for a total of six lanes.

To increase safety for all road users, a raised island is proposed between the centre-median bus lanes from the Whitby/Oshawa boundary to Waverly Street. All unsignalized side streets and driveways on this section of King Street West will change to right-in/right-out access. To support changing travel patterns, signalized intersections will have a dedicated left-turn lane. U-turns and left-turns can be made from the dedicated left-turn lane during a protected left-turn signal phase, while all other traffic at the intersection has a red light. This operation supports safer traffic movements.

At Waverly Street, a new traffic signal is proposed to maintain access to Waverly Street and help buses move from the centre-median bus lanes to the curb lanes. East of Waverly Street, buses will operate in the curb lane on the one-way streets of King and Bond. Buses will stop at curbside platforms.

Along King Street and Bond Street, the preliminary design proposes two general traffic lanes and one curbside bus lane for a total of three lanes. Dedicated right-turn and left-turn lanes are provided at key intersections to keep traffic and transit moving. The preliminary design includes continuous sidewalks throughout Downtown Oshawa.

The King Street and Bond Street bridges over Oshawa Creek are proposed to be replaced to accommodate the bus lanes and provide new accessible sidewalks.

2.2.2 Typical Segments

The DSBRT will transform the majority of the road into a six-lane cross-section with four lanes for general traffic (two lanes in each direction) and two centre-median lanes for transit only (one lane in each direction).

In the City of Toronto, a raised curb island will be constructed outside of the two bus lanes, between the bus lane and the general traffic lane. The preliminary design has been developed to be context sensitive where the Official Plan ROW width is narrower.

In Durham Region, a raised curb island will be constructed between the two bus lanes. The preliminary design is shown in **Appendix A1**.

2.2.3 Constrained Areas (Pinch Points)

The five constrained sections, or 'pinch points', identified in Section 2.1.1.4 and the two turnarounds at either end of the DSBRT route are described next.

2.2.3.1 City of Toronto: West End Terminus

The dedicated transit lanes will end at Grangeway Avenue. The DSBRT will travel along Grangeway Avenue, north of Ellesmere Road, to connect to the proposed new Scarborough Centre bus terminal as part of the Scarborough Subway Extension (SSE). Further details on the design of West End Terminus are described in Scarborough Subway Extension Updated Environmental Project Report – 2020 Addendum (August 2020). The new bus terminal is not included in the DSBRT preliminary design. During detail design, DSBRT will consider and integrate with the design of the future SSE Scarborough Centre bus terminal and transit operations on Grangeway Avenue.

2.2.3.2 City of Toronto: Ellesmere Road from Military Trail to Meadowvale Road

This is a stable residential area with single-family homes having direct frontage on Ellesmere Road. From Military Trail to Meadowvale Road, the design proposed to convert the existing four lane roadway to develop two dedicated centre-median bus lanes, while maintaining two lanes for general traffic. As this is one of the constrained areas, the width of bus platforms is modified to 3.6 m wide and 20 m long, which can accommodate one articulated bus. Commitments to future work on this section of the project are described in **Chapter 8**.

2.2.3.3 City of Toronto: Ellesmere Road from Meadowvale Road to Kingston Road

This is a stable residential area with single-family homes having direct frontage on Ellesmere Road. East of Meadowvale Road, the preliminary design proposes to maintain one lane per direction for general traffic (one lane in each direction) to provide one centre-running transit lane in each direction to Kingston Road. A new traffic signal is proposed at Muirbank Avenue to provide additional left-turn/U-turn access and a pedestrian crossing. Commitments to future work on this section of the project are described in **Chapter 8**.

2.2.3.4 Town of Ajax: Kingston Road from Elizabeth Street (Duffins Creek bridge) to Rotherglen Road

Pickering Village is a historic downtown area, and the right-of-way does not allow for widening without significant disturbance to the existing building and parcel fabric. As there is currently no on-street parking along this segment, there is also a limited opportunity to convert existing road space to transit lanes.

From the Picking-Ajax municipal boundary, the proposed design transitions to a 5-lane median BRT configuration along Kingston Road through Pickering Village. This segment features two centre-running BRT lanes along with one westbound and two eastbound traffic lanes. A road diet is prescribed due to the constrained public right-of-way and in order to minimize significant disturbance to the existing building and parcel fabric in the historic downtown area. It should be noted that the detail design phase of the project will include consultation and consideration of the design of infrastructure features such as the stop shelters, gateway features and the Duffin's Creek bridge to integrate and reflect the historical character of Pickering Village.

Approaching Randall Drive, the alignment shifts slightly to the north to avoid impacts to St. George's Church Cemetery on the south side of Kingston Road. The existing sidewalk on the south side at this location is proposed to tie into existing. On the north side of Kingston Road at Linton Avenue, the existing toe walls are proposed to be realigned to the north as a result of the roading widening.

The south leg of the Church Street intersection is proposed to be realigned in order to straighten the lane approaches across the intersection and enhance the sight distance. At the Church Street intersection, the median BRT stop platforms are proposed to be narrowed to 3.6m in width due to the constrained right-of-way. The westbound traffic lane on the west leg of the intersection includes a 5 m total pavement width between the westbound stop platform wall and the proposed curb. This will allow snowplows to manoeuvre through this single lane of roadway.

2.2.3.5 Town of Whitby: Dundas Street West from Frances Street to Garden Street

Downtown Whitby is a historic downtown area, and the right-of-way is constrained by existing buildings on both sides of the road. Approaching Annes Street, the proposed design transitions to a four-lane centre median BRT configuration by converting one existing travel lane per direction to centre-running transit lane and maintaining one lane

per direction for general traffic. Commitments to future work on this section of the project are described in **Chapter 8**.

From Brock Street to Byron Street, a three-lane mixed traffic westbound option is proposed, where the option provides an eastbound dedicated transit lane and an eastbound general traffic lane at Dundas Street and Brock Street intersection, but the westbound transit and traffic would operate in a mixed through lane with dedicated right turn lane at Dundas and Brock.

Improvements to the sidewalks are proposed on both sides of Dundas Street except for on the south side from Byron Street to Athol Street where the sidewalk matches the existing sidewalk. The sidewalk is proposed to be expanded on the north side of the street to accommodate the bus platform. To mitigate parking impacts due to the sidewalk expansion on the north side of the street, 33 additional parking spaces are proposed to be provided in the expansion of Municipal Lot 2 north of the Dundas Street.

2.2.3.6 City of Oshawa: King Street and Bond Street from Thornton Road to Simcoe Street

In Oshawa, King Street and Bond Street operate as a one-way pair through the downtown area. The presence of the one-way pair of King Street and Bond Street lends itself to a couplet design by converting one existing travel lane on each one-way street into an exclusive bus lane.

From Waverly Street, the eastbound bus lane transitions to a curbside transit lane running along the King Street. After turning around at the east terminus, the curbside transit lane runs westbound along the King Street and transitions to a center-median bus lane west of Waverly Street. Auxiliary right-turn lanes and left-turn lanes are proposed at arterial-arterial intersections where warranted.

Sidewalks are proposed on both sides of King and Bond Street to improve accessibility. Wider platforms ranging from 3.2 m to 3.6 m in width are provided in Downtown Oshawa. Parking impacts haven been minimized and mitigated by providing parking spaces on nearby streets, while on-street parking was not provided adjacent to the BRT corridor.

The bridges on King Street and Bond Street over Oshawa Creek are proposed to be replaced. A single span bridge is proposed to replace the existing bridge on Bond Street. And the arch bridge on King Street is proposed to be replaced with a like-for-like structure.

2.2.3.7 East End Terminus

The dedicated transit lanes will end just east of Simcoe Street. Dedicated transit infrastructure is proposed to extend to Simcoe Street. East of Simcoe Street, buses will run in mixed traffic. In the short-term, buses will continue to Ritson Road and use the DRT William Street layover. In the long-term, buses may be routed south on Ritson

Road to the future GO Station planned as part of the Bowmanville Expansion. The DSBRT does not propose any infrastructure east of Simcoe Street or on Ritson Road.

2.2.4 Typical Stops

2.2.4.1 Functional Design

Safety, efficiency, intuitiveness and accessibility are top priorities for the BRT stop design. To achieve these priorities, right-hand-flow principles were considered when organizing the platform elements. The platform organization also provides a logical sequence as passengers arrive and depart. Each stop will consist of two identical canopy or pass-through modules, arranged side-by-side. At constrained sites, one module could be implemented instead of two, if required. The modular approach also allows the design to be implemented in a phased approach.

As shown in **FIGURE 2.2**, in each of the shelter modules, the passengers will travel through the following three areas:

1. Entrance Area
2. Waiting Area
3. Boarding Area

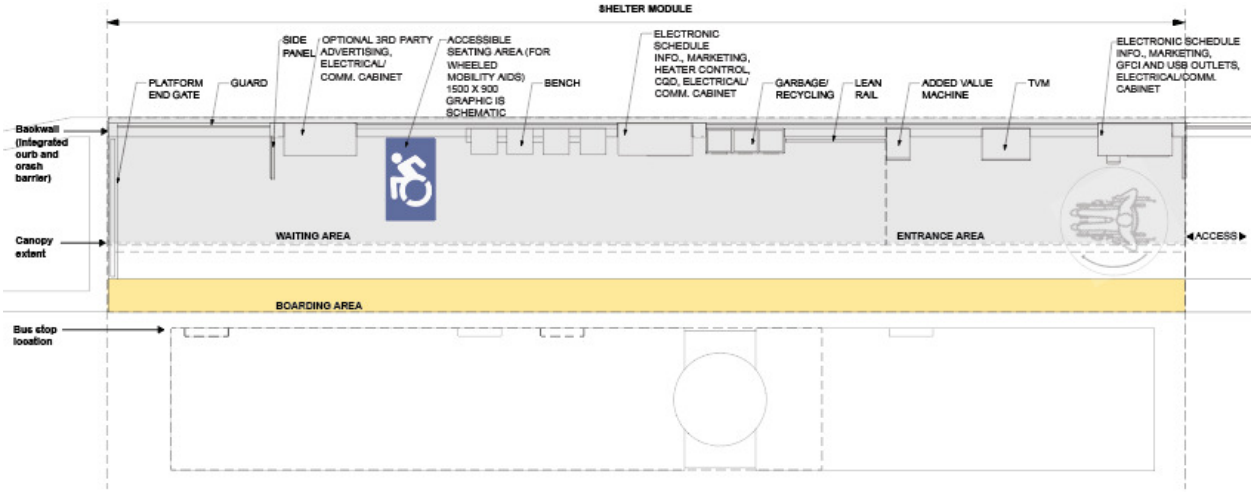


FIGURE 2.2. FUNCTIONAL PLAN LAYOUT OF THE PLATFORM MODULE

The entrance area is the first section that a passenger will access. This area is accessed from the ramp or sidewalk. It is sheltered from rain and wind by the platform canopy, a slim sidewall and a transparent glazed backwall that organizes the amenities and passenger flows to the right-hand side of the platform.

After passing through the entrance area, the passenger enters the waiting area. This area shares the platform canopy, sidewalls and transparent glazed backwall. The waiting area includes benches, lean rails, and a designated accessible seating area.

Through the waiting area, passengers can access the boarding area at the platform edge (demarcated by the tactile warning strip that runs along the length of the platform). The functional elevation of the platform module is shown in **FIGURE 2.3**.

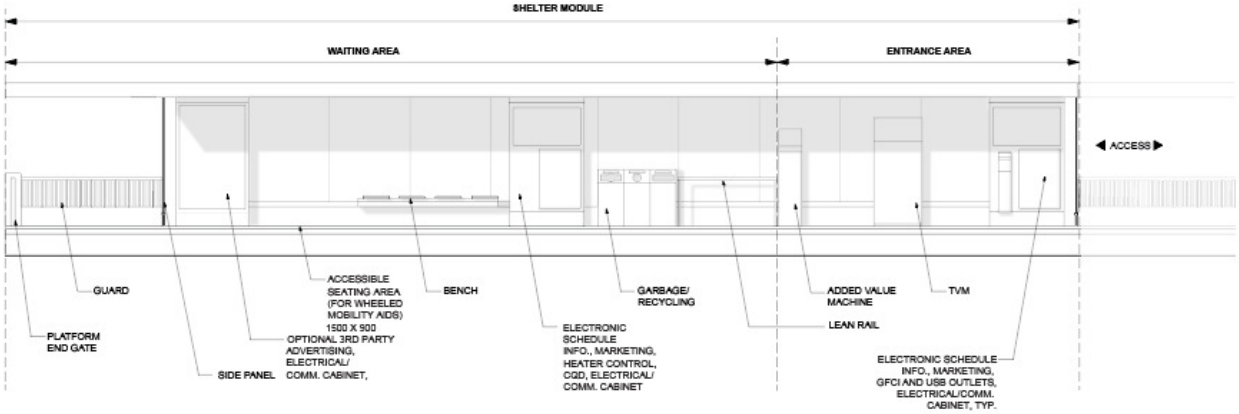


FIGURE 2.3. FUNCTIONAL ELEVATION OF THE PLATFORM MODULE

Each shelter module provides clear and direct passenger flows independently, while the platform connects the two modules into a cohesive element. The modular approach also allows the platform to accommodate two buses at once. The modules provide a consistent and high-quality passenger experience throughout the line.

The consistent 1220 mm module will be used for glazing sizing and the placement of columns throughout the platform, providing cost and maintenance efficiencies as well as visual consistency throughout the platform.

2.2.4.2 Amenities

A list of BRT stop amenities was developed in consultation with TTC and DRT. The amenities are listed below:

- Digital maps, schedules & amenities, including stop markers, at stops;
- Interdictory Signage (eg., “No Smoking”);
- Seating;
- Fare systems;
- Integrated garbage / recycling;
- Lean rails;
- Optional 3rd party advertising, with future conduit provided;
- Variable Message Signs (VMS) / Info panel; and
- Accessible seating area (for wheeled mobility aids).

The shelter design located all amenities against the backwall, which is consistent with the right-hand-flow principles that were described in this section. Waiting area amenities, such as benches and wheelchair accessible seating areas, are also located along the backwall. The benches are supported by the back curb. The use of the backwall as a collecting spine for the amenities helps to maintain a consistent and intuitive passenger experience.

2.2.4.3 Design Concept

The shelter design strives to create an iconic and impactful BRT stop. The goal is to create a functional layout with a focus on ease of maintenance and a commitment to the standards published by Metrolinx and other stakeholders on the project.

To accomplish this, the design provides a clean, orthogonal platform module that floats over a backwall that is predominantly glass. This backwall provides weather-protection, while simultaneously organizing amenities and passenger flows in alignment with right-hand-flow principles. Slim sidewalls further protect passengers from rain and wind and demarcate the entrance and waiting areas from the clear exterior path of travel that also functions as a boarding area. The sidewalls are extended into a glazed enclosure for pass-through stops. Curbside shelters are similar in layout to the open canopy stops. Backwalls provide weather protection at the seating areas only. By excluding the sidewalls, passengers have free access from both sides of the platform. Openings in the backwall allow flow-through pedestrian access from the sidewalk. Each platform module has been designed to allow for easy construction and maintenance. Detailed illustration of platform design concepts could be found in **Appendix A3**. **FIGURE 2.4** through **FIGURE 2.6** illustrate the design concepts for the BRT stops.

Each typical platform is comprised of two shelter modules. This symmetrical approach is not only aesthetically pleasing, but also allows for cost and maintenance efficiencies. The design also allows the platform to accommodate up to two buses at once.

FIGURE 2.4. CONCEPT RENDER FOR CITY OF TORONTO STOPS – OPEN CANOPY

A “kit-of-parts” approach was used in the development of the module. This allows stops to be modified to respond to their location, resulting in a context-sensitive design. The

design language and functional layouts that drive the centre-median shelters will be translated to curbside stops, providing an aesthetic and functional consistency throughout the corridor.

FIGURE 2.5. CONCEPT RENDER FOR CURBSIDE STOPS

While pass-through stops provide a more comprehensive enclosure, the glazed panels and structural elements are consistent with those in the open canopy and curbside designs. Furthermore, the functional plan of these stops, while adjusted slightly to accommodate the additional panels, follows the same three stage process and right-hand flow rules that guide the open canopy and curbside options.

FIGURE 2.6. CONCEPT RENDER FOR DURHAM REGION STOPS – PASS-THROUGH

Therefore, while each of these platform types vary in their relationship to the public right-of-way, collectively they provide a strong, consistent and iconic architectural language. This consistency extends beyond aesthetics and into the functional layout, with modular platform units providing a series of cost and maintenance efficiencies. The

result is a high-quality passenger experience, grounded firmly in the standards established by the Metrolinx Universal Design Standards, that will serve the needs of the community well into the future.

2.2.4.4 Materials and Colour

The materials palette will be developed during detail design. conceptual recommendation based on good practice and universal standards for BRT include:

- Light coloured concrete platform floor; and,
- Maximizing glazing panels on the backwall.

Please refer to Appendix A3 for applicable design guidelines and standards.

2.2.5 Pavement Design

2.2.5.1 Pavement Rehabilitation Designs

The following pavement rehabilitations are proposed:

- Ellesmere Road - from McCowan Road to Markham Road and from Military Trail to Morningside Avenue: mill 50 mm and pave 50 mm, lift thickness of 50 mm of SP 12.5 FC2;
- Ellesmere Road - from Markham Road to Military Trail: mill 100 mm and pave 100 mm, lift thickness of 50 mm of SP 12.5 FC2 and 50 mm of SP 19.0;
- Ellesmere Road - from Morningside Avenue to Kingston Road: mill/excavate 150 mm and pave 150 mm, lift thickness of 50 mm of SP 12.5 FC2 and 50 mm of SP 19.0 twice;
- Kingston Road – from Highway 401 to Southview Drive and from Rotherglen Road South to Salem Road: mill 50 mm and pave 50 mm, lift thickness of 50 mm of SP 12.5 FC2;
- Kingston Road – from Southview Drive to Rotherglen Road South, from Salem Road to Lakeridge Road: mill 100 mm and pave 100 mm, lift thickness of 50 mm of SP 12.5 FC2 and 50 mm of SP 19.0;
- Dundas Street East – from Lakeridge Road to Fothergill Court, from Jeffrey Street to Annes Street, and from Brock Street to Hickory Street: mill 50 mm and pave 50 mm, lift thickness of 50 mm of SP 12.5 FC2;
- Dundas Street East – from Fothergill Court to Jeffrey Street, from Annes Street to Brock Street, and from Hickory Street to Garrard Road: mill 100 mm and pave 100 mm, lift thickness of 50 mm of SP 12.5 FC2 and 50 mm of SP 19.0; and,

- King Street West from Garrard Street to Simcoe Street: mill/excavate 150 mm and pave 150 mm, lift thickness of 50 mm of SP 12.5 FC2 and 50 mm of SP 19.0 twice.

The above proposed rehabilitations are based on the results of the Pavement Conditions Assessment (**Appendix L**) only and did not consider the pavement structure layer thicknesses. As such, the existing and required layer thicknesses will be confirmed during Detailed Design.

2.2.5.2 Pavement Widening Designs

The following pavement designs for the widening of each section along Ellesmere Road below are proposed:

- from McCowan Road to Military Trail – 160 mm of HMA, 150 mm of Granular A Base, 550 mm of Granular B Type I Subbase. HMA lift thicknesses – 40 mm of SP12.5 FC2 and 2 x 60 mm of SP 19.0;
- from Military Trail to Morningside Avenue - 150 mm of HMA, 150 mm of Granular A Base, 550 mm of Granular B Type I Subbase. HMA lift thicknesses – 40 mm of SP12.5 FC2 and, 50 mm and 60 mm of SP 19.0; and,
- from Morningside Avenue to Kingston Road - 150 mm of HMA, 150 mm of Granular A Base, 450 mm of Granular B Type I Subbase. HMA lift thicknesses – 40 mm of SP12.5 FC2 and, 50 mm and 60 mm of SP 19.0.

The following pavement designs for the widening are proposed with 160 mm of HMA and 250 mm of Granular A Base and:

- Kingston Road from Highway 401 to the CN Rail – 500 mm Granular B Type I Subbase. HMA lift thickness - 40 mm of SP12.5 FC2 and 60 mm and 70 mm of SP 19.0;
- Kingston Road from Liverpool Road to Royal Road - 350 mm of Granular B Type I Subbase. HMA lift thickness – 40 mm of SP12.5 FC2 and 60 mm of SP 19.0 twice;
- Kingston Road from Southview Drive to Rotherglen Road S – 400 mm Granular B Type I Subbase. HMA lift thickness - 40 mm of SP12.5 FC2 and 60 mm of SP 19.0 twice;
- Kingston Road from the CN Rail to Liverpool Road, from Royal Road to Southview Drive, from Rotherglen Road to Lakeridge Road – 300 mm of Granular B Type I Subbase. HMA lift thicknesses – 40 mm of SP12.5 FC2 and 50 mm and 60 mm of SP 19.0;
- Dundas Street East from Lakeridge Road to Annes Road, from Brock Street to Hickory Street - 300 mm of Granular B Type I Subbase. HMA lift thicknesses – 40 mm of SP12.5 FC2 and 50 mm and 60 mm of SP 19.0;

- Dundas Street East from Annes Road to Brock Street and from Hickory Street to Garrard Road - 300 mm of Granular B Type I Subbase. HMA lift thicknesses – 40 mm of SP12.5 FC2 and 50 mm of SP 19.0 twice; and,
- King Street West from Garrad Street to Simcoe Street - 300 mm of Granular B Type I Subbase. HMA lift thicknesses – 40 mm of SP12.5 FC2 and 50 mm and 60 mm of SP 19.0.

The pavement designs have been checked against the City of Toronto's minimum requirement (150 mm HMA, 150 mm Granular A Base and 200 mm Granular B Type Subbase), and the Region of Durham's minimum requirements (160 mm HMA, 250 mm Granular A Base). The proposed pavement designs satisfy the minimum requirements.

2.2.5.3 Red Asphalt Pavements

Hot Mix Asphalt (HMA) with coloured pigments, conventional asphalt cement, and conventional aggregates or coloured aggregates is proposed with the following requirements:

- granitic aggregates with 2.5 to 3.0% red pigment (ferric oxide) are to be used to produce a red-coloured asphalt;
- mineral fillers or other materials may be used to improve the brightness of the HMA confirmed by life cycle performance testing;
- asphalt cement grade of PG 70-34, or better (confirmed by performance testing) is to be used;
- red asphalt HMA should satisfy the material requirements of OPSS.MUNI 1151 and testing to evaluate the mix's resistance to rutting by either the Hamburg Wheel-track test in accordance with AASHTO T 324-19 or an Asphalt Pavement Analyzer (APA) in accordance with AASHTO TP 63-09; and,
- the colour of the red asphalt must be similar or better (brighter) than the red asphalt pavement placed on the VivaNext projects in York Region.

2.2.6 Bridges

2.2.6.1 Highland Creek Bridge

The Highland Creek Bridge was built in 1973, which is a 3 span bridge that spans over the Highland Creek on the Ellesmere Road under the jurisdiction of City of Toronto. It is located approximately 0.52 km west of Neilson Road. No widening is required to accommodate the DSBRT Project.

2.2.6.2 Highway 401 Bridge

Highway 401 Bridge is a 2-span road crossing bridge under the jurisdiction of MTO. It is located approximately 0.57 km west of Port Union Road. No widening is required to accommodate the DSBRT Project.

2.2.6.3 Rouge River Bridge

The Rouge River Bridge was built in 1967, which is a 6-span bridge over the Rouge River on Kingston Road. Under the jurisdiction of City of Toronto. No modification is required to accommodate the DSBRT Project.

2.2.6.4 CN Rail Bridge

The CN Rail Bridge was built in 1963, which is a 1-span railway bridge over the Kingston Road under the jurisdiction of CN Rail. It is located 0.2 km west of Altona Road. The existing bridge is proposed to remain to accommodate the eastbound lane of the DSBRT corridor. A new railway bridge is proposed to accommodate the westbound lane of the DSBRT corridor.

2.2.6.5 Highway 412 Bridge

The Highway 412 Bridge is a 2-span road crossing bridge under the jurisdiction of MTO. It is located 0.85 km east of Lake Ridge Road. No widening on this structure is required to accommodate the DSBRT Project.

2.2.6.6 Lynde Creek Bridge

The Lynde Creek Bridge was built in 1972 and is located 0.75 km west of Cochrane Street under the jurisdiction of Durham Region. The bridge is proposed to be replaced to accommodate the DSBRT Project.

2.2.6.7 CP Railway Bridge

The CP Railway Bridge was built in 1966, which is a 3-span railway bridge under the jurisdiction of CP Railway. It is located 0.5 km east of Garden Street. The bridge is proposed to be replaced to accommodate the DSBRT Project.

2.2.6.8 Oshawa Creek Bridge (King Street)

The Oshawa Creek Bridge on King Street was built in 1921, which is a single span arch bridge under the jurisdiction of the Durham Region. It is located 0.2 km west of Centre Street. The bridge is proposed to be replaced to accommodate the DSBRT Project.

2.2.6.9 Oshawa Creek Bridge (Bond Street)

The Oshawa Creek Bridge on Bond Street was built in 1951, which is a 2-span bridge under the jurisdiction of the Durham Region. It is located 0.2 km west of Centre Street. The bridge is proposed to be replaced to accommodate the DSBRT Project.

2.2.7 Culverts

2.2.7.1 Petticoat Creek Culvert

Petticoat Creek Culvert is a single cell Cast-In-Place box culvert at Petticoat Creek under the Kingston Road. It was built in 1960 and is located 0.3 km west of Rosebank Road. The culvert is proposed to be extended to accommodate the DSBRT Project.

2.2.7.2 Dunbarton Creek Culvert

Dunbarton Creek Culvert is a single cell Cast-In-Place box culvert on the Dunbarton Creek crossing the Kinston Road. It was built in 1960 and is located 0.35 km west of Dixie Road. The culvert is proposed to be extended to connect with the upstream crossing structure to accommodate the DSBRT Project.

2.2.7.3 Pine Creek Culvert

Pine Creek Culvert is a single cell Cast-In-Place box culvert crossing the Kingston Road. It was built in 1970 and is located 0.4 km west of Liverpool Road. The culvert is proposed to be extended to accommodate the DSBRT Project.

2.2.7.4 Miller's Creek Culvert

Miller's Creek Culvert consists of one 2-cell and one single-cell culvert. It was built in 1970 and is located 0.52 km east of Westney Road. No culvert extension is proposed to accommodate the DSBRT Project.

2.2.7.5 Carruthers Creek Culvert

Carruthers Creek Culvert is a single cell Cast-In-Place Box Culvert crossing the Kingston Road under the jurisdiction of Durham Region. It was built in 1970 and is located 1.7 km west of Lake Ridge Road. The culvert is proposed to be extended to accommodate the DSBRT Project.

2.2.7.6 Lynde Creek Culvert

Lynde Creek Culvert is a single cell arch structural culvert crossing the Kingston Road under the jurisdiction of Durham Region. It was built in 2014 and is located 0.6 km east of Like Ridge Road. The culvert is proposed to be extended to accommodate the DSBRT Project.

2.2.7.7 Pringle Creek Culvert

Pringle Creek Culvert is a 3-cell culvert under the jurisdiction of the Town of Whitby. It was built in 1966 and is located 75 m east of Garden Street. The culvert is proposed to be extended to accommodate the DSBRT Project.

2.3 Local Transit Integration

Local transit routes that connect or interface with the DSBRT are being coordinated with TTC and DRT. The intent is to create convenient connections for transfers between routes and provide for opportunities to maximize ridership. No additional facilities are required to achieve this integration, and any minor changes to stops would follow the typical transit agency review and approval processes.

2.4 Project Implementation

2.4.1 Planning Issues

The Durham-Scarborough BRT corridor is not currently identified as a priority transit corridor on Schedule 5 of the Growth Plan. If it does become designated as a priority transit corridor through a future amendment to the Growth Plan, then the minimum density target defined for Major Transit Station Areas (MTSAs) would be required. For BRT stops, the minimum density requirement is 160 people and jobs per hectare. The City of Toronto and Durham Region could increase density over the minimum requirement, but to lower the minimum density, Provincial approval would be required.

While MTSA densities are not currently required at BRT stops, the project will connect three Urban Growth Centres identified in the Growth Plan, as well as other high growth areas such as Regional Centres and Corridors. This means that higher densities can still be achieved in key areas along the corridor. Planned infrastructure investments have already been directed to these areas and in some locations, secondary and master planning exercises are underway, with mixed-use development of higher densities planned. These planning exercises will help further establish transit supportive densities and will help development proceed in a timely manner to support the project.

While this magnitude of growth is being planned for, it may take up to 25 years to realize this growth, as planning approvals, infrastructure investments, and construction takes time. Several areas identified for high growth have already built out and redevelopment of these areas may not occur in the medium-term and will have unique redevelopment challenges. There are multiple stakeholders that may have differed interests and it is not uncommon for residents to be resistant to higher density development. Market demand in these areas may soften over the buildout horizon and there is potential that planned infrastructure investments may not be realized due to funding constraints. These factors may present potential challenges to realize transit supportive densities along the corridor.

2.4.2 Construction Issues

The construction of the proposed transit infrastructure through each section of the corridor will vary in timeline, duration and complexity. This is primarily due to the varied existing conditions across each municipal segment. Some sections of roadway through

the DSBRT limits have been urbanized whereas other segments are comprised of a rural roadway composition.

Segments of Kingston Road in Pickering and Ajax, which have already been built with curbside transit lanes will require relatively less infrastructure improvement than other segments without existing dedicated transit infrastructure. The DSBRT design has considered the areas where early works such as road widening, utility relocation and property acquisition have already occurred in order to accommodate the ultimate site conditions for the proposed infrastructure. In such areas, site preparation may be minimal. Sections of road with a current rural roadway cross section will need to ensure that grading, grubbing and clearing and utility installations are performed ahead of road widening. During this process, especially for above ground and subsurface utility relocation, the respective utility asset owners shall be consulted for guidance and coordination.

Due to the proposed project corridor being made up of major arterial roadways, the construction staging plan will need to ensure that general traffic as well as local transit is maintained along Ellesmere Road, Kingston Road, Dundas Street, King Street and Bond Street. Although full closures are not recommended, partial lane closures will need to be implemented for the staged construction. During construction two lanes must be maintained during peak periods in peak direction. Outside of peak periods one lane must be maintained in each direction at all times. The staging plans are to be developed during the detail design stage. In addition, an Emergency Response Plan during construction is to be prepared by the contractor.

At the two railway crossings in Pickering and Whitby, where structural construction is proposed at the existing grade separated crossings, it is mandatory to ensure that rail service is maintained throughout the construction. At the CN Rail crossing in Pickering, a rapid bridge construction method is prescribed in order to construct the new rail bridge for the westbound realigned lanes. This would involve constructing the bridge structure adjacent to the proposed crossing location and shifting into position with a temporary track closure. This work will need to be coordinated with CN Rail during the detail design phase. The CP Railway crossing of Dundas Street in Whitby involves construction of a new structure in order to accommodate the proposed 6-lane road cross section along Dundas Street. During the construction of the bridge, a temporary track detour will be built along the existing CP rail corridor utilizing the western section of the existing deck. This will ensure that rail operations are maintained during construction of the eastern half of the new bridge. The western half will then be built while the track is realigned to its original position on the eastern half of the deck. For the purpose of this EA, CP Railway has been consulted and informed of the project design. The detail design shall be coordinated with CP Railway in order to ensure compliance of the temporary track detour and structural clearances during construction.

Throughout the construction stage, various associated activities, such as noise, vibration and air quality control as well as excess soil disposal, which can have potentially adverse effects to the environment and adjacent residential properties, will be mitigated, as outlined in **Chapter 4** of this EPR.

The physical construction activities that will occur, not in chronological order, include:

- Installation of traffic accommodation measures as required by staging plan;
- Clearing and grubbing of trees and vegetation within the grading limits for construction of the project;
- Stripping of topsoil within the grading limits;
- Excavation of roadway and stop platform areas;
- Excavation of trenches and installing new or relocated above and below grade utility infrastructure;
- Removing existing asphalt and disposing at approved facility;
- Structural removals and disposing of debris;
- Installing SWM system components;
- Potentially salvaging existing granular/asphalt for reuse;
- Placing concrete or erecting fabricated steel or precast elements for bridges or culverts;
- Placing concrete for curb, barriers, retaining walls, planters and sidewalks;
- Excavating bore holes for platform foundations;
- Fabricating and erecting stop platform structures;
- Laying granular and application of hot mix asphalt;
- Installing lighting, ITS equipment and traffic signals;
- Final site grading and topsoil application;
- Painting roadway pavement marking;
- Installing landscaping features such as sod, shrubs, trees, paving stones, irrigation systems, station amenities and platform furniture;
- Installing corridor landscape features and replacement vegetation; and,
- Managing excess soil will be done in accordance with the O. Reg. 406/19: On-Site and Excess Soil Management (2019)

The parameters described in this **Chapter 2** as well as any variations to environmental and design specifications will be reviewed, confirmed, or revised, when necessary, prior to construction of the facilities. Aspects to be addressed and resolved prior to project construction include but are not limited to:

- Review of commitments stated in the EPR and development of a plan to comply with the commitments made;
- Further consultation with applicable Stakeholders as described and detailed in **Chapter 6**;
- Review applicable updated regulations, design guidelines, and design standards;
- Detailed archaeological and excess soil contamination investigations, as required;
- Geotechnical investigations including drilling of boreholes to determine existing soil and groundwater conditions;
- Site surveying (including field investigations for species at risk) as required;
- Review EPR document and proceed with design refinements of all infrastructure and system components which may include:
    - Transit stop design, median breaks, including passenger amenities, access and circulation roads;
    - Drainage and SWM;
    - Structures;
    - Pavement;
    - Illumination and traffic signals;
    - ITS;
    - Landscape; and,
    - Phasing requirements for infrastructure implementation.
- Discuss and define, utility relocation strategy and design with owners;
- Acquire required property;
- Define vehicle types and operational service plans;
- Obtain environmental approvals/permits/exemptions, as required;
- Coordinate passenger transfer strategies, and facility designs with local transit agencies; and,
- Develop fare collection strategies in coordination with all relevant operators.

There is potential that the preliminary design of this BRT may be affected by the proposed Eglinton East Light Rail Transit (EELRT) project. If the preliminary design is

significantly affected, an assessment through an addendum to the EPR or a separate TPAP process will be conducted, as applicable.

2.4.3 Property Issues

The proposed BRT corridor follows existing municipal road networks. The project design approach was to implement the proposed transit infrastructure within the existing municipal and regional road allowance where possible. This approach minimizes land and property requirements and associated impacts to existing neighbourhoods and natural features. Where road widening is proposed and additional right-of-way is required for transit amenities such as stops, impacts to private properties beyond the public right-of-way will be reviewed and refined in detail design to minimize impacts.

2.4.4 Construction Phasing

Construction is planned to occur in phases. Areas with existing congestion is proposed to be prioritized. The existing curbside BRT lanes through Pickering and Ajax in the Durham Region will be adopted to minimize additional construction costs. Construction timing also depends on progress on available funding, property acquisition, permits and approvals. The tentative implementation strategy is shown in **FIGURE 2.7**, Construction Phases will be further assessed through the Preliminary Design Business Case.

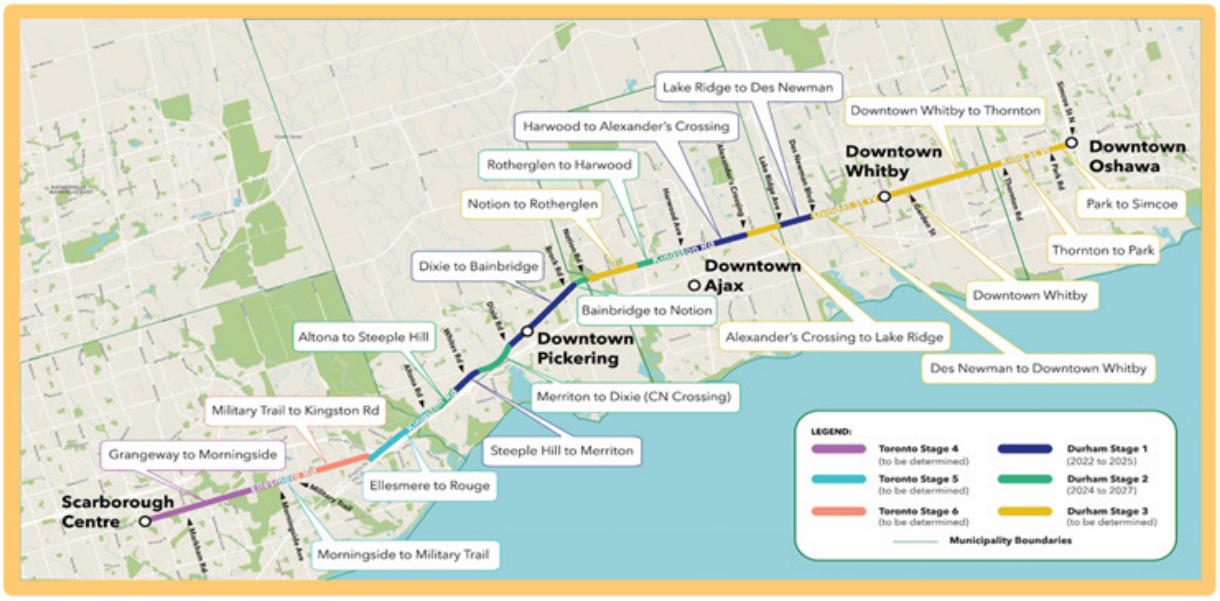


FIGURE 2.7. DRAFT IMPLEMENTATION STRATEGY

2.4.5 Project Funding

It is anticipated that the project will be funded through funding agreements with the Federal, Provincial, Regional, and local governments. Since the Study Area contains two upper-tier municipalities (City of Toronto and Durham Region) and four lower-tier

municipalities (City of Pickering, Town of Ajax, Town of Whitby, City of Oshawa), it is anticipated that the funding mechanisms will vary by municipality.

On September 18, 2020, Durham Region was notified that the Region had received funding from the Investing in Canada Infrastructure Program (ICIP) Public Transit Infrastructure Stream to construct portions of the BRT corridor. On August 12, 2021, joint funding for the construction of dedicated Bus Rapid Transit (BRT) infrastructure in the City of Pickering was announced. This project will construct 7.5 km of dedicated median bus lanes in the City of Pickering.

At the time of publishing, the City of Toronto has not received funding from the Federal or Provincial governments.

As the design is advanced in the detail design phase, it is likely that additional information will be gathered on the Study Area conditions. Design modifications may be required to address new or unforeseen challenges, which could impact the cost of construction.

3. Existing Conditions

This section discusses the existing conditions within the Study Area in the context of the built, natural, socio-economic, and cultural environments. These conditions were used to establish a baseline to compare and evaluate the potential impacts of the Project. Certain components of this section have been informed by technical studies, which are provided in **Appendix B** through **Appendix J**.

3.1 Traffic and Transportation

The Traffic and Transportation Analysis includes a detailed analysis of the traffic, transit and active transportation within the Study Area (see **Appendix B**). The methodology for determining existing conditions is summarized in **Section 3.1.1** and description of existing conditions is provided in **Section 3.1.2** through **3.1.5**.

3.1.1 Methodology

3.1.1.1 Segment Definition

Within the Study Area, the corridor was divided into ten segments for the traffic analysis. These segments are related to but different from the “pinch points” defined in the Initial Business Case (Metrolinx 2018). The traffic analysis segments were organized by road authority and local municipality as illustrated in **FIGURE 3.1**.

City of Toronto:

1. Ellesmere Road from McCowan Road to West of Morningside Avenue;
2. Ellesmere Road at Morningside Avenue to West of Kingston Road at Altona Road;

Region of Durham:

3. Kingston Road from Altona Road to West of Elizabeth Street;
4. Kingston Road from Elizabeth Street to Rotherglen Road (‘*Pickering Village*’);
5. Kingston Road from East of Rotherglen Road to Lake Ridge Road;
6. Dundas Street from Lake Ridge Road to West of Frances Street;
7. Dundas Street at Frances Street to Garden Street (‘*Downtown Whitby*’);
8. Dundas Street east of Garden Street to West of Thornton Road;
9. Bond Street from Thornton Road to Simcoe Street (‘*Downtown Oshawa*’); and,
10. King Street from Thornton Road to Simcoe Street (‘*Downtown Oshawa*’).

#		Segment	From	To
1		Ellesmere Rd	McCowan Rd	W of Morningside Ave
2		Ellesmere Rd / Kingston Rd	Morningside Ave	W of Altona Rd
3		Kingston Rd	Altona Rd	W of Elizabeth St
4	P	Kingston Rd	Elizabeth St	Rotherglen Rd
5		Kingston Rd	E of Rotherglen Rd	Lake Ridge Rd
6		Dundas St	Lake Ridge Rd	W of Frances St
7	P	Dundas St	Frances St	Garden St
8		Dundas St	E of Garden St	W of Thornton Rd
9	P	Bond St	Thornton Rd	Simcoe St
10	P	King St	Thornton Rd	Simcoe St

Note: P – denotes 'Pinch Point' locations

FIGURE 3.1. STUDY AREA AND TRAFFIC ANALYSIS SEGMENT DEFINITION

3.1.1.2 Data Collection

Traffic data were collected from City of Toronto and Durham Region in Fall 2019 and Winter 2020. Durham Region provided Synchro files containing traffic counts and signal timings. The turning movement volumes (counts) embedded were from years 2016 to 2019, and signal timings confirmed to be current to 2019. For Toronto, signal timing plans and turning movement counts were collected from the City.

3.1.1.3 Synchro Analysis

Traffic operations were analyzed using the Synchro 9 traffic analysis software and following the Highway Capacity Manual methodologies. Analysis periods consisted of the weekday morning (a.m.) and afternoon (p.m.) peak hours when corridor traffic volumes are highest.

Performance measures evaluated include overall intersection delays expressed level-of-service (LOS), in addition to volume-to-capacity (v/c) ratio and 95th percentile queuing. LOS is a common measure of performance based on delay and is defined in **TABLE 3.1**. In addition to reporting on overall intersection LOS, all critical movements are identified consisting of individual turning movements with LOS E or F, or having a v/c ratio above 0.95.

TABLE 3.1. INTERSECTION LOS REFERENCE

HCM LOS	Control Delay Per Vehicle(s)	
	Signalized	Unsignalized
A	≤ 10	≤ 10
B	>10 and ≤20	>10 and ≤15
C	>20 and ≤35	>15 and ≤25
D	>35 and ≤55	>25 and ≤35
E	>55 and ≤80	>35 and ≤50
F	>80	>50

3.1.1.4 Active Transportation Network Review

Active transportation and cycling plans from various municipal and Regional governments were reviewed to inform the cycling network review including the following planning documents:

- City of Toronto
    - City of Toronto Cycling Network Plan Update (2019)
- Durham Region & Lower Tier Municipalities:
    - Durham Region Cycling Plan (2012) & Short-Term Cycling Network in Transportation Master Plan (2018)
    - City of Pickering Integrated Transportation Master Plan

- Town of Ajax Integrated Transportation Master Plan (2019)
- Town of Whitby Draft Active Transportation Plan (ongoing)
- City of Oshawa Draft Active Transportation Master Plan (2015)

Segments of the DS BRT corridor with either existing or future cycling facilities identified based on these municipal or Regional network plans are summarized by municipality as "Facilities Along the BRT Corridor". The review includes the proposed facility type and network phasing (where applicable and available).

The recommendations of the various plans are reviewed in the context of the planned BRT improvements to identify a preferred facility type, informed by previous planning work, in the subsequent section of this memo, *Cycling Facility Selection Review*.

Existing or future cycling facilities intersecting the DS BRT corridor are summarized by municipality as "Facilities Intersecting the BRT Corridor". The review includes the status (existing, planned or proposed), facility type, and any phasing/timing for future facilities.

3.1.2 Existing Road Network

3.1.2.1 Ellesmere Road from McCowan Road to West of Morningside Avenue

A summary of Ellesmere Road and its cross streets for this segment is provided below.

Ellesmere Road within this segment is classified as a major arterial road by the Road Classification of City Streets within the City of Toronto. In this segment, Ellesmere Road has a four-lane cross section with turning lanes at major intersections. The segment starts at McCowan Road and extends to just west of Morningside Avenue. Land uses primarily consist of commercial, employment and institutional uses, with pockets of residential areas within the eastern portion. In this segment, Ellesmere Road has a posted speed limit of 60 km/h.

McCowan Road is a major north-south arterial. Within the Study Area, McCowan Road has a posted speed limit of 60 km/h.

Grangeway Avenue is classified as a local road by the Road Classification of City Streets in the jurisdiction of the City of Toronto. It serves local residential and commercial area. It runs from Ellesmere Road to Progress Avenue with a posted speed limit of 40 km/h.

Parkington Crescent is classified as a collector by the Road Classification of City Streets in the jurisdiction of the City of Toronto. It serves local residential areas with a posted speed limit of 40 km/h.

Bellamy Road is a north-south minor arterial road serving institutional land uses north of Ellesmere Road, and local residential areas south of Ellesmere Road. Bellamy Road has a posted speed limit of 50 km/h.

Dolly Varden Boulevard is classified as a collector in the City of Toronto and borders Confederation Park south of Ellesmere Road. The posted speed limit of Dolly Varden Boulevard is 40 km/h.

Markham Road is a major north-south arterial in the City of Toronto mostly serving commercial uses. Markham Road has a posted speed limit of 60 km/h.

Gander Drive is a north-south local collector serving local residential areas. The posted speed limit for Gander Drive is 40 km/h.

Scarborough Golf Club Road is classified as a minor north-south arterial road connecting Ellesmere Road to Kingston Road. The posted speed limit is 50 km/h.

Orton Park Road is classified as a minor north-south arterial road primarily providing access to local residential streets. The posted speed limit is 50 km/h.

Neilson Road is classified as minor north-south arterial road serving residential and institutional areas. The Scarborough Health Network – Centenary Hospital is located at the south-west corner of the Neilson Road-Ellesmere Road intersection within this segment. North of Ellesmere Road, Neilson Road has four lanes (two per direction) with a median turning lane. South of Ellesmere Road, Neilson Road has one lane per direction, providing access to hospital. Neilson Road has a posted speed limit of 50 km/h.

3.1.2.2 Ellesmere Road from Morningside Avenue to West of Kingston Road at Altona Road

A summary of Ellesmere Road and its cross streets for this segment is provided below.

Ellesmere Road within this segment is classified as a minor arterial according to the Road Classification of City Streets in Toronto. It has a four-lane cross section west of Meadowvale Road with turning lanes at major intersection. East of Meadowvale Road, Ellesmere Road narrows and has a two-lane cross section with turning lanes. The segment serves primarily residential areas with some institutional uses such as schools, community parks, and a fire station. Ellesmere Road is an east-west thoroughfare, but curves to become a north-south street to connect with Kingston Road at its eastern terminus. Residential traffic primarily merges onto Kingston Road from Ellesmere Road. The posted speed limit along this segment of Ellesmere Road is 50 km/h.

Kingston Road from Highway 401 to the City of Toronto eastern boundary is classified as a major arterial road. The segment begins at the Kingston Road/Ellesmere Road intersection and extends just west of the Kingston Road/Altona Road intersection. Kingston Road serves a variety of commercial properties and draws traffic from the Highway 401 interchange. The posted speed limit along Kingston Road is 60 km/h.

Morningside Avenue within this segment is classified as a major north-south arterial road by the Road Classification of City Streets within the City of Toronto. Within this segment, Morningside Avenue serves several commercial properties, green space, and major institutional buildings. Most notably, the University of Toronto's Scarborough

Campus (UTSC) and Centennial College's Morningside Campus are located within this segment. The Morningside Park is also located at the south-west corner of Ellesmere Road and Morningside Avenue. The posted speed limit on Morningside Avenue is 60 km/h.

Military Trail is considered a minor arterial north of Ellesmere Road, and a collector south of Ellesmere Road. UTSC is located just west of Military Trail. The road runs diagonally north-west to south-east, and has a posted speed limit of 40 km/h.

Conlins Road is a north-south collector serving primarily residential areas. Within this Study Area, Conlins Road has a posted speed limit of 50 km/h.

Morrish Road is classified as a north-south collector serving residential areas. North of Ellesmere Road, the posted speed limit of Morrish Road is 40 km/h, and south of Ellesmere Road, the posted speed limit is 50 km/h.

Meadowvale Road is classified as a minor arterial north of Ellesmere Road, and a collector south of Ellesmere Road. Within this segment, Meadowvale Road serves primarily residential land uses and has a posted speed limit of 50 km/h.

Rylander Boulevard is classified as a collector serving primarily commercial land uses. With no available signage, the posted speed limit is assumed to be 50 km/h.

Sheppard Avenue within this Study Area is considered an east-west minor arterial road that ends at Kingston Road. Sheppard Avenue has a posted speed limit of 60 km/h.

Port Union Road is classified as a minor north-south arterial in the City of Toronto. Within this segment, Port Union Road provides access to Highway 401 and to a carpool lot owned by the Ministry of Transportation, Ontario. The posted speed limit of Port Union Road is 60 km/h.

3.1.2.3 Kingston Road from Altona Road to West of Elizabeth Street

A summary of Kingston Road and its cross streets for this segment is provided below.

Kingston Road (Highway 2) is classified as a multi-purpose Type B arterial road. The segment starts at Altona Road and ends west of Elizabeth Street, in the City of Pickering. Along this segment, Kingston Road has a four-lane cross section with turning lanes at major intersections. A centre two-way left-turn lane is also provided at some sections where there are a high number of driveways and entrances. Dedicated bus lanes are present south of Steeple Hill to Delta Boulevard and from south of Liverpool Road to Glenanna Road. Kingston Road primarily serves business, employment and industrial uses. There are also residential properties to the north. In this segment, Kingston Road has a posted speed limit of 60 km/h.

Altona Road (Regional Road 27) is a north-south Type B arterial road. Within the Study Area, Altona Road has a posted speed limit of 60 km/h with a two-lane rural cross section.

Whites Road North (Regional Road 38) is a north-south Type A arterial that primarily serves local residential areas. The road connects Steeles Avenue East with Kingston Road West. In this segment, Whites Road has a posted speed limit of 50 km/h.

Liverpool Road (Regional Road 29) is a Type B regional road that extends from Lake Ontario to north of Finch Avenue. It has a five-lane cross-section within the Study Area. The posted speed limit near the study corridor is 50 km/h.

Glenanna Road is a Type C arterial that has a two-lane cross section. This road runs primarily east-west; however, it turns south as it approaches the study corridor. Pickering Parkway is the south limit. The road section north and west of Kingston Road has an assumed posted speed limit of 40 km/h.

Brock Road (Regional Road 1) is a Type A arterial roadway acting as a major transit spine under the jurisdiction of Durham Region. The road generally runs in a north-south direction, with four lanes (two per direction). The posted speed limit within the Study Area is 60 km/h.

Notion Road is a north-south local road that serves industrial and yard depot areas. Notion Road also connects to Pickering Parkway, which is a service road for Highway 401. In the absence of signage, a speed limit of 50 km/h is assumed.

3.1.2.4 Kingston Road from Elizabeth Street to Rotherglen Road ('Pickering Village')

A summary of Kingston Road and its cross streets for this segment is provided below.

Kingston Road (Highway 2) is classified as a multi-purpose Type B arterial road. The segment starts from the intersection of Elizabeth Street and ends at to Rotherglen Road South, in the Town of Ajax. Along this segment, Kingston Road has a four-lane cross section with turning lanes at major intersections. This segment serves residential and mixed-use land uses with a posted speed limit of 50 km/h.

Elizabeth Street is a north-south Type C arterial that serves local residential areas with a posted speed limit of 40 km/h.

Church Street North is a north-south Type B arterial road. Church Street functions as the main north-south spine through the Village Centre. The posted speed limit for Church Street North is 40 km/h.

3.1.2.5 Kingston Road from East of Rotherglen Road to Lake Ridge Road

A summary of Kingston Road and its cross streets for this segment is provided below.

Kingston Road (Highway 2) is classified as a multi-purpose Type B arterial road. The segment starts east of the intersection of Rotherglen Road and connects to Lake Ridge Road, located in the Town of Ajax. Along this segment, Kingston Road has a four-lane cross section with turning lanes at major intersections. Dedicated bus lanes are provided between east of Rotherglen Road and the access to Whitetail Centre Plaza. In the urban areas, Kingston Road primarily serves shopping centres. At the east end of

the segment, Kingston Road provides connection to rural areas and Casino Ajax. The multi-purpose section of the road has a posted speed limit of 60 km/h.

Westney Road (Regional Road 31) is a north-south multi-purpose Type B arterial that serves local residential areas in the north and commercial areas south of Highway 401. Within the Study Area, Westney Road has a posted speed limit of 60 km/h.

Salem Road (Regional Road 41) is a north-south multi-purpose Type B arterial that is predominantly used for commercial purposes. Near the study corridor, Salem Road has a posted speed limit of 60 km/h.

Audley Road is a north-south arterial road located in east Ajax and is discontinuous between Kingston Road and Bayly Street. From Taunton Road to Bayly Street, it is classified as a Type 'B' arterial. From south of Bayly Street to the waterfront at Lake Ontario it is a Type C arterial. It has a posted speed limit of 60 km/h.

Lake Ridge Road is located in Whitby along the eastern municipal boundary of Ajax and is a Type A north-south arterial road. Lake Ridge Road has a posted speed limit of 80 km/h.

Harwood Avenue is a north-south Type C arterial road. The segment between Taunton Road and Woodcock Avenue has a 2-lane cross section and changes to a 4-lane cross-section between Woodcock Avenue and Kingston Road. Harwood Avenue has a posted speed limit of 60 km/h.

3.1.2.6 Dundas Street from Lake Ridge Road to East of Cochrane/Annes Street

A summary of Dundas Street and its cross streets for this segment is provided below.

Dundas Street is classified as a multi-purpose Type B arterial road. The segment starts east of the intersection of Lake Ridge Road at the east end of Ajax to west of Frances Street, in Whitby. Along this segment, Dundas Street has a four-lane cross section with additional turning lanes at major intersections. Centre two-way left-turn lanes are provided east of Jeffrey Street to the east limit of this segment. Dundas Street provides connection to residential areas and Highway 412 with more mixed-use areas nearing Downtown Whitby to the east. The posted speed limit in the rural areas near the expressway is 60 km/h. In the urban setting, the posted speed limit is 50 km/h.

McQuay Boulevard is north-south collector which serves mainly residential uses. The posted speed limit is 40 km/h.

Cochrane/Annes Street is north-south Type C arterial which mainly serves residential uses. The posted speed limit is 50 km/h.

3.1.2.7 Dundas Street from Euclid/Henry Street to East of Garden Street ('Downtown Whitby')

A summary of Dundas Street and its cross streets for this segment is provided below.

Dundas Street is classified as a multi-purpose Type B arterial road under the jurisdiction of Durham Region. This segment starts at the intersection of Frances Street and ends at Garden Street, both of which are in Whitby. Along this segment, Dundas Street has various cross sections. From Frances Street to Euclid Street, Dundas Street has four lanes with auxiliary lanes. From Euclid Street to Bryon Street, on-street parking is permitted on the north side only.

East of Bryon Street to Brock Street, on-street parking is permitted on both sides. From Brock Street to Garden Street, Dundas Street reverts back to a four-lane cross section. Where on-street is permitted, parking on Dundas Street is prohibited between the hours of 4:30 to 6:00 p.m. For this area, Dundas Street serves various land uses (mixed use) with an assumed posted speed limit of 50 km/h.

Brock Street is a multi-purpose Type B arterial which connects Downtown Brooklin with Downtown Whitby and the Whitby GO Station in the south. In the absence of signage, a speed limit of 50 km/h is assumed.

Garden Street is a north/south multi-purpose Type C arterial which mainly serves residential uses. It has a posted speed limit of 50 km/h.

3.1.2.8 Dundas/King Street from Anderson/Hopkins Street to East of Thornton Road

A summary of Dundas Street and the cross streets for this segment is provided below.

Dundas Street is classified as a multi-purpose Type B arterial road. The segment starts east of the intersection of Garden Street in Whitby and ends west of Thornton Road in Oshawa. Along this segment, Dundas Street has a five-lane cross section, including a two-way centre left-turn lane. Turning lanes are also provided on Dundas Street at major intersections. Dundas Street predominantly serves business and commercial areas with access to some residential uses. The multi-purpose section of the road has a posted speed limit of 50 km/h.

Anderson/Hopkins Street is a north-south Type B arterial that primarily serves residential uses with a posted speed limit of 50 km/h.

Thickson Road is a multi-purpose north-south Type A arterial that primarily serves retail and commercial uses near the study corridor. It has a posted speed limit of 60 km/h.

Thornton Road is a north-south Type C arterial that primarily serves residential uses with a posted speed limit of 60 km/h. South of Dundas Street, Thornton Road provides access to Trent University (Durham GTA).

3.1.2.9 Bond Street from Stevenson Road to Simcoe Street ('Downtown Oshawa')

A summary of Bond Street and its cross streets for this segment is provided below.

Bond Street is a one-way Type B arterial road. The segment starts at the east end of the project limit (Simcoe Street) traveling westbound and ending at Thornton Road in

Oshawa. Along this segment, Bond Street has a three-lane cross section west of Park Road N. East of Park Road N, Bond Street has a four-lane cross section with on-street parking permitted east of McMillan Drive to Simcoe Street. The street serves commercial uses and residential uses to the north. With no signage present, a speed limit of 50 km/h is assumed.

Stevenson Road is a north-south Type B arterial. The road provides access to Oshawa Centre Shopping Mall to the south and residential uses to the north. Posted speed limit of 50 km/h.

Gibbons Street is a collector street which mainly serves residential uses. Posted speed limit of 50 km/h.

Park Road is a north-south Type C arterial road which mainly serves residential uses. Posted speed limit of 40 km/h.

Centre Street is a one-way Type B arterial road serving southbound traffic through Downtown Oshawa. In the downtown core, Centre Street serves mostly office and institutional land uses including Oshawa City Hall. A speed limit of 50 km/h is assumed.

Simcoe Street (Regional Road 2) is a one-way Type B arterial road serving northbound traffic through Downtown Oshawa. In the downtown core, Simcoe Street serves a mix of land uses including commercial, office, institutional and residential. On-street parking is permitted along several segments, and a speed limit of 50 km/h is assumed.

3.1.2.10 King Street from Stevenson Road to Simcoe Street ('Downtown Oshawa')

A summary of King Street and its cross streets for this segment is provided below.

King Street is a one-way Type B arterial road. The segment starts at the Thornton Road and ends at the project limit at Simcoe Street in Oshawa. Along this segment, King Street has a four-lane cross section west of McMillan Drive. East of McMillan Drive to Centre Street S, King Street has a four-lane cross section, but with on-street parking on the north side. East of Centre Street S to Simcoe Street, King Street has two travel lanes with on-street parking on both sides. King Street serves commercial and residential uses. With no signage available, a speed limit of 50 km/h is assumed.

Stevenson road is a north-south Type B arterial. The road provides access to Oshawa Centre Shopping Mall to the south and a number of residential uses to the north. It has posted speed limit of 50 km/h.

Gibbons Street is a collector street which mainly serves residential uses. It has posted speed limit of 40 km/h.

Park Road is a north–south collector road which mainly serves residential uses. It has posted speed limit of 40 km/h.

Simcoe Street (Regional Road 2) is a north-south Type B arterial serving northbound traffic (one-way). As the east project limit, Simcoe Street serves a variety of land uses with on-street parking in the downtown area. With no signage present, a speed limit of 50 km/h is assumed.

3.1.3 Existing Traffic

3.1.3.1 Ellesmere Road from McCowan Road to West of Morningside Avenue

Under existing traffic conditions, all intersections in this segment operate at LOS D or better. However, there are several critical movements in both the a.m. and p.m. peak hours, particularly the eastbound left-turn and eastbound through movements at Ellesmere Road and McCowan Road, which operate at or just under capacity.

The traffic volumes indicate that traffic is generally heavier to the westbound direction in the a.m. peak hour and in the eastbound direction in the p.m. peak hour. This is likely attributed to commuting behaviour.

3.1.3.2 Ellesmere Road from Morningside Avenue to West of Kingston Road at Altona Road

Under existing traffic conditions, the study intersections in this segment are operating at levels of service LOS D or better. For the intersections on Ellesmere Road between Military Trail and Kingston Road, there are relatively low volumes, which allows for smooth operations. However, there are still several critical movements in both the a.m. and p.m. peak hours, most notably, the eastbound right and westbound left movements at Kingston Road and Sheppard Avenue/Port Union Road. Moreover, the Highway 401 Eastbound Off-ramp's heavy southbound volume is anticipated to be another congested intersection, although some adjustments to signal timing and cycle length may be able to partially address this situation.

The volumes indicate traffic is generally heavier in the westbound direction in the a.m. peak hour and in the eastbound direction in the p.m. peak hour. This is likely attributed to commuting behaviour.

3.1.3.3 Kingston Road from Altona Road to West of Elizabeth Street

Under existing traffic conditions, all study intersections within this segment are operating at overall LOS D or better, and most operate with some surplus capacity. The intersections at Whites Road, Highway 401 ramp terminal, Liverpool Road, Glenanna Road, and Brock Road do operate with multiple critical movements in the p.m. peak hour, and there are select movements at some of these intersections that are already at capacity.

The results indicate that the p.m. peak hour is generally more congested in this segment than the a.m. peak hour. It is also observed that there are higher amounts of traffic traveling westbound towards Toronto in the a.m. peak and traveling eastbound out of Toronto in the p.m. peak. Given the proximity to Highway 401, there are high turning volumes at arterial roads as the corridor facilitates traffic travelling to and from the highway.

3.1.3.4 Kingston Road from Elizabeth Street to Rotherglen Road ('Pickering Village')

Segment 4 is located in Pickering Village and is identified as one of the 'pinch point' segments along the corridor. Under existing traffic conditions, the three intersections in this segment are operating well at LOS C or better, apart from the Church Street intersection in the p.m. peak hour when it operates at LOS D with a few movements operating close to capacity.

Like the other segments, the volumes show that traffic is heavier in the westbound direction in the a.m. peak hour and in the eastbound direction in the p.m. peak hour. This is likely attributed to commuters traveling to and from the Toronto area. The creek system west of Elizabeth Street, at the Pickering/Ajax boundary, limits the available routes through that area.

3.1.3.5 Kingston Road from East of Rotherglen Road to Lake Ridge Road

Under existing traffic conditions, most intersections along this segment are operating at overall LOS D or better, with exception of the Salem Road and Lake Ridge Road intersections which both operate at overall LOS E in the p.m. peak hour. These two intersections contain several movements near capacity with little room for additional traffic. The intersections of Harwood Avenue, Salem Road and Lake Ridge Road have movements at or past capacity with high delays, as high volumes on all four approaches compete for available green time.

Generally, it is also observed that the p.m. peak hour has more severe congestion and greater delay. The volumes indicate that most traffic is headed westbound and southbound during the a.m. peak hour and northbound and eastbound direction during the p.m. peak hour, likely traveling to Toronto or to Highway 401. Given the proximity to Highway 401, there are high turning volumes at arterial roads as the corridor facilitates traffic travelling to and from the highway.

3.1.3.6 Dundas Street from Lake Ridge Road to East of Cochrane/Annes Street

Under existing traffic conditions, all intersections in this segment are operating well at overall LOS C or better during both peak hours. Critical movements in the p.m. peak are eastbound through, reflecting the higher eastbound demand in the afternoon rush hour.

For this Dundas Street segment, the same trend is observed where traffic volumes are heavier westbound and southbound in the a.m. peak and eastbound and northbound in the p.m. peak. As mentioned previously, this is likely due to commuting trips to/from Toronto and Highway 401.

3.1.3.7 Dundas Street from Euclid/Henry Street to East of Garden Street ('Downtown Whitby')

Segment 7 is located in Downtown Whitby and is identified as one of the 'pinch point' segments along the corridor. Under existing traffic conditions, all intersections in this segment are operating at overall LOS D or better. The eastbound and westbound

through movements are approaching capacity at certain times. The westbound movement through Brock Street in the a.m. peak hour is operating over capacity.

3.1.3.8 Dundas/King Street from Anderson/Hopkins Street to East of Thornton Road

Under existing traffic conditions, all intersections in this segment are operating at overall LOS D or better. While little congestion is observed in the a.m. peak, there is significant congestion in the p.m. peak and several intersections have multiple movements operating at capacity, most notably the arterial-arterial intersections with Anderson/Hopkins Street, Thickson Road, and Thornton Road.

The results indicate that the p.m. peak hour is generally more critical than the a.m. peak hour, with higher numbers of, and more severe, critical movements. Heavier traffic is distributed in the westbound and southbound directions in the a.m. peak hour and in the eastbound and northbound directions in the p.m. peak hour, as is the case along the other segments of the corridor.

3.1.3.9 Bond Street from Stevenson Road to Simcoe Street ('Downtown Oshawa')

Segment 9 is in Downtown Oshawa and is identified as one of the 'pinch point' segments along the corridor. Bond Street operates westbound in conjunction with segment 10 (King Street, eastbound) as a one-way couplet. All intersections in this segment operating well during both peak hours, at LOS B or better. All intersections have surplus capacity, suggesting converting one lane for transit will not have adverse traffic operations without widening Bond Street.

3.1.3.10 King Street from Stevenson Road to Simcoe Street ('Downtown Oshawa')

Segment 10 is in Downtown Oshawa and is identified as one of the 'pinch point' segments along the corridor. King Street operates eastbound in conjunction with segment 9 (Bond Street, westbound) as a one-way couplet. All intersections in this segment operating well during both peak hours, at LOS C or better. All intersections have surplus capacity, though the eastbound through movement is approaching capacity in the p.m. peak hour. Converting one lane for transit may not have adverse traffic operations without widening King Street.

3.1.4 Existing Transit Network

3.1.4.1 Ellesmere Road from McCowan Road to West of Morningside Avenue

An overview of the transit services along the corridor is provided below**.**

McCowan Station is a combined station operating in the City of Toronto. The terminal serves Line 3 – Scarborough Rapid Transit, in addition to a number of TTC-operated bus services. McCowan Station is located on McCowan Road approximately 350 metres north of Ellesmere Road.

Scarborough Centre Station is just west of the study segment, also serving Line 3 – Scarborough Rapid Transit and bus services to and from the Scarborough Town Centre shopping mall. The station serves TTC, GO Transit buses and some intercity carriers.

Toronto Transit Commission operates subway and several bus services in proximity to the Ellesmere Road corridor within this segment. Those routes are listed below:

- **Line 3 Scarborough Rapid Transit** operates near this segment with McCowan Station serving as its eastern terminal station heading westbound to Kennedy Station servicing 4 stops in between, including the Scarborough Centre Station. Scarborough trains run every 4 to 5 minutes during the rush hours and every 5 to 6 minutes outside the rush hours.

- **Route 133 Neilson** has 5 stops in the western portion of Study Area starting at Scarborough Centre Station and ending at Neilson Road. Route 133 runs every 11 minutes during the a.m. and off-peak periods (on average 5 buses per hour) and every 7-8 minutes during the p.m. peak period (on average 8 buses per hour).

- **Route 38A/38B Highland Creek** runs eastbound along Ellesmere Road starting at Scarborough Centre Station and ending at Military Trail. Along this 5.3 km stretch of Ellesmere Road, Route 38 has 9 stops within this segment, and 2 stops in the following segment. Route 38 Highland Creek has an average headway of 6 minutes in the a.m. and p.m. peak hours (10 buses per hour), and 10 minutes in the off-peak period (6 buses per hour).

- **Route 95 York Mills** serves the entire segment along the Ellesmere Road corridor making stops at all 9 signalized intersections. Route 95 begins at York Mills Station and continues along Ellesmere Road starting at Victoria Park Avenue and ending at the Ellesmere Road/Kingston Avenue bus loop. In the Study Area, Route 95 York Mills has an average headway of 10 minutes in both the a.m. and p.m. peak hours.

- **Route 995 York Mills Express** follows Route 95 closely and stops at major intersections only. Route 995 runs less frequently, with an average headway of 10 minutes in the a.m. and p.m. peak hours, and 15 minutes in the off-peak period. This route only operates express west of Markham Road (i.e., only major stops are serviced west of the Markham Road and Ellesmere Road intersection. All stops are serviced between Markham Road and University of Toronto Scarborough Campus.

- **Route 395 York Mills Night Bus** operates between York Mills Station on Line 1 Yonge-University and Meadowvale Loop, near the Sheppard Avenue and Meadowvale Road intersection, generally in an east-west direction. It operates during the overnight period, seven days a week from 1:30 a.m. to 6 a.m. with an average headway of 30 minutes. It has nine stops within this segment along Ellesmere Road from McCowan Road to Morningside Avenue.

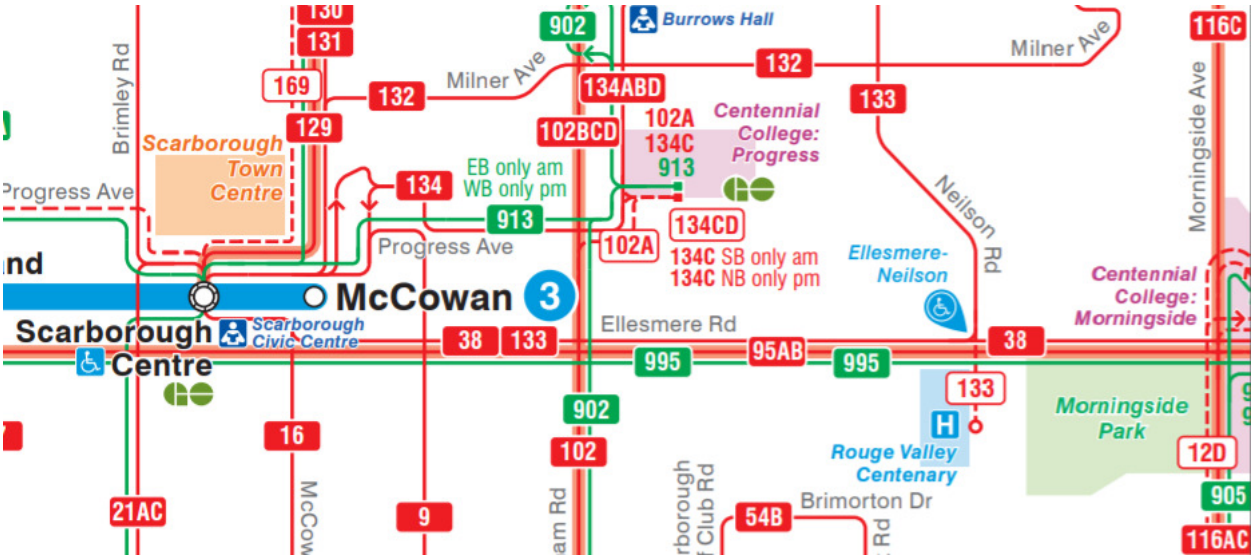


FIGURE 3.2. EXISTING TTC SERVICE – SEGMENT 1 (SOURCE: TTC – MARCH 2021)

3.1.4.2 Ellesmere Road from Morningside Avenue to West of Kingston Road at Altona Road

An overview of the transit services along the corrido is provided below.

GO Transit operates one bus route within this segment:

- **Route 92/92A Oshawa/Yorkdale** connects Yorkdale Bus Terminal and Oshawa Station, including stops at Scarborough Centre, Pickering Town Centre, Downtown Ajax, and Downtown Whitby and Downtown Oshawa. In this segment, Route 92 has one stop at Kingston Road at Sheppard Avenue. The route operates 7 days/week, with up to 10-minute headways in peak periods in areas with 92A service and 30-minute to 1-hour headways during off-peak periods.

Toronto Transit Commission operates subway and several bus services in proximity to the Ellesmere Road corridor within this segment. Those routes are listed below:

- **Route 116/116A/116C Morningside** has two stops in this segment. Route 116 runs approximately every 5 minutes during a.m. and p.m. peak periods (10 buses per hour) and about every 12 minutes during the off-peak periods.
- **Route 38A/38B Highland Creek** continues eastward from segment one and ends at the Rouge Hill GO Station along the southeastern boundary of the City of Toronto. It serves two stops located in the second segment and has an average headway of 6 minutes in the a.m. and p.m. peak hours (10 buses per hour), and 10 minutes in the off-peak period (6 buses per hour).
- **Route 95 York Mills** serves most of the second segment along the Ellesmere Road corridor. Route 95 begins at York Mills Station and continues along Ellesmere Road starting at Victoria Park Avenue and ending at the Ellesmere Road/Kingston Avenue bus loop. In the Study Area, Route 95 York Mills has an average headway of 10 minutes in both the a.m. and p.m. peak hours.

- **Route 995 York Mills Express** has two stops in this segment. Route 995 has an average headway of 10 minutes in the a.m. and p.m. peak hours, and 15 minutes in the off-peak period.
- **Route 395 York Mills Night Bus** operates between York Mills Station on Line 1 Yonge-University and Meadowvale Loop, near the Sheppard Avenue and Meadowvale Road intersection, generally in an east-west direction. It operates during the overnight period, seven days a week from 1:30 a.m. to 6 a.m. with an average headway of 30 minutes. It has nine stops within this segment along Ellesmere Road from Morningside Avenue to Meadowvale Road.

Durham Region Transit (DRT) operates a single route along this segment:

- The **900 PULSE** route currently operates along Ellesmere Road starting at the UTSC campus north of Ellesmere Road and Military Trail and ending in Downtown Oshawa. In the Study Area, PULSE 900 has three stops: Ellesmere Road at Military Trail, Ellesmere Road at Meadowvale Road, and Kingston Road at Port Union Road/Sheppard Avenue.
- **Route 920** runs on Kingston Road from Sheppard Avenue eastwards to Salem Road. This route has two stops on Kingston Road in this segment: at Port Union Road and at Altona Road.

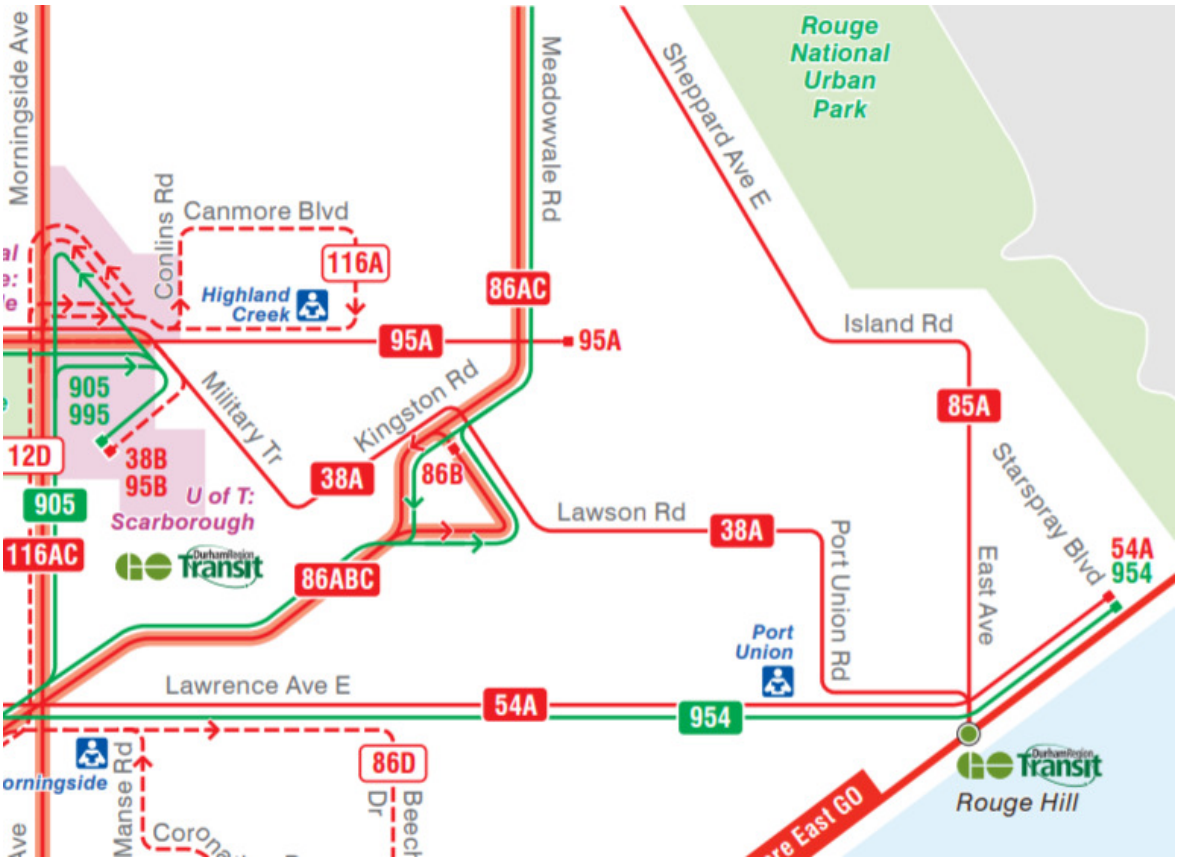


FIGURE 3.3. EXISTING TTC SERVICE – SEGMENT 2 (SOURCE: TTC – MARCH 2021)

3.1.4.3 Kingston Road from Altona Road to West of Elizabeth Street

An overview of the transit services along the corridor is provided below.

Pickering GO Station / **Pickering Parkway Terminal** are separate transit terminals connected via a pedestrian bridge in the City of Pickering, located south of the Study Area. The Pickering GO Station is located along the GO Lakeshore East rail line and the Pickering Parkway Terminal operates on-road near the pedestrian overpass, providing direct connections to GO Station.

Durham Region Transit operates a number of local bus routes that pass through the Study Area in addition to the PULSE service. These routes are listed below:

- **Routes 101 Bay Ridges, 120 Whites and 917 Bayly-Consumers** use the eastbound portion of Kingston Road between Liverpool Road and Glenanna Road to access Pickering Parkway Terminal and to turn around. These routes serve one stop in the Study Area on Kingston Road at Liverpool Road.

- **Route 291 Harwood-Kingston** operates on two separate portions of Kingston Road in this Study Area. The route serves the eastbound stop at Kingston Road and Liverpool Road after departing Pickering Parkway Terminal. It also operates between Bainbridge Road and beyond Elizabeth Street, serving stops in both directions at Notion Road.

- **Route 916 Rossland** operates on Kingston Road between Brock Road and Glenanna Road in the westbound direction and between Liverpool Road and Brock Road in the eastbound direction. Westbound service has stops at Brock Road and Valley Farm Road. Eastbound service has stops at Liverpool, Glenanna and Valley Farm Roads.

- **900 PULSE** route operates along the Highway 2 Corridor between Downtown Oshawa and UTSC. In this segment, PULSE 900 has 15 stops in either direction. PULSE 900 runs in every 10 mins during peak hours and every 20 to 30 mins in off-peak hours. During the weekends, buses run every 15 to 30 mins.

- **Route 920** operates on Kingston Road from Sheppard Avenue eastwards to Salem Road. This route stops at Pickering Town Centre. There are sixteen stops on Kingston Road within this segment: at Rougemont Drive, at Rosebank Road, at Steeple Hill, at Whites Road, at Delta Boulevard, at 780 Kingston Road in front of a commercial plaza, at Fairport Road, at Dixie Road, at Walnut Lane, at Liverpool Road, at Glenanna Road, at Valley Farm Road, at Brock Road, at Bainbridge Drive, at Notion Road and at Elizabeth Street.

- **Route 103 Glenanna** operates on Kingston Road between Altona Road and Whites Road. This route does not operate on weekends. There are five stops on Kingston Road in this segment: at Altona Road, at Rougemount Drive, at Rosebank Road, at Steeple Hill and at Whites Road.

- **Route 110 Finch** operates on Kingston Road between Liverpool Road and Valley Farm Road. The westbound route travels south on Glenanna Road, while the eastbound route travels north on Liverpool Road forming a loop around Pickering Town Centre. There are three stops around Pickering Town Centre that are not on Kingston Road. There are two stops on Kingston Road within this segment: at Liverpool Road (eastbound only) and at Glenanna Road.

GO Transit operates two bus routes within the segment:

- **Route 41Hamilton/Pickering** runs along Highway 2 and stops at Fairport Road.
- **Route 92/92A Oshawa/Yorkdale** directly connects Yorkdale Bus Terminal and Oshawa Station, including station stops at Scarborough Centre, Pickering Town Centre, Downtown Ajax, and Downtown Whitby and Downtown Oshawa. In the Study Area, Route 92 has two stops (in one direction), all of which are shared with 900 PULSE. This route operates seven days per week, with up to 10-minute headways in peak periods in areas with 92A service and 30-minute to 1-hour headways during off-peak periods.

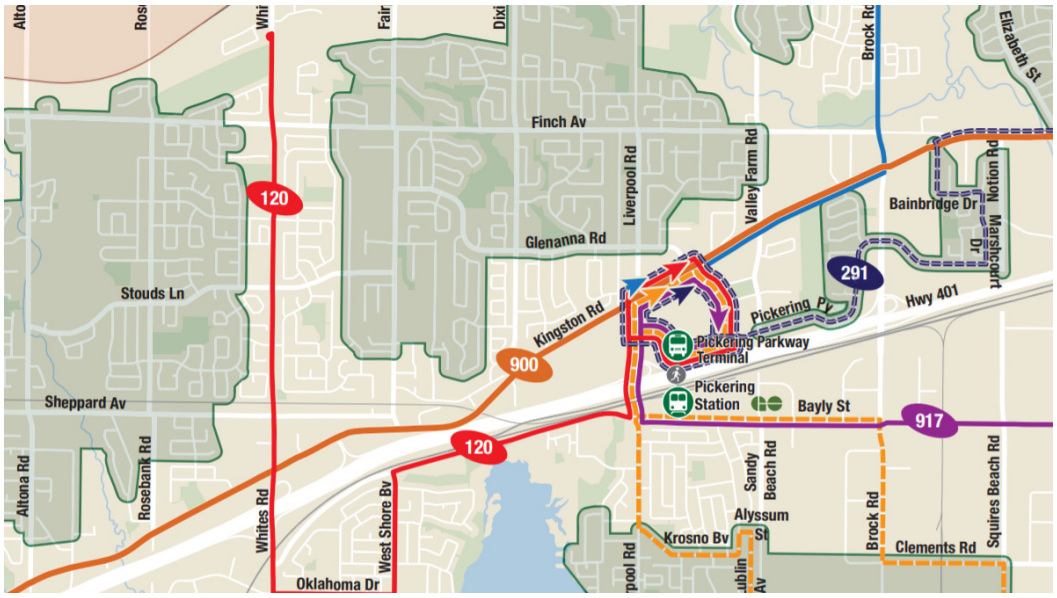


FIGURE 3.4. EXISTING DRT SERVICE – SEGMENT 3 (SOURCE: DRT – JANUARY 2021)

3.1.4.4 Kingston Road from Elizabeth Street to Rotherglen Road ('Pickering Village')

An overview of the transit services along the corridor is provided below.

Durham Region Transit operates one local bus route that passes through the Study Area in addition to the PULSE service. These routes are listed below:

- **Route 291 Harwood-Kingston** operates on a section of Kingston Road in this Study Area. The route shares stopes with the PULSE service in this section.

- **PULSE 900** runs through the Study Area, stopping at Elizabeth, Church and Mill Streets.
- **Route 920** operates on Kingston Road from Sheppard Avenue eastwards to Salem Road. There are two stops on Kingston Road within this segment: at Church Street and at Mills Street.

GO Transit operates one bus route within this segment:

- **Route 92/92A Oshawa/Yorkdale** directly connects Yorkdale Bus Terminal and Oshawa Station, including station stops at Scarborough Centre, Pickering Town Centre, Downtown Ajax, Downtown Whitby and Downtown Oshawa. There are no stops in this segment. This route operates seven days per week, with up to 10-minute headways in peak periods in areas with 92A service and 30-minute to 1-hour headways during off-peak periods.

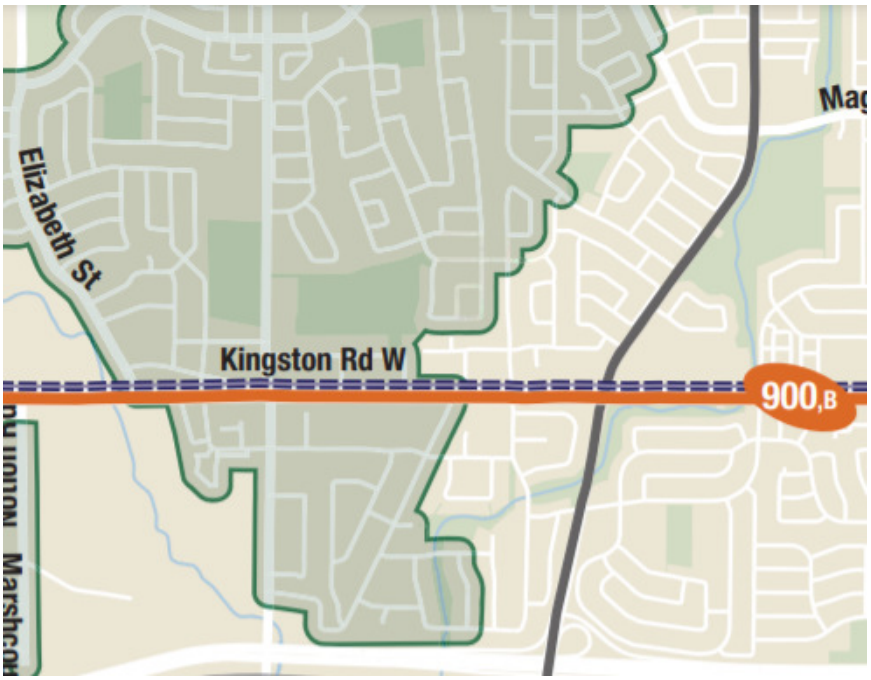


FIGURE 3.5. EXISTING DRT SERVICE – SEGMENT 4

3.1.4.5 Kingston Road from East of Rotherglen Road to Lake Ridge Road

An overview of the transit services along the corridor is provided below.

Durham Region Transit operates two local bus routes through the Study Area and the express PULSE service. The two bus routes are listed below.

- **Route 291 Harwood-Kingston** shares stops with PULSE between Rotherglen Road and Salem Road, with additional stops at two plaza entrances not served by PULSE and two off-street stops in shopping plazas. Route 291 operates from

Pickering Parkway Terminal, moving east along Kingston Road and south to several medical and civic destinations in South Ajax via Harwood Avenue.

- **PULSE 900** has 10 stops in this segment PULSE 900 runs every 10 mins during peak hours and every 20 to 30 mins in off-peak hours. On the weekends, the service runs every 15 to 30 mins.
- **Route 920** runs on Kingston Road from Sheppard Avenue eastwards to Salem Road. There are six stops on Kingston Road within this segment: at Westney Road, at Chapman Drive, at 132 Kingston Road (in front of a commercial plaza), at Harwood Avenue, at 84 Kingston Road (in front of commercial plaza), and at Salem Road. This route turns northwards on Salem Road.

GO Transit operates one bus route within this segment:

- **Route 92/92A Oshawa/Yorkdale** directly connects Yorkdale Bus Terminal and Oshawa Station, including station stops at Scarborough Centre, Pickering Town Centre, Downtown Ajax, and Downtown Whitby and Downtown Oshawa. In this segment, Route 92 stops at Harwood Avenue. In the Study Area, Route 92 has two stops (in one direction). This route operates seven days per week, with up to 10-minute headways in peak periods in areas with 92A service, and 30-minute to 1-hour headways during off-peak periods.

FIGURE 3.6. EXISTING DRT SERVICE – SEGMENT 5 (SOURCE: DRT – JANUARY 2021)

3.1.4.6 Dundas Street from Lake Ridge Road to East of Cochrane/Annes Street

An overview of the transit services along the corridor is provided below.

Durham Region Transit operates two routes through the Study Area.

- **PULSE 900** has 6 stops in this segment PULSE 900 runs every 10 mins during peak hours and every 20 to 30 mins in off-peak hours. On the weekends, the service runs every 15 to 30 mins.
- **Route 392** operates on Dundas Street from McQuay Boulevard to Glen Hill Drive. It has two stops on Dundas Street at Wellington Street and Cochrane Street/Annes Street.

GO Transit operates one bus route within this segment:

- **Route 92/92A Oshawa/Yorkdale** directly connects Yorkdale Bus Terminal and Oshawa Station, including station stops at Scarborough Centre, Pickering Town Centre, Downtown Ajax, Downtown Whitby and Downtown Oshawa. In this segment, the service stops at the Highway 412 Park and Ride. This route operates seven days per week, with up to 10-minute headways in peak periods in areas with 92A service, and 30-minute to 1-hour headways during off-peak periods.

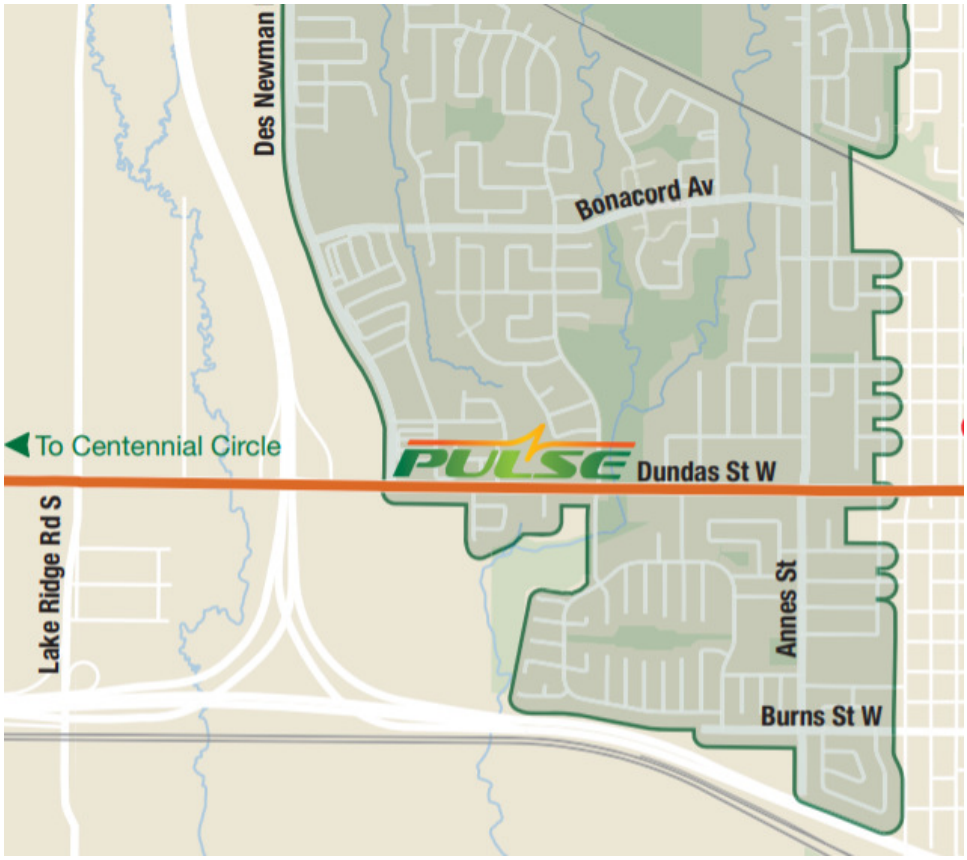


FIGURE 3.7. EXISTING DRT SERVICE – SEGMENT 6 (SOURCE: DRT)

3.1.4.7 Dundas Street from Euclid/Henry Street to East of Garden Street ('Downtown Whitby')

The following section provides an overview of the transit services along the corridor:

Durham Region Transit operates two routes through the Study Area.

- **PULSE 900** has three stops in this section, at Euclid Street/Henry Street, Brock Street, and Hickory Street. PULSE 900 runs in every 10 mins during peak hours and in every 20 to 30 mins in off-peak hours. During the weekends, the transit service runs every 15 to 30 mins.
- **Route 392** operates on Dundas Street from McQuay Boulevard to Glen Hill Drive. It has three stops on Dundas Street within this segment: at King Street, at Brock Street, and Hickory Street. There are two stops on Dundas Street east of this segment: one at Garden Street and at Craydon Road.

GO Transit operates one bus route within this segment:

- **Route 92/92A Oshawa/Yorkdale** directly connects Yorkdale Bus Terminal and Oshawa Station, including station stops at Scarborough Centre, Pickering Town Centre, Downtown Ajax, Downtown Whitby and Downtown Oshawa. In this segment, the service stops at Brock Street. This route operates seven days per week, with up to 10-minute headways in peak periods in areas with 92A service, and 30-minute to 1-hour headways during off-peak periods.

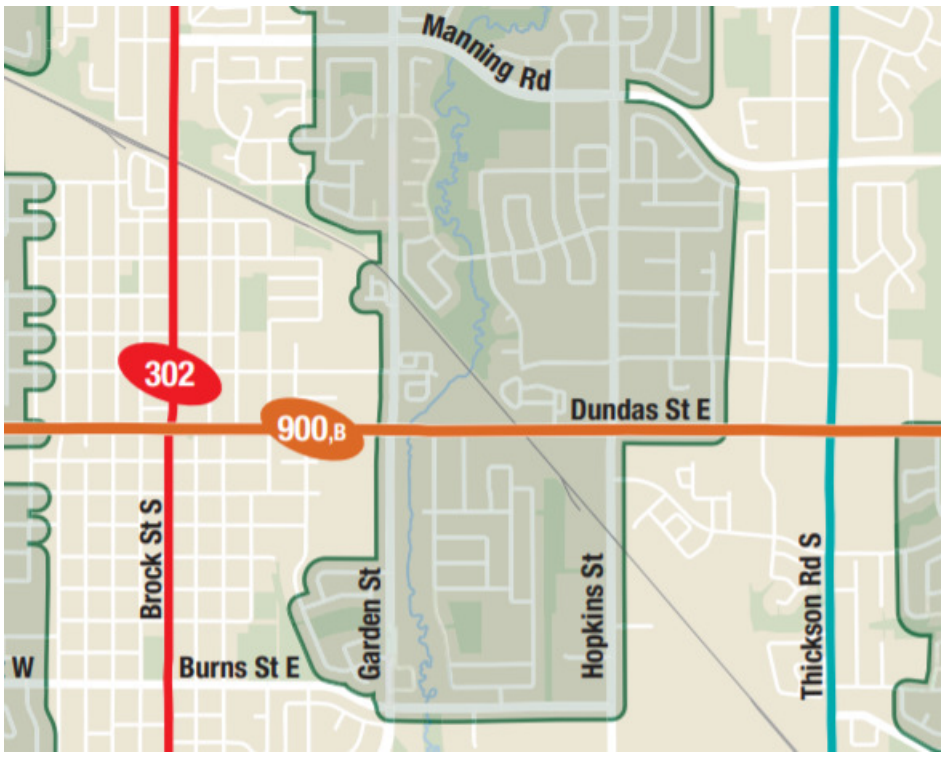


FIGURE 3.8. EXISTING DRT SERVICE – SEGMENT 7 (SOURCE: DRT)

3.1.4.8 Dundas/King Street from Anderson/Hopkins Street to East of Thornton Road

An overview of the transit services along the corridor is provided below.

Durham Region Transit operates two routes through the Study Area.

- **PULSE 900** starts at Centennial Circle and runs on Dundas Street and Kingston Road. In the Study Area, PULSE 900 has seven stops in this section. PULSE 900 runs every 10 mins during peak hours and every 20 to 30 mins during off-peak hours. During the weekends the transit service runs every 15 to 30 mins.
- **Route 392** operates on Dundas Street from McQuay Boulevard to Glen Hill Drive. It has two stops on Dundas Street within this segment: at Anderson Street/Hopkins Street and at Glen Hill Drive. There route operates away from Dundas Street between Glen Hill Drive and Garrad Road/Kendalwood Road. From Garrad Road/Kendalwood Road to Thornton Road, Dundas Street changes name to King Street. There are three stops within this segment: one on Dundas Street at Glen Hill Drive and one at Garrard Road/Kendalwood Road, on Kingston Street at Thornton Road.

GO Transit operates one bus route within this segment:

- **Route 92/92A Oshawa/Yorkdale** directly connects Yorkdale Bus Terminal and Oshawa Station, including station stops at Scarborough Centre, Pickering Town Centre, Downtown Ajax, Downtown Whitby and Downtown Oshawa. In this segment, the service stops at Thickson Road. This route operates seven days per week, with up to 10-minute headways in peak periods in areas with 92A service, and 30-minute to 1-hour headways during off-peak periods.

3.1.4.9 Bond Street from Stevenson Road to Simcoe Street ('Downtown Oshawa')

The following section provides an overview of the transit services along the corridor:

Durham Region Transit operates a number of local bus routes that pass through the Study Area in addition to the PULSE service. These routes are listed below:

- **Route 902 King** operates on this segment from Park Road to beyond Simcoe Street and shares stops with PULSE 900 at Simcoe, Centre and Arena Streets before turning south to the Oshawa Centre Terminal and Oshawa Station.
- **PULSE 900 –** operates seven westbound bus stops along Bond Street within the segment. Vehicles arrive in 10-minute headways during peak hours and 15-minute headways during off peak hours and weekends. The route turns around at Ritson Road beyond the east end of the Study Area, returning eastbound towards Toronto.

GO Transit operates one bus route within this segment:

- **Route 92/92A Oshawa/Yorkdale** directly connects Yorkdale Bus Terminal and Oshawa Station, including station stops at Scarborough Centre, Pickering Town Centre, Downtown Ajax, Downtown Whitby and Downtown Oshawa. In this segment, the service runs westbound from Oshawa Station. This route operates seven days per week, with up to 10-minute headways in peak periods in areas with 92A service, and 30-minute to 1-hour headways during off-peak periods.

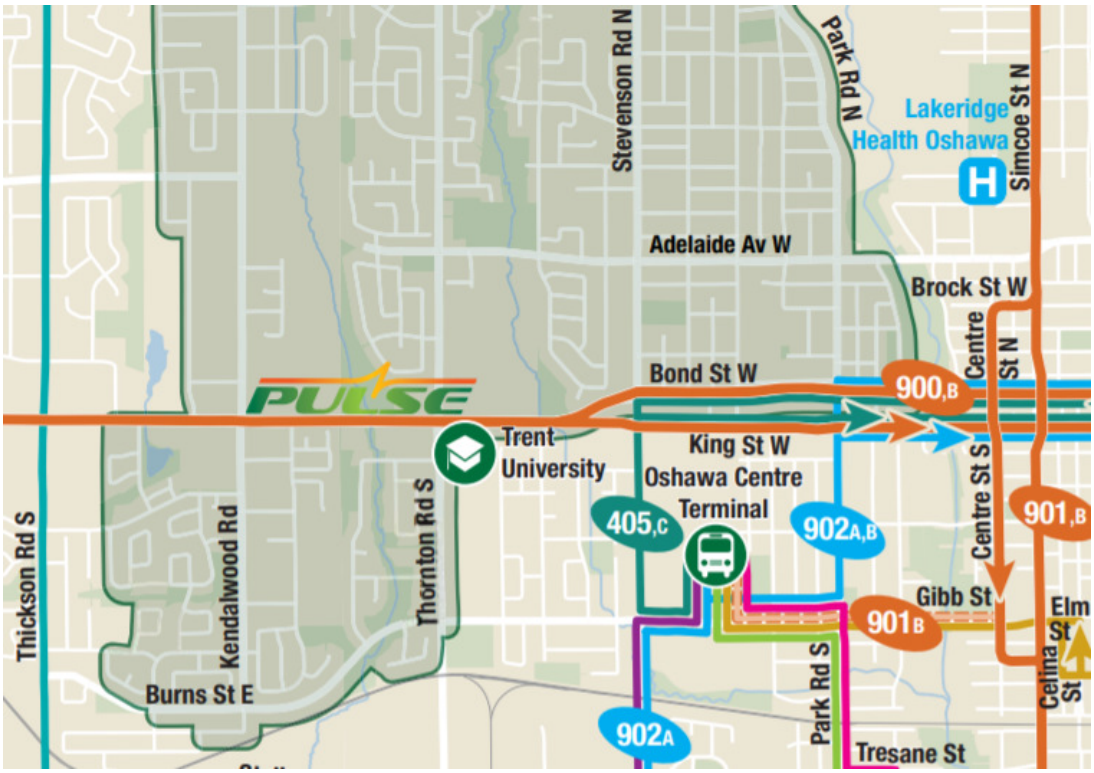


FIGURE 3.9. EXISTING DRT SERVICE – SEGMENT 8 AND 9 (SOURCE: DRT – JANUARY 2021)

3.1.4.10 King Street from Stevenson Road to Simcoe Street ('Downtown Oshawa')

The following section provides an overview of the transit services along the corridor:

Oshawa Centre Terminal is a DRT bus terminal located at the south end of the Oshawa Centre shopping mall approximately 600 m south of the corridor.

Durham Region Transit operates a number of local bus routes that pass through the Study Area. These routes are listed below:

- **Route 902 King** operates on this segment from Park Road to beyond Simcoe Street and shares stops with PULSE 900 at Park Road, Midtown Drive, Centre Street and Simcoe Street before continuing east to Bowmanville.
- **PULSE 900 –** operates one westbound and eight eastbound bus stops along King Street within the segment. Vehicles arrive in 10-minute headways during

peak hours and 15-minute headways during off peak hours and weekends. The route turns around at Ritson Road beyond the east end of the Study Area, returning eastbound towards Toronto.

GO Transit operates one bus route within this segment:

- **Route 92/92A Oshawa/Yorkdale** directly connects Yorkdale Bus Terminal and Oshawa Station, including station stops at Scarborough Centre, Pickering Town Centre, Downtown Ajax, Downtown Whitby and Downtown Oshawa. In this segment, the service runs eastbound to Oshawa Station. This route operates seven days per week, with up to 10-minute headways in peak periods in areas with 92A service, and 30-minute to 1-hour headways during off-peak periods.

3.1.5 Existing Active Transportation Network

3.1.5.1 City of Toronto

The proposed network within the vicinity of the DSBRT corridor is shown in **FIGURE 3.10**.

In the City of Toronto, existing or planned cycling facilities are provided on Ellesmere Road from Dormington Drive to Orton Park Road. There are generally sidewalks on both sides of Ellesmere Road west of Morningside Avenue. East of Morningside Avenue, sidewalk is provided intermittently on one or both sides of Ellesmere Road, Along Kingston Road, sidewalks are also intermittent, and there are on-road bike lanes at the intersection of Kingston Road and Sheppard Avenue.

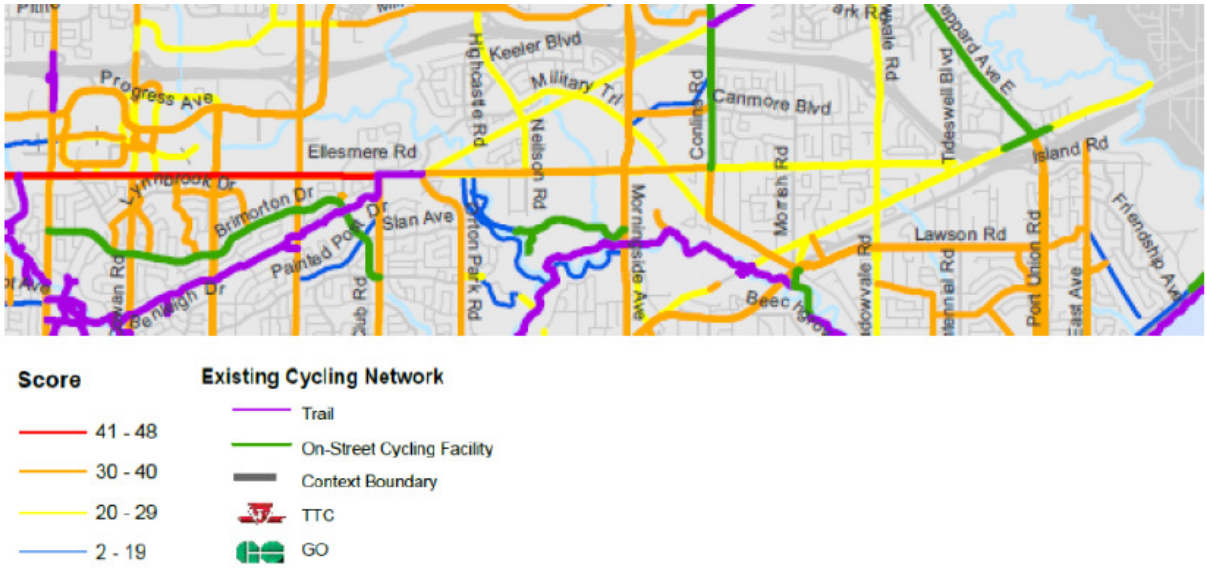


FIGURE 3.10. CITY OF TORONTO PROPOSED CYCLING NETWORK BY ANALYSIS SCORES

An additional update on the status and proposed facilities along a portion of Segment #1 was provided by the City of Toronto for consideration as part of this study.

Ellesmere Road (Markham Road to Scarborough Golf Club Rd) – In 2020/2021, cycle tracks will be constructed along Ellesmere from Markham Road to Scarborough Golf Club Road, stopping a bit short of both intersections. The design includes a two-way cycle track on the north side and a one-way cycle track on the south side. The north side cycle track is currently in detailed design by ECS as part of road resurfacing along this segment. Depending on construction coordination, the south side cycle track may be constructed the following year. A full corridor level review has been completed for the segment of Ellesmere from Markham Road to Military Trail.

Ellesmere Road (Orton Park Road/Military Trail to Highland Creek Ravine Access Trail) – Starting Fall 2020, a multi-use trail will be constructed along the north side of Ellesmere Road from Orton Park Road down into the Highland Creek ravine, partly within the Ellesmere Road ROW. This trail will connect the existing pieces of the Gatineau Hydro Corridor Trail and Highland Creek Trail.

There are also several existing and planned facilities which intersect the BRT corridor. These corridors are summarized in **TABLE 3.2**.

TABLE 3.2. SUMMARY OF EXISTING AND PLANNED INTERSECTING CYCLING FACILITIES – CITY OF TORONTO

Corridor	Direction (N/S)	Intersection Type	Status Plan	Facility Type (If Available)
McCowan Road	N/S	Signalized Intersection	Proposed	N/A
Grangeway Avenue	N	Un-Signalized T-Intersection	Proposed (North of Ellesmere Rd)	N/A
Parkington Crescent	S	Signalized Intersection	Proposed (South of Ellesmere Rd)	N/A
Bellamy Road	N/S	Signalized Intersection	Proposed	N/A
Markham Road	N/S	Signalized Intersection	Proposed	N/A
Scarborough Golf Club Road / Gatineau Hydro Corridor Trail	N/S	Signalized Intersection	Existing (South)	Multi-use Path
Military Trail / Orton Park Road	S	Signalized Intersection	Proposed	N/A
Hydro Corridor	N	Hydro Corridor	Proposed	Multi-use Trail (assumed)
Botany Hill Park	S	Park Access	Proposed	N/A
Neilson Road	N	Signalized Intersection	Proposed	N/A
Morningside Avenue	N/S	Signalized Intersection	Proposed	N/A
Military Trail	N/S	Trail Access	Proposed	N/A
Conlins Road	N/S	Signalized Intersection	Existing (North) Proposed (South)	Bike Lanes (North)

Corridor	Direction (N/S)	Intersection Type	Status Plan	Facility Type (If Available)
Meadowvale Road	N/S	Signalized Intersection	Proposed	N/A
Sheppard Avenue	N/S	Signalized Intersection	Existing (North) Proposed (South)	Bike Lanes (North)

3.1.5.2 Durham Region

The proposed network by facility type within the vicinity of the BRT corridor is shown in **FIGURE 3.11**.

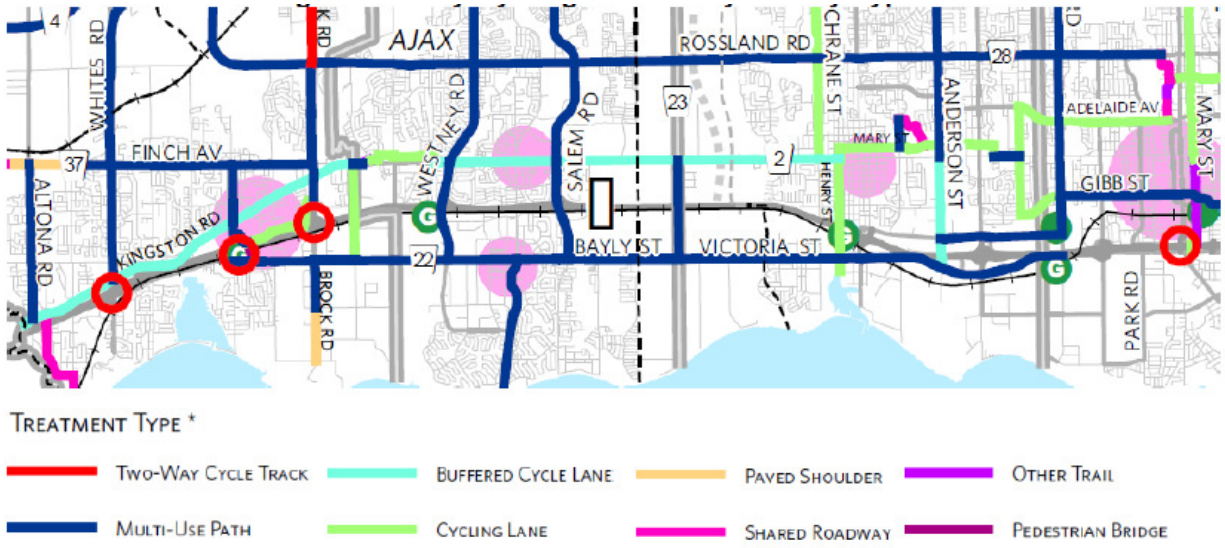


FIGURE 3.11. DURHAM REGION PRIMARY CYCLING NETWORK BY FACILITY TYPE

A summary of the planned facilities along the BRT corridor in Durham Region is provided in **TABLE 3.3**. In Durham Region, existing cycling facilities are provided intermittently in Pickering and Ajax where Kingston Road was widened to provide curbside bus lanes. There are generally sidewalks on both sides of Kingston Road, Dundas Street, King Street and Bond Street.

TABLE 3.3. SUMMARY OF EXISTING AND PLANNED CYCLING FACILITIES ALONG THE BRT CORRIDOR – DURHAM REGION CYCLING PLAN (2012)

Segment Limits	Identified	Facility Type	Identified in Municipal Plan
Kingston Road; Altona Road to Notion Road	Yes	Proposed Buffered Cycle Lane	Yes
Kingston Road; Notion Road to Elizabeth Street	Yes	Proposed Multiuse Path	Partially

Segment Limits	Identified	Facility Type	Identified in Municipal Plan
Kingston Road; Elizabeth Street to Westney Road	Partially - Via Alternate Route between Elizabeth & Rotherglen	Proposed Buffered Cycle Lane	Partially
Kingston Road; Westney Road to Salem Road	Yes	Existing Buffered Cycle Lane	Yes
Kingston Road/Dundas Street; Salem Road to Henry Street	Yes	Proposed Buffered Cycle Lane	Yes
Dundas Street; Henry Street to Kathleen Street	No – Alternate route via Henry Street & Mary Street/Crawforth Street	N/A	N/A
Dundas Street; Kathleen Street to Kendalwood Road	Yes	Proposed Multiuse Path	Yes

Based on the network maps shown in **FIGURE 3.11**, there are also several existing and planned facilities which intersect the BRT corridor. These corridors are summarized in **TABLE 3.4**.

TABLE 3.4. SUMMARY OF EXISTING AND PLANNED INTERSECTING CYCLING FACILITIES – DURHAM REGION CYCLING PLAN (2012)

Corridor	Direction (N/S)	Status Plan	Facility Type	Identified in Municipal Plan
Altona Road	N	Proposed (now Existing – east side)	Multi-use Path	Yes
Rougemount Drive	S	Proposed	Shared Roadway	Yes
Whites Road	N	Proposed	Multi-use Path	Yes
Liverpool Road	N/S	Proposed	Multi-use Path	Yes
Brock Road	N/S	Proposed (now Existing – west side)	Multi-use Path	Yes
Notion Road	S	Proposed	Cycling Lane (Superseded by concept for multi-use path on east side with Notion Road Flyover study)	Yes
Westney Road	N/S	Proposed	Multi-use Path	Yes
Salem Road	N/S	Proposed	Multi-use Path	Yes
Lake Ridge Road	S	Proposed	Multi-use Path	Yes
Cochrane Street	N	Proposed	Cycling Lane	Yes
Henry Street	S	Proposed	Cycling Lane	No

Corridor	Direction (N/S)	Status Plan	Facility Type	Identified in Municipal Plan
		(now partially existing – edge line)		
Anderson Street	N/S	Proposed	Multi-use Path	Yes
Garrard Road / Kendalwood Road	N/S	Proposed (now partially existing – edge line / signed route)	Cycling Lane	Yes
Thornton Road	N/S	Proposed	Multi-use Path	Yes

3.2 Natural Environment

The Natural Environment Report – Impact Assessment prepared by LGL Limited in January 2021 (see **Appendix C**) includes a detailed description of the results of the secondary source natural heritage review as well as the detailed natural heritage existing conditions field investigations undertaken by LGL Limited in 2019 and 2020 during the pre-TPAP phase. A summary of the existing natural heritage conditions within the Study Area is provided in the sections below.

3.2.1 Methodology

3.2.1.1 Environmental Policy Review

Various environmental policies, plans and legislation related to natural heritage were reviewed to determine the existing natural environment requirements as part of the Project including the following:

- Provincial Policy Statement, 2020;
- A Places to Grow: Growth Plan for the Greater Golden Horseshoe, 2020;
- Metrolinx Regional Transportation Plan, 2008 and 2041 Regional Transportation Plan for the Greater Toronto and Hamilton Area;
- Rouge National Urban Park Management Plan, 2019;
- Greenbelt Plan, 2017;
- Ontario *Endangered Species Act* 2007 (ESA) and Canada *Species at Risk Act* 2002 (SARA);
- *Fisheries Act*, 2019;
- *Conservation Authorities Act*, 1990 and The Living City Policies for Planning and Development in the Watersheds of the Toronto and Region Conservation Authority, 2014;

- *Migratory Birds Convention Act*, 1994; and,
- Local and Regional Official Plans - Natural Heritage Features, Systems and Policies;
    - City of Toronto Official Plan (2019),
    - Durham Regional Official Plan (2019),
    - City of Pickering Official Plan (2018),
    - Town of Ajax Official Plan (2016),
    - Town of Whitby Official Plan (2018), and
    - City of Oshawa Official Plan (2019).

3.2.1.2 Desktop and Background Data Review

Data was obtained from published data sources and unpublished information made available by relevant external agencies/stakeholders. This data was then reviewed and used to identify data gaps and deficiencies, and to scope the type, location and level of detail for field investigations (see **Section 3.2.1.4** below). All of the most recent plans, policies, legislation and Official Plans referenced above were accessed online.

The overall Study Area for the initial natural heritage desktop and background existing conditions data review included the DSBRT footprint covering the existing ROW and adjacent lands/habitats up to 120 m (north and south) from the future footprint (see **FIGURE 3.12**).

Aquatic Environment

Several background sources were reviewed for information pertaining to fish and fish habitat within the Study Area. Specifically, documents found on the websites of the TRCA and CLOCA regarding specific watersheds/subwatersheds and watercourses were examined. Both CLOCA and TRCA also provided additional aquatic resources/fisheries information for the Study Area in June 2019 and August 2019 respectively. In addition, the 'Make a Map' feature of the Natural Heritage Information Centre (NHIC) of the MNDMNRF (now Ministry of Northern Development, Mines, Natural Resources and Forestry) website was examined for aquatic SAR as was the Fisheries and Oceans Canada (DFO) Aquatic Species at Risk Mapping.

Terrestrial Environment

The geographical extent, composition, structure and function of vegetation communities within the Study Area were initially identified through air photo interpretation and a review of secondary source data, and later confirmed during the detailed field investigations. Air photos were interpreted by LGL Limited to determine the limits and characteristics of the vegetation communities in the Study Area. Additional information for areas within the City of Toronto, and within TRCA and CLOCA jurisdictions, were

incorporated to the extent possible using the Ecological Land Classification (ELC) data and designated natural area mapping provided from these agencies. Other background information reviewed included mapping from Carolinian Canada and species at risk (SAR) data from the NHIC. Detailed field investigations were conducted in late spring, summer and fall of 2019 to confirm existing conditions as these relate to vegetation and vegetation communities (see **Section 3.2.1.4**).

Wildlife

An investigation of the wildlife and wildlife habitat found in the Study Area was carried out using air photo interpretation, a review of secondary source data, and field surveys. The TRCA, CLOCA, MNDMNRF Aurora District Office, and Ontario Nature were contacted to request fauna element occurrence data. Information concerning wildlife SAR previously recorded within the vicinity of the Study Area was obtained from the NHIC. MNDMNRF provided SAR information for each municipality although this data was not specific to the Study Area. SAR occurrence information/occurrence records requested from MECP were not provided. Data obtained from CLOCA and TRCA provided element occurrence records for an array of wildlife species, including SAR. Ontario Nature provided reptile and amphibian data. More general information relating to wildlife and wildlife habitat was obtained following a review of published and non-published sources, including avian data obtained from Bird Studies Canada.

3.2.1.3 Agency Consultation

The external agencies/stakeholders that were contacted by the DSBRT study team (including Metrolinx, IBI Group, Parsons and LGL Limited) between March 2019 and January 2020 to obtain natural heritage data for the Study Area included the following:

- MNDMNRF (Aurora District Office);
- MECP;
- Ontario Nature;
- TRCA;
- CLOCA;
- Carolinian Canada;
- Tallgrass Ontario;
- City of Toronto; and,
- Durham Region.

External agencies were only contacted to obtain background natural heritage data that has not been published or that could not otherwise be obtained through literature and online searches.

3.2.1.4 Field Surveys

Detailed natural heritage field surveys were conducted by LGL Limited between April 2019 and June 2020 within the Study Area. The Study Area for the detailed natural heritage field investigations focused on the footprint (including the road rights-of-way and adjacent lands) within and directly adjacent to the road right-of-way (ROW) and up to approximately 120 m north and south of the centreline depending on the natural heritage requirements for each discipline.

Aquatic Environment

Site investigations were conducted at all 23 watercourses within the Study Area to document existing conditions regarding fish and fish habitat. Fish sampling was not conducted at most crossings as good datasets exist and were made available from the various regulatory agencies. However, sampling was deemed necessary at six sites for which data were not available (Crossings 3, 7, 8, 9, 15 and 17). Electrofishing was conducted at these sites on June 1, 2020. Site investigations focused on the physical characterization of habitat within approximately 50 m upstream and 100 m downstream of the crossings. These surveys were conducted on June 11 and 12, June 24 and 26, and October 9 and 11, 2019 and on April 24, 2020. Features are described in **Section 3.2.2** and are mapped on air photos. **Appendix C** presents a photographic record of the watercourses as well as the aquatic survey data including the habitat mapping overlayed onto aerial photos.

Terrestrial Environment

Field surveys were undertaken to identify, categorize and map local ecosites and vegetation types throughout the Study Area. Field surveys were undertaken, and vegetation communities classified according to the Ecological Land Classification for Southern Ontario: First Approximation and its Application (Lee *et al*. 1998), to the extent possible. Walking surveys were undertaken collecting species presence and species density information. Observations recorded included habitat inclusions where these were too small to delineate and noted habitat disturbances. Detailed field investigations conducted focused on an area up to approximately 30 m to 50 m from the paved/gravel shoulder, both north and south of Ellesmere Road / Kingston Road / Dundas Street / King Street and Bond Street (the Study Area) in order to confirm existing conditions as these relate to vegetation and vegetation communities.

Numerous field surveys were undertaken between May and October 2019. Additional visits took place in May and June 2019 in wetlands and good quality forested areas to record any early spring/ephemeral plant presence.

Wildlife

Detailed field investigations to document wildlife and wildlife habitat were conducted by LGL in spring/early summer of 2019 (and winter/spring of 2020 for bat habitat characterization) and focused on the proposed footprint and adjacent lands up to 50 m (north and south) from the future footprint (see **Appendix C** (Figures NER-1a – NER-

1i)). Surveys conducted included targeted anuran (frog and toad) and breeding bird surveys following provincially recognized protocols such as the Ontario Marsh Monitoring Program and the Ontario Breeding Bird Atlas Protocol, and a high-level bat habitat characterization which included forest classification and identification of tree snags and cavities. Incidental observations of wildlife were recorded during the 2019 field investigations.

3.2.2 Existing Watercourses/Hydrological Features

A total of twenty-four (24) watercourses cross the DSBRT corridor (with twenty-five (25) crossings total including two crossings of Oshawa Creek at King Street and Bond Street). Four are located within the City of Toronto (Crossings 1-4); seven are located within the City of Pickering (Crossings 5-11); three are located within the Town of Ajax (Crossings 12-14); six are located within the Town of Whitby (Crossings 15-20); and three are located within the City of Oshawa (Crossings 21-23). All watercourses are shown on **Appendix C** (Figures NER-1a to NER-1i). These watercourses are located within ten (10) watersheds: Highland Creek; Rouge River; Petticoat Creek, Frenchman's Bay (Amberlea, Dunbarton and Pine Creeks); Duffins Creek, Carruthers Creek, Lynde Creek; Pringle Creek; Corbett Creek; and Oshawa Creek. The first six watersheds are under the jurisdiction of the TRCA and the remaining four are under the jurisdiction of CLOCA.

3.2.3 Existing Aquatic Environment

This section describes the existing fish and fish habitat at each watercourse crossing and is presented geographically from west to east and further subdivided by municipality. This discussion is based on field investigations that were completed on June 11 and 12, June 24 and 26, and October 9 and 11, 2019 and on April 24 and June 1, 2020 and on July 30, 2021, and incorporates fish and fish habitat data that have been obtained from external agencies (MNDMNR, TRCA and CLOCA). **TABLE 3.5** presents a summary of fish and fish habitat conditions at each of the watercourses. **Appendix C** (Appendix B) presents a photographic record of the watercourses and **Appendix C** (Appendix C) presents the aquatic survey data including the habitat mapping overlayed onto aerial photos.

TABLE 3.5. EXISTING FISH AND FISH HABITAT CONDITIONS SUMMARY TABLE

Watercourse	Flow	Thermal Regime*	Fish Habitat	Fish Species Present	Substrate Type	Vegetation	Species at Risk/ Critical Habitat Present**	In Water Works Timing Window***
HIGHLAND CREEK WATERSHED								
Crossing 1: Highland Creek	Permanent	Warmwater	Direct	Creek Chub, Blacknose Dace, Longnose Dace, White Sucker, Fathead Minnow, Rainbow Trout, Chinook Salmon (MNDMNRF 2019a) Not sampled by LGL; Chinook Salmon observed at site visit (October 9, 2019)	Boulder, cobble, gravel, armourstone	N/A	N/A	July 15- March 31
Crossing 2: Tributary of Highland Creek	Permanent	Coldwater	Indirect	Creek Chub, Blacknose Dace, Fathead Minnow, Longnose Dace, White Sucker (MNDMNRF 2019a) Not sampled by LGL	Sand, gravel	N/A	N/A	June 15 – September 15
Crossing 3: Centennial Creek	Intermittent (piped downstream)	Warmwater	Indirect	Not provided (MNDMNRF 2019) Not sampled by LGL due to absence of water	N/A	*Phragmites*	N/A	July 15- March 31
ROUGE RIVER WATERSHED								
Crossing 4: Rouge River	Permanent	Warmwater	Direct	Not provided (MNDMNRF 2019) Blacknose Dace, Central Stoneroller, Common Shiner, Creek Chub, Logperch, Longnose Dace, Pumpkinseed, Rainbow Darter, Smallmouth Bass, Stonecat, White Sucker (TRCA 2019a) Not sampled by LGL; Gizzard Shad observed at site visit (October 9, 2019)	Sand, gravel, silt, boulder, cobble, detritus	*Elodea canadensis*	Potential Eastern Pondmussel *(Ligumia nasuta*) habitat (downstream only) Possible American Eel (*Anguilla rostrata*)	July 15- March 31
PETTICOAT CREEK WATERSHED								
Crossing 5: Petticoat Creek	Permanent	Warmwater	Direct	Brook Stickleback, Central Stoneroller, Creek Chub, Blacknose Dace, Fathead Minnow, Johnny Darter, Northern Redbelly Dace, Rainbow Darter, White Sucker (MNDMNRF 2019a) Not sampled by LGL; White Sucker, Creek Chub and Blacknose Dace observed during site visit (October 9, 2019)	Boulder, cobble, silt, gravel, clay	Watercress (*Nasturtium officinale), Phragmites,* grasses	N/A	July 15- March 31
Crossing 6: Tributary of Petticoat Creek	Permanent	Warmwater	Direct	Brook Stickleback, Central Stoneroller, Creek Chub, Blacknose Dace, Fathead Minnow, Johnny Darter, Northern Redbelly Dace, Rainbow Darter, White Sucker (MNDMNRF 2019a) Not sampled by LGL	Concrete, rip rap boulders, cobble, gravel, sand	Grasses, cattails, bulrush (*Typha* sp.)	N/A	July 15- March 31
FRENCHMAN'S BAY WATERSHED								
Crossing 7: Amberlea Creek	Permanent	Warmwater	Upstream – indirect, Downstream - potential direct	Not provided (MNDMNRF 2019) Sampled by LGL - no catch	Cobble, gravel, silt	N/A	N/A	July 15- March 31
Crossing 8: Tributary of Amberlea Creek	Permanent	Warmwater	Upstream – indirect, Downstream – potential direct, downstream of Kingston Road only	Not provided (MNDMNRF 2019) Sampled by LGL - no catch	Boulders, cobble, gravel, sand	Grasses, watercress	N/A	July 15- March 31

Watercourse	Flow	Thermal Regime*	Fish Habitat	Fish Species Present	Substrate Type	Vegetation	Species at Risk/ Critical Habitat Present**	In Water Works Timing Window***
Crossing 9: Tributary of Amberlea Creek	Permanent	Warmwater	Upstream - piped, Downstream - indirect	Not provided (MNDMNRF 2019) Sampled by LGL - no catch	Sand, boulder, cobbles	Grasses, cattails, algae	N/A	July 15- March 31
Crossing 10: Dunbarton Creek	Permanent	Warmwater	Direct	Creek Chub, Goldfish (MNDMNRF 2019a) Not sampled by LGL; Creek Chub observed during site visit (October 9, 2019)	Rip rap boulders, cobble, gravel, silt	Grasses, watercress	N/A	July 15- March 31
Crossing 11: Pine Creek	Permanent	Warmwater	Direct	Central Mudminnow, Common Shiner, Creek Chub, Blacknose Dace, Logperch, White Sucker (MNDMNRF 2019a) Not sampled by LGL, several Creek Chub observed during site visit (October 9, 2019)	Sand, gravel, cobble, boulder, detritus, exposed clay	N/A	N/A	July 15- March 31
DUFFINS CREEK WATERSHED								
Crossing 12: West Duffins Creek	Permanent	Coldwater	Direct	Creek Chub, Blacknose Dace, Johnny Darter, Longnose Dace, Rainbow Darter, Rainbow Trout, Stonecat, White Sucker (MND MNDMNRF 2019a) Not sampled by LGL; Chinook Salmon observed during site visit (October 11, 2019)	Sand, boulder, cobble, gravel, silt	N/A	Occupied Redside Dace (*Clinostomus elongatus*) Possible American Eel (*Anguilla rostrata*)	June 15 – September 15
Crossing 13: Duffins Creek	Permanent	Coldwater	Direct	Carp and Minnows, *Salmonidae* sp., Bluntnose Minnow, Brassy Minnow, Brook Stickleback, Brown Bullhead, Common Carp, Common Shiner, Creek Chub, Blacknose Dace, Emerald Shiner, Fathead Minnow, Finescale Dace, Golden Shiner, Johnny Darter (MNDMNRF 2019a) Not sampled by LGL	Cobble, boulder, gravel, sand, detritus	N/A	Contributing Redside Dace (*Clinostomus elongatus*) Possible American Eel (*Anguilla rostrata*)	June 15 – September 15
CARRUTHERS CREEK WATERSHED								
Crossing 14: Carruthers Creek	Permanent	Warmwater	Direct	Banded Killifish, Bluntnose Minnow, Common Shiner, Creek Chub, Blacknose Dace, Fathead Minnow, Johnny Darter, Tesselated Darter, Longnose Dace, Pumpkinseed, Rock Bass, White Sucker (MNDMNRF 2019a) Not sampled by LGL	Cobble, gravel, sand, silt	N/A	Historic Redside Dace (no current status) Possible American Eel (*Anguilla rostrata*)	July 15- March 31
LYNDE CREEK WATERSHED								
Crossing 14a: Tributary of Carruthers Creek	Intermittent	Warmwater	Indirect	Not provided (MNDMNRF 2019) Sampled by LGL - no catch	Silt, detritus	Cattails, *Phragmites*	N/A	July 15- March 31
Crossing 15: Tributary of Lynde Creek	Intermittent /ephemeral	Warmwater	Indirect	Not provided (MNDMNRF 2019) Sampled by LGL - no catch	Silt, detritus	Cattails, *Phragmites*	N/A	July 15- March 31
Crossing 16: Tributary of Lynde Creek	Permanent	Coolwater	Direct	Not provided (MNDMNRF 2019) Blacknose Dace, Bluntnose Minnow, Brook Stickleback, Creek Chub, Fathead Minnow, Lamprey sp., White Sucker (CLOCA, 2019a)	Silt, cobble, sand, gravel, detritus	Emergent grasses, cattails	Possible American Eel (*Anguilla rostrata*)	June15 – September 15
Crossing 17: Tributary of Lynde Creek	Permanent /piped downstream	Warmwater	Direct	Not provided (MNDMNRF 2019) Sampled by LGL Blacknose Dace, Creek Chub, Fathead Minnow	CSP	Grasses	N/A	July 15- March 31

Watercourse	Flow	Thermal Regime*	Fish Habitat	Fish Species Present	Substrate Type	Vegetation	Species at Risk/ Critical Habitat Present**	In Water Works Timing Window***
Crossing 18: Lynde Creek	Permanent	Coldwater	Direct	Creek Chub, Fathead Minnow, Johnny Darter, Longnose Dace, Pumpkinseed, Rainbow Darter, Rock Bass, Sand Shiner, Sea Lamprey, Smallmouth Bass, White Sucker (MNDMNRF 2019a) Migratory Rainbow Trout, Chinook Salmon (CLOCA 2019a) Not sampled by LGL; Chinook Salmon observed during site visit (October 11, 2019)	Cobble, boulder, gravel, sand, silt	N/A	No status Possibly occupied Redside Dace (requires study) Possible American Eel (*Anguilla rostrata*)	June 15 – September 15
PRINGLE CREEK WATERSHED								
Crossing 19: Pringle Creek	Permanent	Coldwater /Coolwater *	Direct	Creek Chub, Blacknose Dace, Johnny Darter, Tesselated Darter, Longnose Dace, Rainbow Trout (MNDMNRF 2019a) Rainbow Trout, Chinook Salmon (CLOCA 2019a) Not sampled by LGL; Chinook Salmon, Johnny Darter, Blacknose Dace, Creek Chub, Cyprinid sp. observed during site visit (October 11, 2019)	Rip rap boulder, cobble, gravel, sand, silt	Watercress	N/A	June 15 – September 15 or July 1 – September 15
CORBETT CREEK WATERSHED								
Crossing 20: Tributary of Corbett Creek	Intermittent	Warmwater	Direct	Creek Chub, Longnose Dace, White Sucker (MNDMNRF 2019a) Not sampled by LGL	Detritus, silt	Duckweed (*Lemna* sp.), *Phragmites*, cattails, grasses	N/A	July 15- March 31
Crossing 21: Corbett Creek	Permanent	Warmwater *	Direct	Bluntnose Minnow, Brook Stickleback, Brown Bullhead (MNDMNRF 2019a) Not sampled by LGL	Silt, detritus, sand, silt, gravel, rip rap	Cattails, grasses	N/A	July 15- March 31
OSHAWA CREEK WATERSHED								
Crossing 22: Goodman Creek	Permanent	Warmwater	Direct	Bluntnose Minnow, Brook Stickleback, Common Shiner, Creek Chub, Blacknose Dace, Fathead Minnow, Goldfish, Johnny Darter, Tesselated Darter, Longnose Dace, Northern Redbelly Dace, Pumpkinseed, Rock bass, Rainbow Darter, White Sucker (MNDMNRF 2019a) Not sampled by LGL; Cyprinid sp. and Creek Chub observed during site visit (October 11, 2019)	Gravel, silt, sand	Grasses, watercress	N/A	July 15- March 31
Crossing 23: Oshawa Creek	Permanent	Coldwater	Direct	Chinook Salmon, Alewife, Bluntnose Minnow, Brook Trout, Common Shiner, Creek Chub, Blacknose Dace, Fathead Minnow, Johnny Darter, Tessellated Darter, Logperch, Longnose Dace, Mottled Sculpin, Pumpkinseed, Rainbow Trout, Rock bass, Sea Lamprey, Smallmouth Bass (MNDMNRF 2019a) Chinook Salmon, Rainbow Trout, American Eel (CLOCA 2019a) Not sampled by LGL; Chinook Salmon observed during site visit.	Boulder, cobble, gravel	N/A	Possible American Eel (*Anguilla rostrata*)	July 15- March 31

Thermal Regime* = To be determined during detail design due to conflicting information from secondary sources.

SAR/Critical Habitat** = American Eel (*Anguilla rostrata*) occupation is possible at Crossings 4, 12-14, 16, 18, and 23, but requires study to confirm.

In Water Works Timing Window*** = Based on generally accepted timing windows typical for Southern Ontario watercourses and letter dated December 14, 2021 from MNDMNRF

3.2.4 Existing Terrestrial Environment

Vegetation and Vegetation Communities

The Study Area falls within the Lake Simcoe-Rideau Ecoregion 6E and Lake Erie-Lake Simcoe Ecoregion 7E (MNDMNRF 2019a). Vegetation communities found within the Study Area consist of a mixture of forest, wetland and cultural communities. A large portion of the Study Area, within the road ROW, is associated with cultural communities and manicured areas that contain a high proportion of invasive and non-native plant species that are disturbance tolerant. Overall, cultural vegetation communities delineated were observed to be in a disturbed state associated with existing land use practices. Forests identified are generally part of larger vegetation communities that extend beyond the Study Area, typically associated with watercourses and valleylands that cross Ellesmere Road/Kingston Road where large tracts of protected forest habitat were observed. These areas are typically associated with significant natural areas including the Highland Creek Swamp ANSI and the Rouge River Valley ANSI. Such larger natural features are typically located within the City of Toronto limits. Several cultural woodlands, meadow marsh and shallow marsh communities are associated with water crossings, the provincially significant Lynde Creek Coastal Wetland Complex and/or several environmentally significant areas identified within or adjacent to the Study Area. Many of the natural areas were historically identified by the TRCA (TRCA 1982) and refined by the City of Toronto in 2012 (North-South Environmental *et al.* 2012) and CLOCA (CLOCA 2019b) and across Durham Region. Vegetation communities were classified according to the *Ecological Land Classification for Southern Ontario: First Approximation and Its Application* (Lee et al. 1998), to the extent possible. In instances where edges are not representative of the larger vegetation community present, a stand description was not taken (see **Appendix C**, Appendix E) for copies of the Ecological Land Classification Sheets).

A total of 29 ecosites/vegetation types were identified within the Study Area based on field surveys undertaken by LGL staff throughout the spring, summer and fall of 2019. The range of vegetation communities present within the Study Area include several deciduous (FOD2-1, FOD3-1, FOD5-1, FOD5-3, FOD5-7, FOD5, FOD6-5 and FOD7-3), coniferous (FOC4-1) and mixed forest types (FOM2, FOM3-2 and FOM6-1). Wetland communities include Reed-Canary Grass Mineral Meadow Marsh (MAM2-2), Mineral Shallow Marsh (MAS2), Cattail Mineral Shallow Marsh (MAS2-1), Willow Mineral Thicket Swamp (SWT2-2), Birch-Poplar Mineral Mixed Swamp (SWM3), and several deciduous swamps (SWD3, SWD3-4 and SWD4). Cultural community types were also identified including Mineral Cultural Meadow (CUM1-1), Mineral Cultural Thicket (CUT1 and CUT1-1), and Mineral Cultural Woodland (CUW1), along with various plantation types (CUP1, CUP1-3, CUP1-8, CUP2 and CUP3-2). The communities identified include numerous combined vegetation communities including Mineral Cultural Meadow/Mineral Cultural Thicket (CUM1-1/CUT1 and CUM1-1/CUT1-1), Mineral Cultural Meadow/Mineral Cultural Woodland (CUM1-1/CUW1), Mineral Cultural Thicket/Mineral Cultural Woodland (CUT1/CUW1 and CUT1-1/CUW1), Mineral Meadow Marsh/Mineral Shallow Marsh (MAM2-2/MAS2), Mineral Shallow Marsh/Swamp Thicket

(MAS2-1/SWT2-2) and Mineral Shallow Marsh/Deciduous Swamp (MAS2-1/SWD4). These communities were either too small to delineate separately, or boundaries were difficult to distinguish often because communities were in successional.

Several small wetland patches typically less than 0.1 ha, or long narrow strips associated with roadside ditches that are dominated by common reed (*Phragmites australis*), were identified as inclusions within cultural meadow communities or manicured areas especially along ditches adjacent to Ellesmere Road/Kingston Road/Dundas Street. Many of these inclusions were dry and likely established due to seasonal runoff from the road network and commercial areas.

Areas not identified as Ecological Land Classification (ELC) vegetation communities were observed; primarily manicured areas (M) associated with sidewalks, parks, front yards, commercial development, cemeteries, etc., and hedgerows (H). Manicured areas also included mown lawns, gardens and planted trees. As noted above, common reed, and to a much less extent, cattails (*Typha* spp.), were noted to have established along roadside ditches.

The various ELC vegetation communities, manicured areas and hedgerows identified during field surveys undertaken by LGL staff are summarized in **TABLE 3.6** and are presented in **Appendix C** (Figures NER-1a to NER-1i).

TABLE 3.6. SUMMARY OF ECOLOGICAL LAND CLASSIFICATION COMMUNITIES

ELC Code	Vegetation Type	Species Association	Comments
Terrestrial-Natural/Semi-Natural			
FOC	CONIFEROUS FOREST		
FOC4-1a - b	Fresh-Moist White Cedar Coniferous Forest	**Canopy:** dominated by eastern white cedar (*Thuja occidentalis*). **Understorey:** includes choke cherry (*Prunus virginiana*), alternate-leaved dogwood (*Cornus alternifolia*) and common buckthorn (*Rhamnus cathartica*). **Ground Cover:** includes swallow-wort (*Cynanchum rossicum*) and wild sarsaparilla (*Aralia nudicaulis*).	• Tree cover > 60% (FO). • Conifer trees > 75% of canopy cover (C). • White cedar dominant (4). • Dominated entirely by white cedar (-1). • Middle to lower slopes and tableland, seepage and bottomlands.
FOD	DECIDUOUS FOREST		
FOD2-1	Dry-Fresh Oak-Red Maple Deciduous Forest	**Canopy:** includes red oak (*Quercus rubra*), red maple (*Acer rubrum*), American beech (*Fagus grandifolia*), eastern white cedar and white pine (*Pinus strobus*). **Understorey:** includes alternate-leaved dogwood, and common buckthorn. **Ground Cover:** includes riverbank grape (*Vitis riparia*), swallow-wort and Pennsylvania sedge (*Carex pennsylvanica*).	• Tree cover >60% (FO). • Deciduous trees >75% of canopy cover (D). • Oak species dominant with maples or other species (2). • Either Oak or Red Maple can dominate (-1).
FOD3-1a - b	Dry-Fresh Poplar Deciduous Forest	**Canopy:** includes white birch (*Betula papyrifera*), basswood (*Tilia americana*), large-tooth aspen (*Populus grandidentata*), and Manitoba maple (*Acer negundo*). **Understorey:** includes common buckthorn and tartarian honeysuckle (*Lonicera tatarica*). **Ground Cover:** includes swallow-wort, Canada goldenrod (*Solidago canadensis*) and Kentucky bluegrass (*Poa pratensis*).	• Tree cover >60% (FO). • Deciduous trees >75% of canopy cover (D). • Trembling aspen, largetooth aspen or white birch or similar associates dominant (3). • Dry-Fresh (-1).
FOD5-1a - b	Dry-Fresh Sugar Maple-Deciduous Forest	**Canopy:** includes Sugar maple (*Acer saccharum* ssp. *saccharum*), American beech, red oak, white pine and black cherry (*Prunus serotina*). **Understorey:** includes choke cherry, scarlet hawthorn (*Crataegus pedicellata*) and common buckthorn. **Ground Cover:** includes alternate-leaved dogwood and tartartian honeysuckle.	• Tree cover >60% (FO). • Deciduous trees >75% of canopy cover (D). • Sugar maple with other deciduous associates (5). • Almost entirely dominated by sugar maple (-1).
FOD5-3a - b	Dry-Fresh Sugar Maple-Oak Deciduous Forest	**Canopy:** includes Sugar maple, red oak (*Quercus rubra*), American beech and white pine. **Understorey:** includes alternate-leaved dogwood, common buckthorn and choke cherry. **Ground Cover:** includes herb-robert (*Geranium robertianum*), swallow-wort, large-leaved aster (*Eurybia macrophyllus*), blue-stem goldenrod (*Solidago caesia*), and white avens (*Geum canadense*).	• Tree cover >60% (FO). • Deciduous trees >75% of canopy cover (D). • Sugar maple with other deciduous associates (5). • Almost entirely dominated by sugar maple (-3).
FOD5-7	Dry-Fresh Sugar Maple – Black Cherry Deciduous Forest	**Canopy:** includes sugar maple, black cherry (*Prunus serotina*), trembling aspen (*Populus tremuloides*) and eastern hemlock (*Tsuga canadensis*). **Understorey:** includes choke cherry, common buckthorn, guelder rose (*Viburnum opulus*) and sugar maple. **Ground Cover:** includes yellowish enchanter's nightshade (Circaea *lutetiana* spp. *canadensis*), poison-ivy (*Rhus radicans* spp. *negundo*), swallow-wort, and white trillium (*Trillium grandiflorum*).	• Tree cover >60% (FO). • Deciduous trees > 75% of canopy cover (D). • Sugar maple with other deciduous associates (5). • Black cherry is also present (-7).
FOD5a - c	Dry-Fresh Sugar Maple Deciduous Forest	**Canopy:** includes sugar maple, black walnut (*Juglans nigra*), basswood, black cherry and Manitoba maple. **Understorey:** includes wild black current (*Ribes americanum*), choke cherry, common buckthorn and tartarian honeysuckle. **Ground Cover:** includes riverbank grape, swallow-wort, small jack-in-the-pulpit (*Arisaema triphyllum*), and yellow dog's-tooth violet (*Erythronium americanum*).	• Tree cover >60% (FO). • Deciduous trees >75% of canopy cover (D). • Sugar maple with other deciduous associates (5).

ELC Code	Vegetation Type	Species Association	Comments
FOD6-5	Fresh-Moist Sugar Maple-Hardwood Deciduous Forest	**Canopy:** includes sugar maple, American beech, white birch, yellow birch (*Betula alleghaniensis*), basswood and eastern white cedar. **Understorey:** includes wild black currant (*Ribes americanum*), chokecherry and alternate-leaved dogwood. **Ground Cover:** includes swallow-wort, lily-of-the-valley (*Convallaria majalis*) and white trillium.	• Tree cover >60% (FO). • Deciduous trees >75% of canopy cover (D). • Sugar maple with ashes, maples and elm associates (6). • Uncommon associates with sugar maple (-5).
FOD7-3	Fresh-Moist Willow Lowland Deciduous Forest	**Canopy:** includes white willow (*Salix alba*), crack willow (*S. fragilis*), Manitoba maple and trembling aspen. **Understorey:** includes red-osier dogwood (*Cornus sericea*) and riverbank grape. **Ground Cover:** includes tall goldenrod (*Solidago altissima*), yellow avens (*Geum aleppicum*) and rice cut grass (*Leersia oryzoides*).	• Tree cover >60% (FO). • Deciduous trees >75% of canopy cover (D). • White elm, willows, black walnut, basswood and ashes dominate separately or in variable mixtures (7). • Often resulting from cultural influences (-3).
FOM	MIXED FOREST		
FOM2a - c	Dry-Fresh White Pine-Maple-Oak Mixed Forest	**Canopy:** includes white pine, eastern white cedar, eastern hemlock, white elm (*Ulmus americana*) and trembling aspen. **Understorey:** includes smooth juneberry (*Amelanchier laevis*), alternate-leaved dogwood and common buckthorn. **Ground Cover:** includes ostrich fern (*Matteuccia struthiopteris* var. *latiusculum*), yellow avens, yellowish enchanter's nightshade, lily-of-the-valley and riverbank grape.	• Tree cover >60% (FO). • Conifer trees >25% and deciduous tree species >25% canopy cover (M). • White pine with sugar maple, and red oak, dominant species varies (2).
FOM3-2	Dry-Fresh Sugar Maple-Hemlock Mixed Forest	**Canopy:** includes sugar maple, red maple, red oak, basswood and Manitoba maple. **Understorey:** includes common buckthorn, multiflora rose, guelder rose, sugar maple and winged spindle tree. **Ground Cover:** includes swallow-wort, bitter nightshade, Pennsylvania sedge and spotted touch-me-not (*Impatiens capensis*).	• Tree cover >60% (FO). • Conifer trees >25% and deciduous tree species >25% canopy cover (M). • Hemlock with sugar maple, red maple or red oak, dominant species varies (3). • Hemlock with sugar maple, sugar maple >25% of canopy cover (-2).
FOM6-1	Fresh-Moist Sugar Maple – Hemlock Mixed Forest	**Canopy:** includes sugar maple, eastern hemlock, black cherry and red ash (*Fraxinus pennsylvanica*). **Understorey:** includes choke cherry, alternate-leaved dogwood and round-leaved dogwood (*Cornus rugosa*). **Ground Cover:** includes yellowish enchanter's nightshade, herb-robert, swallow-wort, zig-zag goldenrod and blue cohosh (*Caulophyllum thalictroides*).	• Tree cover >60% (FO). • Conifer trees >25% and deciduous tree species >25% canopy cover (M). • Hemlock with sugar maple, yellow birch, dominant species varies (6). • Hemlock with sugar maple, sugar maple >25% of canopy cover (-1).
Terrestrial-Cultural			
CUM	CULTURAL MEADOW		
CUM1-1a - p	Dry – Moist Old Field Meadow	**Emergent:** includes trembling aspen, green ash (*Fraxinus pennsylvanica*), scotch pine (*Pinus sylvestris*) and staghorn sumac (*Rhus hirta*). **Understorey:** includes common buckthorn (*Rhamnus cathartica*) and red raspberry (*Rubus idaeus*). **Ground Cover:** includes Kentucky bluegrass, smooth brome (*Bromus inermis*), wild carrot (*Daucus carota*), swallow-wort, clovers (*Trifolium repens, T. pratense*), Canada goldenrod (*Solidago canadensis*), common reed (*Phragmites australis*), and New England aster (*Symphyotrichum novae-angliae*).	• Cultural community (CU). • Tree cover and shrub cover < 25% (M). • Mineral soil (1). • This community can occur on a wide range of soil moisture regimes (Dry-Moist) (-1).
CUM/CUT	CULTURAL MEADOW / THICKET		
CUM1-1a/CUT1-1a to CUM1-1c/CUT1-1c	Dry – Moist Old Field Meadow/ Sumac Cultural Thicket	**Emergent:** includes green ash and trembling aspen. **Understorey:** thicket inclusions are dominated by staghorn sumac. **Ground Cover:** includes Kentucky bluegrass, smooth brome, swallow-wort, Canada goldenrod, and white heath aster (*Symphyotrichum ericoides*).	• Cultural communities (CU). • Tree cover and shrub cover < 25% (M). • Tree cover <25%; shrub cover >25% (T). • Mineral soil (1). • These communities can occur on a wide range of soil moisture regimes (Dry-Moist) and in thicket communities sumac is dominant (-1).

ELC Code	Vegetation Type	Species Association	Comments
CUM1-1/CUT1	Dry – Moist Old Field Meadow/ Mineral Cultural Thicket	**Emergent:** includes green ash, black walnut (*Juglans nigra*), apple (*Malus* sp.), and Norway maple (*Acer platanoides*). **Understorey:** includes smoke-tree (*Cotinus coggygria*), tartarian honeysuckle, common buckthorn, and staghorn sumac. **Ground Cover:** includes Kentucky bluegrass, smooth brome, butter and eggs (*Linaria vulgaris*), horseweed (*Conyza canadensis*), Canada goldenrod and Canada thistle (*Cirsium arevense*).	• Cultural communities (CU). • Tree cover and shrub cover < 25% (M). • Tree cover <25%; shrub cover >25% (T). • Mineral soil (1). • These communities can occur on a wide range of soil moisture regimes (Dry-Moist) (-1).
CUM/CUW	CULTURAL MEADOW / WOODLAND		
CUM1-1a/CUW1a to CUM1-1g/CUW1g	Dry – Moist Old Field Meadow/ Mineral Cultural Woodland	**Canopy:** includes black walnut, white spruce (*Picea glauca*), Austrian pine (*Pinus nigra*), eastern white cedar (*Thuja occidentalis*), white elm, white birch (*Betula papyrifera*), trembling aspen, Manitoba maple (*Acer negundo*), Siberian elm (*Ulmus pumila*), and willows (*Salix* sp.). **Understorey:** includes winged spindle tree (*Euonymus alata*), white ash (*Fraxinus americana*), staghorn sumac, riverbank grape, and common buckthorn. **Ground Cover:** species includes bluegrasses (*Poa* sp.), Canada goldenrod, bird's-foot trefoil (*Lotus corniculata*), poison-ivy, swallow-wort, common reed, garlic mustard (*Alliaria petiolata*) and smooth brome.	• Cultural communities (CU). • Tree cover and shrub cover < 25% (M). • 35% < tree cover ≤ 60% (W). • Mineral soil (1). • These communities can occur on a wide range of soil moisture regimes (Dry-Moist) • (-1).
CUT	CULTURAL THICKET		
CUT1a - c	Mineral Cultural Thicket	**Emergent:** includes white spruce, Colorado spruce (*Picea pungens*), eastern red cedar (*Juniperus virginiana*), eastern white cedar (*Thuja occidentalis*), trembling aspen, and Manitoba maple. **Understorey:** includes staghorn sumac, common buckthorn, Russian olive (*Elaeagnus angustifolia*), riverbank grape, green ash and common buckthorn (*Rhamnus cathartica*). **Ground Cover:** includes clovers, smooth brome, ribgrass (*Plantago lanceolata*), and swallow-wort.	• Cultural community (CU). • Tree cover <25%; shrub cover >25% (T). • Mineral soil (1).
CUT1-1 a-c	Sumac Cultural Thicket	**Emergent:** includes Siberian elm, eastern cottonwood (*Populus deltoides*) and black locust (*Robinia pseudo-accacia*). **Understorey:** dominated by staghorn sumac. **Ground Cover:** includes variable crown-vetch, wild carrot, swallow-wort, and large-leaved aster.	• Cultural community (CU). • Tree cover <25%; shrub cover >25% (T). • Mineral soil (1). • Sumac is dominant (-1).
CUT/CUW	CULTURAL THICKET / CULTURAL WOODLAND		
CUT1/CUW1	Sumac Cultural Thicket/Mineral Cultural Woodland	**Canopy:** includes Austrian pine (*Pinus nigra*), Scotch pine (*Pinus sylvestris*), black walnut, silver maple (*Acer saccharinum*), and Manitoba maple. **Understorey:** includes eastern red cedar, red ash, staghorn sumac, and common buckthorn (*Rhamnus cathartica*). **Ground Cover:** includes Kentucky bluegrass, riverbank grape, swallow-wort, white heath aster, Canada goldenrod and common reed.	• Cultural community (CU). • Tree cover <25%; shrub cover >25% (T). • 35% < tree cover ≤ 60% (W). • Mineral soil (1).
CUT1-1/CUW1	Sumac Cultural Thicket/Mineral Cultural Woodland	**Canopy:** includes Siberian elm, Norway maple, basswood, white elm, and eastern white cedar. **Understorey:** dominated by staghorn sumac. **Ground Cover:** includes orchard grass (*Dactylis glomerata*), Canada bluegrass (*Poa compressa*), garlic mustard and common dandelion (*Taraxacum officinale*).	• Cultural community (CU). • Tree cover <25%; shrub cover >25% (T). • 35% < tree cover < 60% (W). • Mineral soil (1). • Sumac is dominant (-1).
CUP	CULTURAL PLANTATION		
CUP1	Deciduous Plantation	**Canopy:** includes basswood, black locust, red ash, and eastern white cedar. **Understorey:** includes multiflora rosa (*Rosa multiflora*), choke cherry (*Prunus virginiana*), and common buckthorn. **Ground Cover:** includes garlic mustard, yellow avens, and creeping Charlie (*Glechoma hederacea*).	• Cultural communities (CU). • Tree cover is <60% (P). • Deciduous tree species > 75% of canopy cover (1). • Community resulting from, or maintained by, anthropogenic-based influences.

ELC Code	Vegetation Type	Species Association	Comments
CUP1-3	Black Walnut Deciduous Plantation	**Canopy:** includes black walnut, white elm, bur oak (*Quercus macrocarpa*), basswood and Manitoba maple. **Understorey:** includes choke cherry and red ash. **Ground Cover:** includes Canada goldenrod, riverbank grape and white snakeroot (*Ageratina altissima*).	• Cultural communities (CU). • Tree cover is <60% (P). • Deciduous tree species > 75% of canopy cover (1). • Black walnut dominant (-3). • Community resulting from, or maintained by, anthropogenic-based influences.
CUP1-8a and CUP1-8b	Red Oak Deciduous Plantation	**Canopy:** includes red oak, ironwood (*Ostrya virginiana*), black cherry (*Prunus virginiana*), sugar maple and eastern white pine. **Understorey:** includes common buckthorn and tartarian honeysuckle. **Ground Cover:** includes yellowish enchanter's nightshade, riverbank grape, poison-ivy, and swallow-wort.	• Cultural communities (CU). • Tree cover is <60% (P). • Deciduous tree species > 75% of canopy cover (1). • Red oak dominant (-8). • Community resulting from, or maintained by, anthropogenic-based influences.
CUP2	Mixed Plantation	**Canopy:** includes Austrian pine, white pine, red oak, sugar maple, and basswood. **Understorey:** includes choke cherry, winged spindle tree, and tartartian honeysuckle. **Ground Cover:** includes riverbank grape, wild sarsaparilla, swallow-wort and zig-zag goldenrod (*Solidago flexicaulis*).	• Cultural communities (CU). • Tree cover is <60% (P). • Coniferous tree species > 25% and deciduous tree species > 25% of canopy cover (2).
CUP3-2 a-b	White Pine Coniferous Plantation	**Canopy:** includes white pine, Norway spruce (*Picea abies*), eastern white cedar, bur oak, red oak and black walnut. **Understorey:** includes tartarian honeysuckle. **Ground Cover:** includes swallow-wort, smooth brome, and orchard grass.	• Cultural communities (CU). • Tree cover is <60% (P). • Coniferous tree species > 75% of canopy cover (3). • White pine dominant (-2).
CUW	CULTURAL WOODLAND		
CUW1a - w	Mineral Cultural Woodland	**Canopy:** includes Austrian pine, Norway spruce, white pine, white elm, Siberian elm, basswood, eastern cottonwood, trembling aspen, hybrid willow (*Salix X pendulina*) and black walnut. **Understorey:** includes eastern red cedar, Japanese knotweed (*Polygonum cuspidatum*), thimble-berry (*Rubus occidentalis*), winged spindle tree, common buckthorn, willows, guelder rose (*Viburnum opulus*), and tartarian honeysuckle. **Ground Cover:** includes Kentucky bluegrass, swallow-wort, garlic mustard, yellow avens, riverbank grape, glandular touch-me-not (*Impatiens glandulifera*), goutweed (*Aegopodium podagraria*), Indian hemp (*Apochynum cannabinum*), lungwort (*Pulmonaria officinalis*) and swallow-wort.	• Cultural communities (CU). • 35% < tree cover < 60% (W). • Mineral Soil (1).
Wetland			
MAM	MEADOW MARSH		
MAM2-2	Reed-Canary Grass Mineral Meadow Marsh	**Emergent:** includes white willow and silver maple. **Ground Cover:** includes reed-canary grass (*Phalaris arundinacea*), panicled aster (*Symphyotrichum lanceolatus* spp. *herperius*), and Canada goldenrod.	• Tree or shrub cover <25% (MA). • Flooding seasonal, species less tolerant of prolonged flooding (M). • Mineral soil (2). • Reed-canary grass dominant (-2).
MAM/MAS	MEADOW MARSH / SHALLOW MARSH		
MAM2-2/MAS2	Reed-Canary Grass Mineral Meadow Marsh/Mineral Shallow Marsh	**Emergent:** includes Manitoba maple. **Ground Cover:** includes reed-canary grass, panicled aster, American wild mint (*Mentha arvensis* ssp. *borealis*), spotted joe-pye-weed (*Eupatorium maculatum*) and fox sedge (*Carex vulpinoidea*).	• Tree or shrub cover <25% (MA). • Flooding seasonal, species less tolerant of prolonged flooding (M). • Standing or flowing water for much of the growing season (S). • Mineral soil (2). • Reed-canary grass dominant (-2).
MAS	SHALLOW MARSH		
MAS2a - f	Mineral Shallow Marsh	**Emergent:** trembling aspen, Manitoba maple and hybrid willow. **Understorey:** willows (*Salix discolor*) and Missouri willow (*Salix eriocephala*). **Ground Cover:** dominated by common reed with riverbank grape, swallow-wort and Canada goldenrod.	• Tree or shrub cover <25% (MA). • Water up to 2 m deep, with standing or flowing water for much of the growing season (S). • Mineral soil (2). • Dominated by emergent hydrophytic macrophytes.

ELC Code	Vegetation Type	Species Association	Comments
MAS2-1a - h	Cattail Mineral Shallow Marsh	**Emergent:** trembling aspen, and crack and white willow, and Manitoba maple. **Understorey:** includes eastern white cedar and Missouri willow. **Ground Cover:** cattails (*Typha* spp.) dominate with spotted touch-me-not (*Impatiens*), blue vervain (*Verbena hastata*), sedges (*Carex stipata*, *C. hystericina*, and *C. lacustris*), horsetails (*Equisetum arvense* and *E. pratense*), sensitive fern (*Onoclea sensibilis*), Canada anemone (*Canadensis anemone*), dame's rocket (*Hesperis matronalis*), and purple loosestrife (*Lythrum salicaria*).	• Tree or shrub cover <25% (MA). • Water up to 2 m deep, with standing or flowing water for much of the growing season (S). • Mineral soil (2). • Cattails are dominant (-1). • Dominated by emergent hydrophytic macrophytes.
MAS/SWD	SHALLOW MARSH / DECIDUOUS SWAMP		
MAS2-1/SWD4	Cattail Mineral Shallow Marsh/Mineral Deciduous Swamp	**Emergent:** black walnut and white willow. **Understorey:** includes red-osier dogwood. **Ground Cover:** includes spreading bentgrass (*Agrostis stolonifera*), elecampane (*Inula helenium*), spotted jewel-weed (*Capensis impatiens*), purple-stemmed aster (*Symphyotrichum puniceum*), narrow-leafed cattail (*Typha angustifolia*), and field mint (*Mentha arvensis*).	• Tree or shrub cover <25% (MA). • Water up to 2 m deep, with standing or flowing water for much of the growing season (S). • Mineral soil (2). • Tree or shrub cover >25% and dominated by hydrophytic shrub and tree species (SW). • Deciduous tree cover >75% of canopy cover (D). • Mineral soils and less common associates of willow, white elm, birch and aspen (4).
MAS/SWT	SHALLOW MARSH / THICKET SWAMP		
MAS2-1/SWT2-2	Cattail Mineral Shallow Marsh/Willow Mineral Thicket Swamp	**Emergent:** willows (*Salix* sp.) and black walnut. **Understorey:** includes willows and guelder rose. **Ground Cover:** dominated by cattails (*Typha* sp.) and includes purple loosestrife (*Lythrum salicaria*), blue vervain, spotted joe-pye-weed, reed canary grass and white bedstraw (*Galium mullugo*).	• Tree or shrub cover <25% (MA). • Water up to 2 m deep, with standing or flowing water for much of the growing season (S). • Mineral soil (2). • Tree or shrub cover >25% and dominated by hydrophytic shrub and tree species (SW). • Tree cover <u>≤</u>25%; hydrophytic shrubs >25% (T). • Mineral soils, areas where flooding duration is short, substrate is aerated spring/early summer (2). • Willows dominant (-2).
SWT	THICKET SWAMP		
SWT2-2	Willow Mineral Thicket Swamp	**Emergent:** crack willow. **Understorey:** dominated by willows and includes red-osier dogwood and guelder rose. **Ground Cover:** includes spotted touch-me-not, blue vervain, cattails and awl-fruited sedge.	• Tree or shrub cover >25% and dominated by hydrophytic shrub and tree species (SW). • Deciduous tree cover <25%; hydrophytic shrubs > 25% (T). • Mineral soil (2). • Willows are dominant (-2).
SWD	DECIDUOUS SWAMP		
SWD3a - c	Maple Mineral Deciduous Swamp	**Canopy:** includes Manitoba maple, freeman's maple (*Acer X freemanii*), willows and black walnut. **Understorey:** includes red ash, Manitoba maple and choke cherry. **Ground Cover:** includes white and yellow avens, white bedstraw, Canada goldenrod, giant goldenrod and dame's rocket.	• Tree or shrub cover >25% and dominated by hydrophytic shrub and tree species (SW). • Deciduous tree cover >75% of canopy cover (D). • Mineral soils and maple dominant (3).
SWD3-4a - c	Manitoba Maple Mineral Deciduous Swamp	**Canopy:** includes Manitoba maple, willows, black walnut, freeman's maple (*Acer X freemanii*), and balsam poplar (*Betula balsamifera*) and trembling aspen. **Understorey:** includes red ash, Manitoba maple, balsam poplar, and choke cherry. **Ground Cover:** includes spotted touch-me-not, swallow-wort, reed canary grass, blue vervain, large-leaved aster, white snakeroot, giant goldenrod, and cattails.	• Tree or shrub cover >25% and dominated by hydrophytic shrub and tree species (SW). • Deciduous tree cover >75% of canopy cover (D). • Mineral soils and less common associates of willow, white elm, birch and aspen (4).
SWD4	Mineral Deciduous Swamp	**Canopy:** white elm, crack willow, Manitoba maple and silver maple. **Understorey:** includes Manitoba maple, red ash, guelder rose and common buckthorn. **Ground Cover:** includes riverbank grape and Canada goldenrod.	• Tree or shrub cover >25% and dominated by hydrophytic shrub and tree species (SW). • Deciduous tree cover >75% of canopy cover (D).

ELC Code	Vegetation Type	Species Association	Comments
			• Mineral soils and less common associates of willow, white elm, birch and aspen (4).
SWM3	Birch-Poplar Mineral Mixed Swamp	**Canopy:** balsam poplar, trembling aspen, white ash and eastern white cedar. **Understorey:** includes balsam poplar, red ash, red-osier dogwood, common buckthorn and common elderberry (*Sambucus canadensis*). **Ground Cover:** includes riverbank grape, coltsfoot (*Tussilago farfara*) and narrow-leaved cattail.	• Tree or shrub cover >25% and dominated by hydrophytic shrub and tree species (SW). • Deciduous tree cover >25% and coniferous tree cover >25% of canopy cover (M). • Mineral soils, and birch and poplar species variably dominant (3).
OTHER*	MANICURED AND HEDGEROW		
M and H	Manicured grasses and planted shrubs and/or trees	Areas where large expanses of grass/shrubs/trees are maintained and/or planted. **Planted/established trees/shrubs:** includes Norway maple, sugar maple, common hackberry (*Celtis occidentalis*), red oak, bur oak, maiden-hair tree (*Ginkgo biloba*), tulip tree (*Liriodendron tulipifera*), honey locust (*Gleditsia triacanthos*), black locust (*Robinia pseudo-acacia*), Canadian redbud (*Cercis canadensis*), Kentucky coffee-tree (*Gymnocladus dioicus*), Colorado spruce, Norway Spruce, white spruce, eastern red cedar, eastern cottonwood, hybrid willow, silver variegated dogwood (*Cornus alba 'elegantissima'*), Japanese Yew (*Taxus cuspidata*), hawthorns (*Crataegus* spp.), Canada plum (*Prunus nigra*), honeysuckles (*Lonicera* spp.), staghorn sumac, and common buckthorn. **Grasses**: includes bluegrasses, smooth brome, reed-canary grass, sweet manna grass (*Glyceria maxima*), Canada goldenrod, bird's-foot trefoil, ribgrass, common plantain (*Plantago major*), and common dandelion.	

Flora

Detailed field investigations undertaken across the Study Area in 2019 included documenting species presence. A vascular plant list (see **Appendix C**, **Appendix F**) was prepared as a result of botanical survey data collected for vegetation communities identified. A total of 305 plant species were recorded within the Study Area, however, 13 of these plants could only be identified to genus. Of the 292 plants identified to species, 167 are native (57%) and 125 are non-native (43%). The overall percentage of native species in the Study Area is low when compared with the percentage of native plant species in the flora of Ontario (73%: Kaiser 1983). This is a reflection of the high degree of residential, commercial, and industrial land uses within the Study Area, with an associated high proportion of cultural communities and manicured areas, and an increased diversity of non-native and/or invasive species. This ultimately serves to promote the establishment and continued dispersal of these species.

Forest and wetland communities generally provide higher quality habitat and have a higher occurrence of native plant species that are more specialized. Higher quality vegetation communities with a more diverse range of native species were associated with designated natural areas including Highland Creek Swamp ANSI and associated ESAs, Ellesmere Woods ESA, and the Rouge River Valley ANSI and associated ESAs.

Appendix C (Section 4f) provides a more detailed summary of existing conditions and vegetation communities identified within the respective municipalities across the Study Area.

3.2.5 Existing Wildlife

There are many natural heritage features located within the Study Area between McCowan Road in the City of Toronto and Simcoe Street in the City of Oshawa, mainly associated with the main watercourses/valleylands located within the Study Area. Valleylands associated with Highland Creek, Tributary of Highland Creek, Centennial Creek, and Rouge River/Little Rouge Creek (within Toronto); Petticoat Creek, Dunbarton Creek, and Pine Creek (within Pickering); West Duffins Creek, Duffins Creek and Carruthers Creek (within Ajax); Lynde Creek, Pringle Creek and Tributary of Corbett Creek (within Whitby); and Corbett Creek, Goodman Creek, and Oshawa Creek (within Oshawa) comprise the highest quality natural heritage features in the Study Area, provide important north-south local and regional movement corridors for wildlife, and support a moderate diversity of wildlife species. These north-south naturalized linkages provide increased opportunity for wildlife utilization of habitats within and adjacent to the Study Area. Interspaced between these larger, more contiguous natural heritage features, are numerous open-country habitat types such as cultural meadows, thickets, woodlands, plantations, agricultural lands, and several aquatic habitat types (meadow marsh, shallow marsh, deciduous swamp, mixed swamp and thicket swamp).

However, outside of these valleylands, the landscape is highly disturbed and supports limited natural heritage features (largely composed of manicured lands), resulting in the

presence of a low to moderate diversity of wildlife species generally considered urban or tolerant of anthropogenic features and disturbance.

A summary of wildlife habitat conditions for each municipality is provided in **Appendix C** (Section 4g).

Herpetofauna

Methodologies outlined in the Marsh Monitoring Program (2000) were followed to confirm the presence of anuran species, document potential breeding habitat/areas, and confirm the nature, extent and significance of amphibian usage. Six stations were strategically placed throughout the Study Area where amphibian breeding habitat was suspected (based on aerial photo interpretation and initial field review) and where access was permitted. **Appendix C** (Figures NER-1a to NER-1i) present the locations of the stations. Anuran surveys were conducted on three separate occasions during the spring and summer of 2019. Each survey was conducted during appropriate weather conditions, beginning one half hour after sunset and concluding just prior to midnight. Surveys were completed during periods of peak anuran breeding activity and vocalization. Anuran breeding evidence was documented for four species during the 2019 surveys. Vocalizing male American Toad (*Anaxyrus americanus*), Green Frog (*Lithobates clamitans*), Gray Tree Frog (*Hyla versicolor)* and Spring Peeper *(Pseudacris crucifer)* were noted within the Study Area, or in the immediate vicinity of the Study Area. A summary of anuran species is presented in **TABLE 3.7**. Overall, the majority of aquatic habitats observed throughout the Study Area displayed evidence of amphibian breeding during 2019 survey periods. It is noted that a high level of traffic noise interfered with the ability to hear anuran vocalizations in some locations. Amphibian breeding behaviour was observed in the following locations; Highland Creek (south of Ellesmere Road, east of Orton Park Road), isolated marsh areas within Morningside Park (south of Ellesmere Road, west of Morningside Avenue), pond (north of Kingston Road East, east of Carruthers Creek), storm water management pond (south of Kingston Road East, east of Galea Drive), marsh (north of Dundas Street East, east of Kathleen Street), and within Lynde Creek Coastal Wetland Complex PSW (south of Dundas Street West, east of Highway 401).

Amphibian occurrence records within the vicinity of the Study Area were obtained from the Ontario Reptile and Amphibian Atlas (ORAA, Ontario Nature 2019) and CLOCA (2019b). Data obtained from the ORAA indicated records for four species: American Toad, Green Frog, Eastern Gartersnake (*Thamnophis sirtalis sirtalis*) and Midland Painted Turtle (*Chrysemys picta marginata*). Data received from CLOCA contained a record for Snapping Turtle (*Chelydra serpentina*) in the vicinity of the Study Area. Of these species, American Toad and Green Frog were identified by LGL during the 2019 field investigations, as noted above. Other reptile and amphibian species are expected to be found within the Study Area; though, an assemblage that is generally considered tolerant of anthropogenic influences is expected to be present within the lands examined.

TABLE 3.7. WILDLIFE SPECIES DOCUMENTED WITHIN THE STUDY AREA BY LGL AND SECONDARY SOURCE DATA

Wildlife	Scientific Name	Common Name	Species Status under Legislation/Local Sensitivity				Source of Species Identification	
			Canada SARA	Ontario ESA	Legal Status	Local	LGL[1]	Secondary Source[2]
Herpetofauna	*Anaxyrus americanus*	American Toad	-	-	-	L4	*	*
	Thamnophis sirtalis	Eastern Gartersnake	-	-	-	L4		*
	Lithobates clamitans	Green Frog	-	-	-	L4	*	*
	Hyla versicolor	Gray Tree Frog	-	-	FWCA(P)	L2	*	*
	Chrysemys picta	Midland Painted Turtle	-	-	-	L4		*
	Pseudacris crucifer	Spring Peeper	-	-	-	L2	*	*
	Chelydra serpentina	Snapping Turtle	SC	SC	-	L3		*
Invertebrates	*Papilio cresphontes*	Giant Swallowtail	-	-	FWCA(P)	-		*
Birds	*Corvus brachyhrynchos*	American Crow	-	-	-	L5	*	
	Carduelis tristis	American Goldfinch	-	-	MBCA	L5	*	
	Setophaga ruticilla	American Redstart	-	-	MBCA	L3	*	
	Turdus migratorius	American Robin	-	-	MBCA	L5	*	
	Haliaeetus leucocephalus	Bald Eagle	-	SC	FWCA(P)	-		*
	Icterus galbula	Baltimore Oriole	-	-	MBCA	L5	*	
	Riparia riparia	Bank Swallow	-	THR	MBCA	L3		*
	Hirundo rustica	Barn Swallow		THR	MBCA	L4	*	
	Ceryle alcyon	Belted Kingfisher	-	-	FWCA(P)	L4	*	
	Poecile atricapillus	Black-capped Chickadee	-	-	MBCA	L5	*	
	Nycticorax nycticorax	Black-crowned Night Heron	-	-	MBCA	L3		*
	Polioptila caerulea	Blue-gray Gnatcatcher	-	-	MBCA	L4	*	
	Cyanocitta cristata	Blue Jay	-	-	FWCA(P)	L5	*	
	Dolichonyx oryzivorus	Bobolink	-	THR	MBCA	L2		*
	Molothrus ater	Brown-headed Cowbird	-	-	-	L5	*	
	Branta canadensis	Canada Goose	-	-	MBCA	L5	*	
	Bombycilla cedrorum	Cedar Waxwing	-	-	MBCA	L5	*	
	Dendroica pensylvanica	Chestnut-sided Warbler	-	-	MBCA	L3	*	
	Chaetura pelagica	Chimney Swift	THR	THR	MBCA	L4		*
	Spizella passerina	Chipping Sparrow	-	-	MBCA	L5	*	
	Petrochelidon pyrrhonota	Cliff Swallow	-	-	MBCA	L5	*	
	Quiscalus quiscula	Common Grackle	-	-	-	L5	*	
	Chordeiles minor	Common Nighthawk	THR	SC	MBCA	L3		*
	Geothlypis trichas	Common Yellowthroat	-	-	MBCA	L4		*
	Accipiter cooperii	Cooper's Hawk	-	-	FWCA(P)	L4		*
	Picoides pubescens	Downy Woodpecker	-	-	MBCA	L5	*	
	Tyrannus tyrannus	Eastern Kingbird	-	-	MBCA	L4	*	
	Sturnella magna	Eastern Meadowlark	-	THR	MBCA	L3		*
	Sayornis phoebe	Eastern Phoebe	-	-	MBCA	L5	*	
	Sturnus vulgaris	European Starling	-	-	-	L+	*	
	Aquila chrysaetos	Golden Eagle	-	END	FWCA(P)	-		*

Wildlife	Scientific Name	Common Name	Species Status under Legislation/Local Sensitivity				Source of Species Identification	
			Canada SARA	Ontario ESA	Legal Status	Local	LGL[1]	Secondary Source[2]
	Dumetella carolinensis	Gray Catbird	-	-	MBCA	L4	*	
	Ardea herodias	Great Blue Heron	-	-	MBCA	L3	*	
	Butorides virescens	Green Heron	-	-	-	L4	*	
	Picoides villosus	Hairy Woodpecker	-	-	MBCA	L4	*	
	Carpodacus mexicanus	House Finch	-	-	MBCA	L+	*	
	Passer domesticus	House Sparrow	-	-	-	L+	*	
	Troglodytes aedon	House Wren	-	-	MBCA	L5	*	
	Limosa haemastica	Hudsonian Godwit	-	-	MBCA	-		*
	Passerina cyanea	Indigo Bunting	-	-	MBCA	L4	*	
	Ixobrychus exilis	Least Bittern	THR	THR	MBCA	L2		*
	Zenaida macroura	Mourning Dove	-	-	MBCA	L5	*	
	Oporornis philadelphia	Mourning Warbler	-	-	MBCA	L3	*	
	Vermivora ruficapilla	Nashville Warbler	-	-	MBCA	L3	*	
	Cardinalis cardinalis	Northern Cardinal	-	-	MBCA	L5	*	
	Colaptes auratus	Northern Flicker	-	-	MBCA	L4		*
	Stelgidopteryx serripennis	Northern Rough-winged Swallow	-	-	MBCA	L4		*
	Icterus spurius	Orchard Oriole	-	-	MBCA	L5		*
	Falco peregrinus/anatum/tundrius	Peregrine Falcon	SC	SC	FWCA(P)	L4		*
	Dendroica pinus	Pine Warbler	-	-	MBCA	L4		*
	Sitta canadensis	Red-breasted Nuthatch	-	-	MBCA	L4		*
	Vireo olivaceus	Red-eyed Vireo	-	-	MBCA	L4	*	
	Phalaropus lobatus	Red-necked Phalarope	THR	SC	MBCA	L3		*
	Buteo jamaicensis	Red-tailed Hawk	-	-	FWCA(P)	L5	*	
	Agelaius phoeniceus	Red-winged Blackbird	-	-	-	L5	*	
	Columba livia	Rock Dove (Pigeon)	-	-	-	L+	*	
	Pheucticus ludovicianus	Rose-breasted Grosbeak	-	-	MBCA	L4	*	
	Buteo lagopus	Rough-legged Hawk	-	-	FWCA(P)	-		*
	Passerculus sandwichensis	Savannah Sparrow	-	-	MBCA	L4	*	
	Calidris pusilla	Semipalmated Sandpiper	-	-	MBCA	-		*
	Melospiza melodia	Song Sparrow	-	-	MBCA	L5	*	
	Actitis macularius	Spotted Sandpiper	-	-	MBCA	L4	*	
	Melospiza georgiana	Swamp Sparrow	-	-	MBCA	L4	*	
	Cygnus buccinator	Trumpeter Swan	-	-	MBCA	L+	*	
	Vireo gilvus	Warbling Vireo	-	-	MBCA	L5	*	
	Sitta carolinensis	White-breasted Nuthatch	-	-	MBCA	L4		*
	Empidonax traillii	Willow Flycatcher	-	-	MBCA	L4	*	
	Aix sponsa	Wood Duck	-	-	MBCA	L4	*	
	Dendroica petechia	Yellow Warbler	-	-	MBCA	L5	*	

Wildlife	Scientific Name	Common Name	Species Status under Legislation/Local Sensitivity				Source of Species Identification	
			Canada SARA	Ontario ESA	Legal Status	Local	LGL[1]	Secondary Source[2]
Mammals	*Neovison vison*	American Mink	-	-	FWCA(F)	L4	*	
	Sylvilagus floridanus	Eastern Cottontail	-	-	FWCA(G)	L4	*	*
	Sciurus carolinensis	Eastern Gray Squirrel	-	-	FWCA(G)	L5	*	
	Castor canadensis	Beaver	-	-	FWCA(F)	L3	*	
	Microtus pennsylvanicus	Meadow Vole	-	-	-	L4		*
	Ondatra zibethica	Muskrat	-	-	FWCA(F)	L4	*	
	Procyon lotor	Northern Raccoon	-	-	FWCA(F)	L5	*	
	Tamiasciurus hudsonicus	Red Squirrel	-	-	FWCA(F)	L4	*	
	Odocoileus virginianus	White-tailed Deer	-	-	FWCA(G)	L4	*	

Source of Species Identification:

1 – Species recorded within the study area during field investigations (LGL 2019).

2 – Species identified by secondary source data, including Ontario Reptile and Amphibian Atlas, CLOCA and TRCA.

Of the four amphibian species observed by LGL in 2019, none are identified as SAR. One herpetofauna SAR has been recorded in the vicinity of the Study Area based on records from secondary data sources (CLOCA) noted above: Snapping Turtle.

Invertebrates

One invertebrate record was provided by CLOCA: Giant Swallowtail (*Papilio cresphontes*). This species is not at risk but is afforded protection under the FWCA. No invertebrates were documented during the 2019 field investigations.

Birds

Breeding bird surveys were conducted during the breeding bird season when most birds are on their territories engaged in breeding activities, and between the hours of 5:00 and 10:00 am, in accordance with the Ontario Breeding Bird Atlas protocol (2001). A point count methodology was utilized, where a point count location was surveyed for ten minutes and all species seen and heard were recorded. Breeding evidence was recorded to determine if the species was a possible, probable or confirmed breeder following protocols of the Ontario Breeding Bird Atlas (Cadman et al., 2007). Point count locations were situated to ensure representation of the predominant habitat types within the Study Area. Incidental species observations, including those of birds, were also collected on all Study Area visits. The locations of the 32 breeding bird point count stations are presented in **Appendix C** (Figures NER-1a-1i).

A total of 47 bird species were documented within the vicinity of the Study Area during the breeding bird surveys conducted by LGL Limited, and an additional 22 species were identified through secondary sources (CLOCA 2019b, NHIC 2019a, TRCA 2019b). Each of these bird species as well as species status is presented in **TABLE 3.7** and further details of the bird species documented by LGL are presented in **Appendix C**, Appendix I.

Forty-six of the 47 bird species documented during breeding bird surveys conducted by LGL Limited are considered common to the community types found within the Study Area and include primarily urban tolerant species. However, one SAR, Barn Swallow (*Hirundo rustica*), was observed during the first survey on June 11, 2019. No Barn Swallow nests were observed within the Study Area; however, potential Barn Swallow nesting habitat exists within the Study Area. The four crossings and bridge structures that are potential Barn Swallow nesting habitat include: Highland Creek (Crossing 1), Rouge River (Crossing 4), West Duffins Creek (Crossing 12) and Lynde Creek (Crossing 18). These bridge structures may provide nesting habitat for other species as well (see Figures NER-1a, 1c, 1e and 1g). Barn Swallow are considered possible breeders.

Thirty-six of the bird species documented by LGL Limited are considered migratory and are regulated under the MBCA, while three species, Blue Jay (*Cyanocitta cristata*), Red-tailed Hawk (*Buteo jamaicensis*) and Belted Kingfisher (*Ceryle alcyon*), are protected under the *Fish and Wildlife Conventions Act* (FWCA). Only eight of the observed bird species are not under any legislative protection: House Sparrow (*Passer domesticus*),

Brown-headed Cowbird (*Molothrus ater*), European Starling (*Sturnus vulgaris*), Red-winged Blackbird (*Agelaius phoeniceus*), Rock Dove (*Columba livia*), American Crow (*Corvus brachyhrynchos*), Green Heron (*Butorides virescens*) and, Common Grackle (*Quiscalus quiscula*). Four of the species observed are considered area sensitive according to the Significant Wildlife Habitat Technical Guide (MNDMNRF 2000): Savannah Sparrow *(Passerculus sandwichensis*), Hairy Woodpecker (*Picoides villosus*), Blue-gray Gnatcatcher (*Polioptila caerulea*) and American Redstart (*Setophaga ruticilla).* No species of concern according to TRCA were documented; however, three species, Savannah Sparrow, Nashville Warbler (*Vermivora ruficapilla*) and Chestnut-sided Warbler (*Dendroica pensylvanica*) are considered Level 1 (highest priority of conservation concern) within Durham and Toronto (Couturier, 1999).

Three species, American Robin (*Turdus migratorius*), Canada Goose (*Branta canadensis*) and Red-winged Blackbird, were confirmed breeding within the Study Area based on the observation of a nest with young/recently fledged young. The American Robin nest was located under the West Duffins bridge at breeding bird station 17 (Crossing 12) and the Red-winged Blackbird young were documented at breeding bird station 19 (Crossing 13). The Canada Goose young were observed at breeding bird station 20. The remaining 44 species were considered either observed, possible, or probabale breeders. No stick nests or other nests, or evidence of nesting by other migratory birds, were observed during field investigations.

Of the 22 additional bird species identified through secondary sources, seventeen are considered migratory and are regulated under the MBCA, while five species, Peregrine Falcon (*Falco peregrinus/anatum/tundrius*), Golden Eagle (*Aquila chrysaetos*), Rough-legged Hawk (*Buteo lagopus*), Bald Eagle (*Haliaeetus leucocephalus*) and Coopers Hawk (*Accipiter cooperii*), are protected under the FWCA. Eight of the species identified are considered area sensitive according to the Significant Wildlife Habitat Technical Guide (MNDMNRF 2000): Bald Eagle, Bobolink (*Dolichonyx oryzivorus),* Coopers Hawk, Eastern Meadowlark (*Sturnella magna*), Least Bittern (*Ixobrychus exilis*), Pine Warbler (*Dendroica pinus*), White-breasted Nuthatch (*Sitta canadensis*), and Red-breasted Nuthatch (*Sitta canadensis*). Seven of the species identified are considered species of concern according to TRCA including Red-necked Phalarope (*Phalaropus lobatus*), Least Bittern, Eastern Meadowlark, Common Nighthawk (*Chordeiles minor*), Bobolink, Black-crowned Night Heron (*Nycticorax nycticorax*), and Bank Swallow (*Riparia riparia*). Four species (Least Bittern, Common Nighthawk, Black-crowned Night Heron and Bald Eagle) are considered Level 1 (highest priority of conservation concern) within Durham. Within Toronto, only Least Bittern, Common Nighthawk and Black-crowned Nighthawk are considered Level 1 (highest priority of conservation concern).

An additional ten SAR birds were identified as being located in the vicinity of the Study Area by secondary source data (CLOCA 2019b, NHIC 2019a and TRCA 2019b), and each species is discussed further in **Section 3.2.7.**

Mammals

Eight mammal species were identified during LGL's 2019 field investigations in the Study Area (see **Appendix C** (Table 7 and Appendix I) for more details). Eastern gray squirrel (Sciurus carolinensis), white-tailed deer (*Odocoileus virginianus*), and eastern cottontail (*Sylvilagus floridanus*) were identified across a variety of habitats within multiple municipalities of the Study Area. Within Toronto, eastern gray squirrel (along with red squirrel (*Tamiasciurus hudsonicus*)) was located near the Highland Creek valleylands. Eastern gray squirrel was also located within the West Duffin Creek valleylands (Ajax). White-tailed deer were observed within the Rouge River valley (Toronto) and near Petticoat Creek (Pickering). Eastern cottontail was found in almost all municipalities, typically within watercourse valleylands. Fresh beaver (*Castor canadensis*) activity was also noted at Pine Creek and Lynde Creek.

Additionally, a raccoon (*Procyon lotor)* family was observed within a highly urban area along Kingston Road in Pickering. Muskrat (*Ondatra zibethicus*) was also observed within the vicinity of the Carruthers Creek valleylands (Ajax), and American Mink (*Neovison vison*) within the Pringle Creek valleylands (Whitby). The mammal species documented by LGL represent an assemblage that readily utilizes human influenced landscapes.

Two mammal species (including one not identified during LGL's 2019 field investigations: meadow vole (*Microtus pennsylvanicus*)) have been identified within the Study Area based on records received from TRCA (2019). Species recorded by TRCA also include eastern cottontail. Based on the habitat types present, additional mammal species which prefer open-county/agricultural, thicket, deciduous forest, coniferous forest, mixed forest, wetland, aquatic and anthropogenic habitats have the potential to be found within the Study Area. Generally, the mammal species expected within the Study Area represent an assemblage that readily utilizes human influenced landscapes.

None of the mammal species identified in the Study Area (by LGL's field investigations and by the TRCA element occurrence data) are designated as SAR. All of the mammal species identified within the Study Area are protected under the FWCA with the exception of meadow vole. One mammal species recorded in the Study Area, Beaver, is considered a sensitive species (as defined by TRCA L Rank: 1-3).

In addition to incidental observations of mammals during all field visits, a high-level bat habitat characterization was completed in conjunction with the tree inventory in winter/ spring 2020. Results of the bat habitat characterization are discussed in **Section 3.2.7.**

3.2.6 Existing Significant Wildlife Habitat

The Provincial Policy Statement defines wildlife habitat as: "*areas where plants, animals, and other organisms live, and find adequate amounts of food, water, shelter, and space needed to sustain their populations. Specific wildlife habitats of concern may include areas where species concentrate at a vulnerable point in their annual or life cycle; and areas which are important to migratory or non-migratory species*."

Criteria for determining the significance of wildlife habitat are provided by the MNDMNRF. The Study Area is located within MNDMNRF Ecoregion 6E and Ecoregion 7E (see **Appendix C** (Figure 1)). Therefore, the site is subject to the Significant Wildlife Habitat Criteria Schedules for Ecoregions 6E and 7E (MNDMNRF 2015). The following types of significant wildlife habitat are identified for Ecoregions 6E and 7E:

- Seasonal concentration areas of animals;
- Rare vegetation communities or specialized habitats for wildlife;
- Habitats of species of conservation concern; and,
- Animal movement corridors.

Seasonal concentration areas may include waterfowl stopover and staging areas, shorebird migratory stopover areas, raptor wintering areas, bat hibernacula or maternity colonies, turtle wintering areas, reptile hibernacula, colonial nesting bird sites, migratory butterfly stopover areas, landbird migratory stopover areas or winter deer yards. During LGL's 2019 field survey, no seasonal concentration areas were found within or in proximity to the Study Area. No rare vegetation communities or specialized habitats for wildlife were found within the Study Area; nor were any habitats for rare (provincially ranked S1 to S3 species) or special concern species found.

Although no Significant Wildlife Habitat was documented as per the Provincial Policy Statement, many portions of the Study Area (all creeks and associated valley and riparian areas) do provide important local and regional animal movement corridors.

3.2.7 Existing Species at Risk

A total of 16 species at risk (SAR) have been recorded in the vicinity of the Study Area by secondary source data, including data obtained from MNDMNRF (NHIC), DFO, TRCA and CLOCA. These 16 species include three aquatic SAR, one plant SAR, and 12 wildlife SAR. However, only two of these SAR were identified within the vicinity of the Study Area during LGL's field investigations including Barn Swallow (regulated as 'Threatened' under the Ontario ESA) and butternut (regulated as 'Endangered' by both the Ontario ESA and Canada SARA). One additional plant SAR (Kentucky coffee tree – regulated as 'Threatened' under the Ontario ESA and Canada SARA) was identified during the arborist investigation. The 17 aquatic, plant and wildlife SAR recorded within the vicinity of the Study Area are further discussed below.

Aquatic Species at Risk

A search of the NHIC database (MNDMNRF 2019), the DFO aquatic species at risk mapping (2019) as well as records from TRCA and CLOCA was completed and identified three aquatic SAR that have been reported from the watercourses found within the Study Area including American Eel (*Anguilla rostrate*), Redside Dace (*Clinostomus elongatus*) and Eastern Pondmussel (*Ligumia nasuta*).

American Eel, listed as 'Endangered' provincially and 'Threatened' federally (Committee on the Status of Endangered Species in Canada - COSEWIC), has been reported from Oshawa Creek (Crossing 23) within close proximity to the Study Area by CLOCA and NHIC mapping. Provincially, this species receives protection under the Ontario *Endangered Species Act (ESA), 2007* (ESA 2007). Although American Eel is listed federally as 'Threatened' by COSEWIC, it has 'No Status' under the federal *Species at Risk Act* (SARA), and therefore is not regulated federally. Recent experience with this species indicates that it will not require permitting under the ESA 2007 due to its general habitat requirements and transient behaviour. However, its presence in Oshawa Creek will automatically trigger a review by DFO under the *Fisheries Act* for any works occurring within the highwater mark of the watercourse.

Redside Dace, a provincially and federally 'Endangered' species, were reported from two squares encompassing Carruthers Creek (Crossing 14) in 1999. It is not known whether this species still exists within this watercourse as it was not mapped by DFO 2019 mapping. This species is protected under the ESA 2007 and SARA. Further consultation with the MECP is needed to determine next steps regarding Redside Dace.

Eastern Pondmussel is mapped on DFO species at risk mapping (2019) as occurring within the Rouge River marsh habitat associated with its confluence with Lake Ontario downstream of Kingston Road. However, the shaded area of habitat shown on the mapping indicates that this habitat extends north of the Highway 401 crossing, but south of Kingston Road. As such, a portion of the Study Area (around Crossing 4) contains potential habitat for this species. However, as Eastern Pondmussel is listed as Special Concern both provincially and federally, it is not protected under either the ESA 2007 or SARA.

Plant Species at Risk

The MNDMNRF Natural Heritage Areas Mapping identified one plant SAR (butternut – regulated as 'Endangered' by both the Canada SARA and the Ontario ESA) as being recorded within the Study Area. This butternut tree element occurrence record was identified within the vicinity of Brock Road and West Duffins Creek, within the City of Pickering/Town of Ajax. However, during field investigations, no butternut trees were identified within this portion of the Study Area. Within the Town of Whitby, one butternut tree was observed from within the ROW, close to the edge of a cultural meadow and cattail shallow marsh, north of Dundas Street. This tree is located outside of the ROW. In addition, three butternuts were identified during the arborist survey within the vicinity of Morningside Park in the City of Toronto. The locations of these three butternuts are presented in the Arborist Report (LGL 2021) (see **Appendix D**).

In addition, a total of 125 Kentucky coffee trees were identified as planted amenity trees within the Study Area during the arborist survey. The locations of these trees are presented in the Arborist Report (LGL 2021) – see **Appendix D**). Kentucky coffee tree is regulated as 'Threatened' under the Ontario ESA and the Canada SARA. The Ministry of Environment, Conservation and Parks (MECP) has advised that streetscape

Kentucky coffee trees are likely cultivars and, as such, do not require Ontario ESA authorizations (MECP, 2019).

No other plant SAR ('Threatened', 'Endangered', or 'Special Concern') were identified during LGL's 2019 field investigations.

Seventeen plant species of concern or regionally rare plant species were identified within vegetation communities across the Study Area. **Appendix C** (Table 8) presents a summary of these species with the associated vegetation community and segment or municipality in which each was observed. Plant species listed are only presented in vegetation communities within the respective region or municipality in which the species' status is TRCA L1 to L3 or rare in Toronto or Durham (Varga 2000). All of the species listed have populations that are provincially secure. Species locations for many of the species listed are presented on **Appendix C** (Figures NER-1a to NER-1i). Several species with frequent presence including meadow horsetail (*Equisetum pratense*), poison-ivy (*Rhus radicans* ssp. *negundo*) and white spruce are not presented. Gray-headed coneflower (*Ratibida pinnata*) was identified within the Town of Ajax. This species is ranked provincially as S2S3 with a population that is vulnerable to imperiled. Numerous individuals were observed within a manicured area/cultural meadow associated with Carruthers Creek, adjacent to Casino Ajax (Ajax Downs). Gray-headed coneflower is typical of prairie habitat, and it is very likely that this species was included in a seed mix installed at some point within the area.

Wildlife Species at Risk

A total of 12 wildlife SAR, including one herpetofauna and 11 birds have been recorded within the vicinity of the Study Area based on secondary source data. These secondary source records have been attributed to several data sources as described below. Only one wildlife SAR (Barn Swallow) was confirmed at one location within the Study Area during LGL's 2019 field investigations. Based on the habitat where the Barn Swallow was observed, it is considered possibly breeding within the Study Area.

Wildlife occurrence record data from NHIC (2019a) identified records for four wildlife SAR which have been recorded in the vicinity of the Study Area including three bird species (Peregrine Falcon (*Falco peregrinus)*, Bank Swallow (*Riparia riparia)* and Eastern Meadowlark (*Sturnella magna)*) and one herpetofauna species (Snapping Turtle).

Wildlife occurrence record data received from CLOCA (2019b) included records for all 12 identified wildlife SAR which have been recorded in areas around the Study Area in the past 20 years, including 11 bird species and one herpetofauna species listed below.

- Bald Eagle *Haliaeetus leucocephalus*
- Bank Swallow *Riparia riparia*
- Barn Swallow *Hirundo rustica*

- Bobolink *Dolichonyx oryzivorus*
- Chimney Swift *Chaetura pelagica*
- Common Nighthawk *Chordeiles minor*
- Eastern Meadowlark *Sturnella magna*
- Golden Eagle *Aquila chrysaetos*
- Least Bittern *Ixobrychus exilis*
- Peregrine Falcon *Falco peregrinus*
- Red-necked Phalarope *Phalaropus lobatus*
- Snapping Turtle *Chelydra serpentine*

TRCA also provided wildlife occurrence record data and identified one wildlife SAR (Bank Swallow), recorded in 2005.

Each of the 12 wildlife SAR recorded within the vicinity of the Study Area, their respective legal status, dates observed, preferred habitat/biological requirements, habitat suitability of the Study Area, likelihood of presence within the Study Area and survey results (if completed) are discussed further in **Appendix C** (Section 4i and Table 9).

Additional wildlife SAR records were provided by MNDMNRF in February 2019 through Metrolinx (MNDMNRF 2019d). The MNDMNRF data describes 32 additional wildlife SAR (not documented by other secondary sources) including 21 birds, 3 invertebrates, 5 mammals (including 4 bats) and 3 herpetofauna. These SAR have been recorded within the five DSBRT municipalities (City of Toronto, City of Pickering, Town of Ajax, Town of Whitby and City of Oshawa) but are not specific to the Study Area. As a result, it is not known whether these 32 additional wildlife SAR were recorded within the vicinity of the Study Area. **Appendix C** provides further details on these additional SAR including their location, legal status, dates observed, biological requirements/preferred habitat and habitat suitability of the Study Area/likelihood of presence within the Study Area.

Bats

Forest communities with mature trees have the potential to provide suitable roosting habitat for endangered bat species (all regulated bat species under the Ontario ESA), including eastern small-footed myotis (*Myotis leibii*), little brown myotis (*Myotis lucifugus*), northern myotis (*Myotis septentrionalis*), and tri-coloured bat (*Perimyotis subflavus*). The Ontario ESA affords protection for endangered bat species (subsection 9(1)) and their habitat (subsection 10(1)). Given that species-specific habitat regulations have not yet been developed for SAR bats, habitat is protected according to the general

definition provided in the Ontario ESA. Specifically, according to section 2(1), the Act protects "*an area, on which the species depends, directly or indirectly, to carry on its life processes, including processes such as reproduction, rearing, hibernation, migration or feeding*".

Mature trees which could contain suitable roosting habitat for SAR bats are likely present in association with treed portions of the Study Area. Lake Ontario, which is situated south of the Study Area, offers suitable foraging habitat for bat species. Additionally, many of the forests identified are generally part of larger vegetation communities that extend beyond the Study Area, typically associated with watercourses and valleylands. These watercourses also offer suitable foraging habitat. Little brown myotis and northern myotis will use cavities in the trees or exfoliating bark, while tri-coloured bat roosts in clumps of leaves in the foliage. Little brown myotis will frequently use buildings while the other three endangered bat species will use buildings, but far less frequently. Eastern small-footed myotis is a saxicolous (rock-loving) species and will frequently roost in rock piles, talus or crack and crevices in rock outcrops.

Within the Study Area, many forest communities were noted including several deciduous (FOD2-1, FOD3-1, FOD5-1, FOD5-3, FOD5-7, FOD5, FOD6-5 and FOD7-3), coniferous (FOC4-1) and mixed (FOM2, FOM3-2 and FOM6-1) forest types. In addition to forest communities, the following swamps may also provide habitat: Birch-Poplar Mineral Mixed Swamp (SWM3), and several deciduous swamps (SWD3, SWD3-4 and SWD4). Cultural community types identified that may also provide habitat include Mineral Cultural Woodland (CUW1), along with various plantation types (CUP1, CUP1-3, CUP1-8, CUP2 and CUP3-2). In addition to the forest classification completed, a search for "bat trees" and a snag tree assessment was completed in winter/spring 2020 during leaf off conditions. Bat trees are those which have cavities, cracks, exfoliating bark or clumps of leaves that would be suitable for roosting. Typically trees that are considered candidate bat trees exhibit the following characteristics:

- tallest in the community;
- cavities/crevices often originating as cracks, scars, knot holes or woodpecker cavities;
- a diameter at breast height greater than 25 cm (for the purposes of this survey, trees with a DBH greater than 20 cm were included); and,
- loose or peeling bark.

The assessment of bat habitat found a variety of candidate snag habitat trees within the Study Area; a total of 48 trees were documented. Details of species and tree attributes are included in **Appendix C** (Table 10) and locations of snags are included in **Appendix C** (Figures NER-1a to NER-1i).

3.2.8 Existing Significant Natural Heritage Features

Designated natural areas include areas identified for protection by the MNDMNRF, TRCA, CLOCA and upper and lower tier municipalities. All designated natural areas within the vicinity of the Study Area are presented in **Appendix C** (Figure NER-2). Those designated areas presented in **Appendix C** (Figure 2 and Figure NER-2) but not discussed below include natural areas that are over 120 m from the Study Area (both north and south) where impacts from the proposed DSBRT development will not occur.

Provincially Significant Wetlands

There are three Provincially Significant Wetlands (PSWs) located within the vicinity of the Study Area. In the City of Toronto and partly within the City of Pickering is the Rouge River Marshes Wetland Complex located south of the Study Area just beyond 120 m from the roadway. Within the City of Pickering is the Frenchman's Bay Coastal Marsh, which is located south of Highway 401 and is over 120 m from the roadway. In the Town of Whitby is the Lynde Creek Coastal Wetland Complex, located north, but primarily south of Dundas Street adjacent to the ROW. A description of each PSW is provided in **Appendix C** (Section 4j) and the locations are presented on **Appendix C** (Figure NER 2).

Unevaluated Wetlands

Unevaluated wetlands include wetlands that have not been evaluated using the Ontario Wetland Evaluation System (OWES) and are not identified as provincially significant. Within the vicinity of the Study Area, there are seven unevaluated wetlands presented in **Appendix C** (Figure NER-2).

Areas of Natural and Scientific Interest

There are three Areas of Natural and Scientific Interest (ANSIs) located in the vicinity of the Study Area including the Highland Creek Swamp Life Science ANSI, the Rouge River Valley Life Science ANSI and the Frenchman's Bay Coastal Marsh ANSI. A description of each ANSI is provided in **Appendix C** (Section 4j) and the locations are presented on **Appendix C** (Figure NER-2).

Carolinian Core Natural Areas and Carolinian Existing and Potential Connections

Carolinian Canada is the southernmost region of Canada and contains more rare and endangered species of plants and animals than any other part of Canada. Species include over 125 SAR. Forest and wetland cover have been significantly reduced over time, and now the Carolinian zone occupies only 1% of Canada's land area (Carolinian Canada). As a result, Carolinian Core Natural Areas and Carolinian Existing and Potential Connections/Areas have been identified in support of conserving and protecting Carolinian remnants within existing natural heritage systems.

Carolinian Core Natural Area is associated with the Rouge River Valley Life Science ANSI which is adjacent and north, as well as over 220 m south, of the Study Area. Across this section of the Study Area, Kingston Road is conveyed via a bridge that

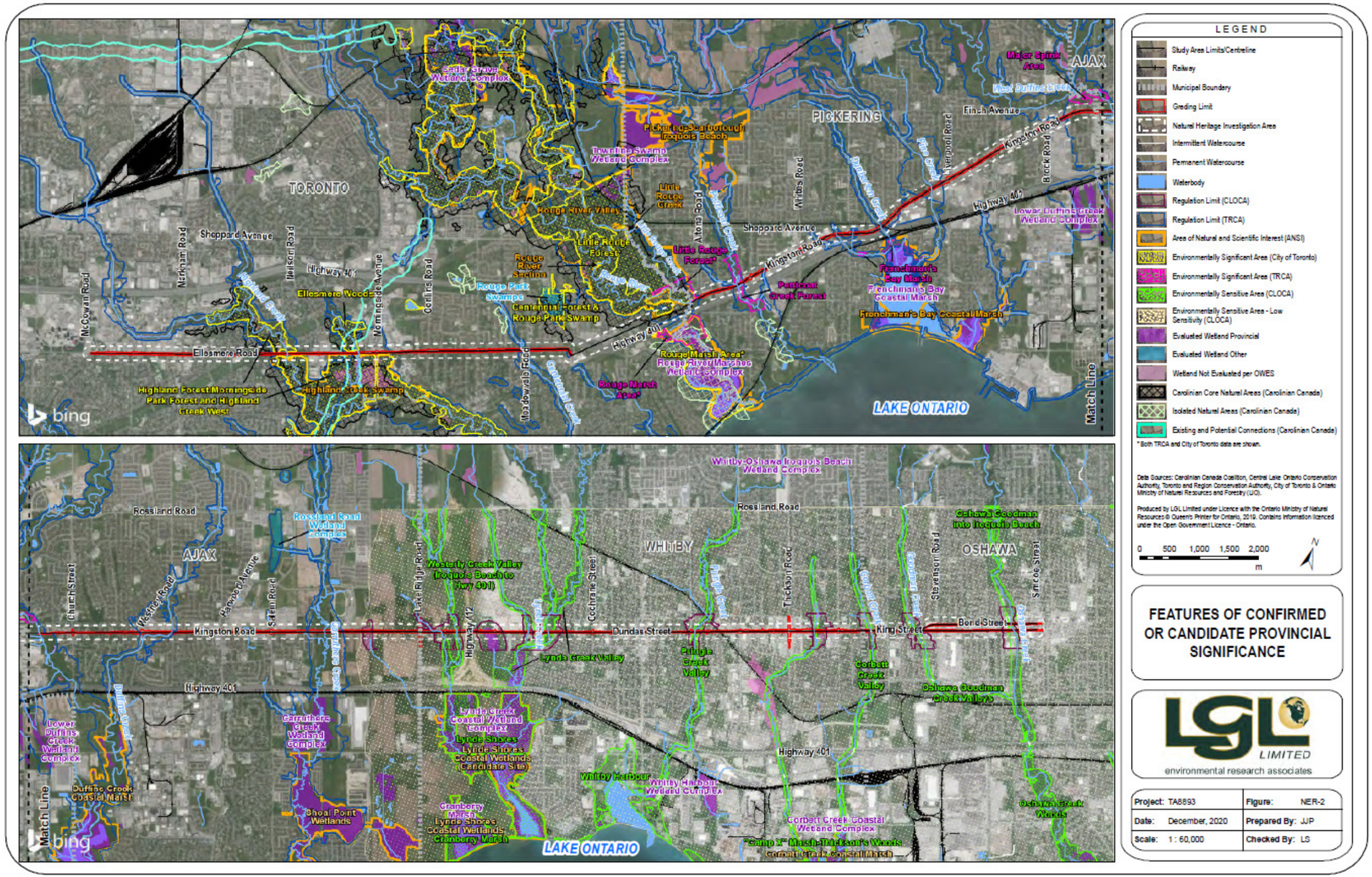
crosses over the Rouge River and Little Rouge Creek. Another Core Natural Area and Existing and Potential Connection/Area are associated with the Highland Creek Swamp ANSI and Highland Forest/Morningside Park Forest and Highland Creek West ESA (City of Toronto)/Morningside Park Forest ESA (TRCA), with associated natural features adjacent to the ROW and within the Study Area. In addition, isolated Core Natural Areas were identified, but these are located outside of the Study Area.

Environmentally Significant Areas – TRCA Jurisdiction

According to the TRCA (2019b) and City of Toronto (2019b), there are five Environmentally Significant Areas (ESAs) located directly within the Study Area (including Highland Forest/Morningside Park Forest and Highland Creek West ESA (City of Toronto)/Morningside Park Forest ESA (TRCA) - overlapping and considered one ESA, Ellesmere Woods ESA, Little Rouge Forest ESA, Petticoat Creek Forest ESA and Major Spink Area ESA), and an additional three ESAs located just outside of but within the vicinity of the Study Area (Centennial Forest and Rouge Park Swamp ESA, Rouge Marsh Area ESA and Frenchman's Bay Marsh ESA). A description of each ESA is provided in **Appendix C** (Section 4j) and the locations are presented on **Appendix C** (Figure NER-2).

Natural Heritage System – CLOCA Jurisdiction

CLOCA's Natural Heritage System was published in December 2017 and updated in July 2021. The NHS was developed merging the Functional NHS (FNHS) comprised of "valued natural components" (includes core habitat areas and corridors, riparian corridors including those for species at risk, wetlands and woodlands > 0.5 ha, PSWs, and ANSIs) with the Targeted Terrestrial NHS (TTNHS). The TTNHS was used to determine "where additional natural cover should occur adjacent to the FNHS, in order to achieve watershed health targets" (CLOCA July 2010 (rev. December 2011).



LEGEND

- Study Area Limits/Centreline
- Railway
- Municipal Boundary
- Grading Limit
- Natural Heritage Investigation Area
- Intermittent Watercourse
- Permanent Watercourse
- Waterbody
- Regulation Limit (CLOCA)
- Regulation Limit (TRCA)
- Area of Natural and Scientific Interest (ANSI)
- Environmentally Significant Area (City of Toronto)
- Environmentally Significant Area (TRCA)
- Environmentally Sensitive Area (CLOCA)
- Environmentally Sensitive Area - Low Sensitivity (CLOCA)
- Evaluated Wetland Provincial
- Evaluated Wetland Other
- Wetland Not Evaluated per OWES
- Carolinian Core Natural Areas (Carolinian Canada)
- Isolated Natural Areas (Carolinian Canada)
- Existing and Potential Connections (Carolinian Canada)

* Both TRCA and City of Toronto data are shown.

Data Sources: Carolinian Canada Coalition, Central Lake Ontario Conservation Authority, Toronto and Region Conservation Authority, City of Toronto & Ontario Ministry of Natural Resources and Forestry (LIO).

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FEATURES OF CONFIRMED OR CANDIDATE PROVINCIAL SIGNIFICANCE

LGL LIMITED
environmental research associates

Project:	TA8893	Figure:	NER-2
Date:	December, 2020	Prepared By:	JJP
Scale:	1 : 60,000	Checked By:	LS

FIGURE 3.12. NATURAL HERITAGE FEATURES OF CONFIRMED OR CANDIDATE PROVINCIAL SIGNIFICANCE

3.3 Landforms/Physiography, Soils, Geology, and Groundwater

3.3.1 Methodology

The Natural Environment Report – Impact Assessment prepared by LGL Limited in January 2021 (see **Appendix C**) includes a detailed description of the results of the secondary source review for landforms/physiography, soils and geology undertaken by LGL Limited in 2019 and 2020 during the pre-TPAP phase. A summary of the existing conditions within the Study Area is provided in the sections below.

Data was obtained solely from published data sources and unpublished information made available by relevant external agencies/stakeholders, and no field investigations were completed. The overall Study Area for the initial desktop and background existing conditions data review included the DSBRT footprint covering the existing ROW and adjacent lands up to 120 m (north and south) from the future footprint (see **FIGURE 3.12**). The Preliminary Groundwater Study Area selected includes lands within 100 m of either side of the DSBRT project extent.

The Approved Source Water Protection Plan for the Credit Valley, Toronto and Region, and Central Lake Source Protection Regions (CTC Source Protection Region, 2015) was reviewed to identify potential threats in the Study Area and associated specific policies that may apply to the DSBRT project. The Approved Updated Assessment Report: Central Lake Ontario Source Protection Area (CLOSPA, July 24, 2015) and the Approved Updated Assessment Report: Toronto and Region Source Protection Area (TRSPA, July 24, 2015) that supported the CTC Source Protection Plan were reviewed to determine if the DSBRT project would potentially effect source water in the Study Area. The Source Water Protection Information Atlas (MECP 2018) was reviewed to accurately identify the locations of HVAs within the Study Area as well as the locations of Intake Protection Zones (IPZs) for municipal water treatment plants on the shores of Lake Ontario.

3.3.2 Existing Landforms and Physiography

The area between Lake Ontario and the interlobate moraine has been divided into three regions: the Iroquois Plain, the Peel Plain, and the South Slope. According to Chapman and Putnam (1984), the entire Study Area is located within the South Slope and the Iroquois Plain physiographic regions. A description of these regions is presented in **Appendix C**. The bedrock formation and the distribution of the soil parent materials lie within Ontario County.

3.3.3 Existing Soils, Bedrock Geology and Quaternary Geology

Bedrock consists of shale, limestone, dolostone and siltstone of the Georgian Bay Formation from the Upper Ordovician period (Ontario Geological Survey 1991).

Quaternary geology consists of the following deposits from the Pleistocene Epoch:

- Halton Till (Ontario-Erie lobe): predominantly silt to silty clay matrix, high in matrix carbonate content and clast poor;
- Till: undifferentiated, predominantly sandy silt to silt matrix, commonly rich in clasts, often high in total carbonate content;
- Glaciolacustrine deposits: silt and clay, minor sand; basin and quiet water deposits; and,
- Glaciolacustrine deposits: sand, gravelly sand and gravel; nearshore and beach deposits (Barnett, Cowan and Henry 1991).

At a finer scale, quaternary geology consists of modern and older river deposits associated with the major watercourses; glacial lake deposits associated with Lake Iroquois and the Peel Ponds; and glacial ice deposits associated with the Laurentide Ice Sheet during the Wisconsinan glaciation (Sharpe 1980).

Within the DSBRT Study Area, Woburn, Fox Sandy Loam, Brighton and Bottom Land soils are found within the former Scarborough Township. Woburn, Brighton, Bottom Land, Smithfield, Schomberg, Tecumseth, Granby, Darlington, Whitby, Bondhead, Simcoe and Lyons soils are found within the former Ontario County. Report No. 23 of the Soil Survey of Ontario County (Olding, Wicklund and Richards 1990) was referred to for the description and classification of the soil series within the DSBRT Study Area.

3.3.4 Existing Groundwater Resources

Topography and Drainage

The topography of the Study Area is generally flat to rolling hills and slopes downward regionally to the south towards Lake Ontario. Ground elevation in the Study Area ranges from greater than 100 to approximately 160 masl in the east Scarborough section, and less than 100 to greater than 120 masl in the east section through Pickering, Ajax, Whitby, and west Oshawa.

There are several watercourses and ravines that cross the Study Area (see **Appendix C**, Section 4d and 4e) and flow southward to Lake Ontario. The expected direction of shallow groundwater flow is generally southward toward Lake Ontario but could be affected locally by various watercourses (rivers, creeks and ravines), shallow more permeable fills, post-glacial lacustrine, and beach deposits that are present in the Study Area. The deeper regional groundwater flow is expected to be southerly throughout the Study Area, towards Lake Ontario, and potentially affected by deeper watercourses.

Groundwater Site Conditions

Shallow groundwater or indications of shallow groundwater were encountered at the following sites:

- Observed at three locations in sand, silty clay or sand silt west of Brock Road (at Liverpool Road) in Pickering near Pine Creek;
- Measured in two monitoring wells at “Elevation of 81.0 m and 81.0 m” near the Pine Creek culvert and where a watermain is proposed to be replaced;
- Observed “wet soils” in typically silty clay at seven boreholes all in Pickering, near Dixie Road crossing, near Pine Creek;
- Measured between 2.6 to 4.1 mbgs or elevations of 81.0 to 81.5 masl in four monitoring wells near Pine Creek (compare to Pine Creek at 80.4 m); and,
- Observed at various boreholes, specifically four of ten advanced in west Pickering at depths ranging from 3.9 to 6.1 m, all sixteen boreholes advanced in east Pickering, and in most of the thirteen advanced in Ajax.

No information reviewed provided a direction of the shallow groundwater flow or quality (i.e., chemistry). Hydraulic conductivity testing was completed at two monitoring wells in west Pickering at BH-18-7 and BH-8 both screened from approximately elevations 73 to 75 masl (approximately 8.5 to 10.5 mbgs), where the watermain is proposed to be replaced near Pine Creek (Golder, May 2020). The results were 1×10^{-7} m/s and 6×10^{-8} m/s, which is typical of a silt to silty sand (Freeze and Cherry, 1979).

Source Water

The relevant findings from review of The Approved Source Water Protection Plan for the Credit Valley, Toronto and Region, and Central Lake Source Protection Regions (CTC Source Protection Region, 2015) are summarized as follows:

- There are no Well Head Protection Areas (WHPAs) or Significant Groundwater Recharge Areas (SGRAs) within the Study Area because all WHPAs and SGRAs are located further to north in the CTC Source Protection Plan, where municipal groundwater supply wells exist; and
- There are four intake protection zones (IPZs) associated with municipal supply intakes in Lake Ontario near the Study Area: (1) east Scarborough (F.J. Hogan intake), (2) Pickering-Ajax (Ajax intake), (3) Whitby (Whitby intake) and (4) Oshawa (Oshawa intake). Based on the Event Based Area (EBA) modelling, there are only several IPZ-3 areas that transect the Study Area, specifically along some water courses that cross it flowing from north to south. These areas are associated with large spills that were modelled from an existing east-west trending petroleum pipeline and bulk petroleum storage facility north of the Study Area, or major breaks to four sanitary trunk sewer mains with nearest modelled break associated with Highland Creek located west of the study aera. The petroleum modelling is not applicable to the DSBRT project; however, the modelled sanitary sewer trunk main breaks were at similar distances from the Lake Ontario as the Study Area indicating similar breaks into water courses that transect the Study Area would pose a threat to the applicable intakes in Lake

Ontario. There are no specific policies associated with these IPZ-3 areas that would apply to the DSBRT project.

The relevant findings related to the review of The Approved Updated Assessment Report: Central Lake Ontario Source Protection Area (CLOSPA, July 24, 2015) and the Approved Updated Assessment Report: Toronto and Region Source Protection Area (TRSPA, July 24, 2015) that supported the CTC Source Protection Plan to determine if the DSBRT project would potentially effect source water in the Study Area. are summarized as follows:

- Most drinking water within the CLOSPA and TRSPA is from Lake Ontario, with a small percentage being from groundwater. All drinking water within the Study Area is from Lake Ontario;
- Locally shallow sodium and chloride concentrations can increase in urbanized areas due to road salting, but groundwater is of good quality within the Study Area. There are naturally elevated concentrations of iron, manganese and elevated hardness;
- There were no long-term permits for groundwater (or surface water) takings were identified within the Study Area;
- There were no SGRAs in the Study Area;
- The overburden thickness was in the “Low” range;
- The Duffins Creek watershed was cited as having relatively high base flow indexes (BFIs) indicating that significant baseflow is from groundwater discharge;
- The Scarborough Aquifer is present throughout much of the western portion of the Study Area, but is buried beneath younger Quaternary deposits (e.g., glaciolacustrine, Halton Till etc.);
- Groundwater flow patterns are strongly influenced by north-south flowing water courses;
- There were no Well Head Protection Areas (WHPAs) within or near the Study Area;
- There is Provincially Significant Wetlands in the Study Area at Dundas and Coronation Roads in Whitby, specifically the Lynde Creek Costal Wetland or near the Study Area. (see **Appendix C**, Section 4j); and,
- There are shallow Highly Vulnerable Aquifers (HVAs) located throughout the Study Area.

The relevant findings related to the review of the on-line interactive Source Water Protection Information Atlas (MECP, 2018) are summarized as follows:

- It was confirmed there are no WHPAs or SGRAs in the study area;
- The nearest SGRA is the Rouge River Valley between the western and eastern sections of the study area; and,
- There are numerous shallow HVAs throughout the study area.

Municipal Use

The Study Area is highly urbanized with most properties connected to municipal drinking water systems that are supplied from Lake Ontario. One small portion of the Study Area might have active water wells, specifically along the boundary between Ajax and Whitby where some agricultural land use is evident. Therefore, these areas may have domestic and/or irrigation and livestock wells. This area may need further evaluation based on the depth of construction and potential for construction dewatering to occur near or within. Overall, groundwater within the Study Area is not used by any municipality for drinking water.

Permits to Take Water

A search of MECP's Permit to Take Water (PTTW) database was completed in January 2021 (MECP 2021). The following permits were identified within or near the Study Area:

- Permit 7671-BP3JSZ issued to the City of Pickering for groundwater construction dewatering approximately 150 m south of the Study Area at a property on Glenanna Road; and,
- Permit 2758-ABMQSA issued to R.A.B. Properties Limited for groundwater dewatering approximately 100 m south of the east of Markham Road.

The following inactive permits were identified within the study area for construction dewatering:

- Permit 5171-6FBLW2 issued to The Corporation of the Town of Ajax at Alexander's Crossing and Kingston Road East in Ajax;
- Permit 0777-7M2SGB issued to Picov Downs Inc. west of Alexander's Crossing and Kingston Road East in Ajax;
- Permit 6806-7RTJW2 issued to Picov Downs Inc. west of Alexander's Crossing and Kingston Road East in Ajax;
- Permit 5528-8CDR62 issued to City of Toronto west of Mornelle Court and Ellesmere Road in Toronto;
- Permit 8746-8RYQLC issued to The Regional Municipality of Durham between Palace Street and Cochrane Street, along Dundas Street West in Whitby;
- Permit 6628-9D7QZC issued to SNC-Lavalin Construction (Ontario) Inc. east of Halls Road North and Dundas Steet West in Whitby;

- Permit 2832-9LNMZG issued to The Regional Municipality of Durham east of Liverpool Road and Kingston Road in Pickering;
- Permit 7810-9GYS2L issued to SNC-Lavalin Construction (Ontario) Inc. east of Halls Road North and Dundas Street West in Whitby;
- Permit 1251-B45LEK issued to Insitu Contractors Inc. at 550 Bond Street West in Oshawa;
- Permit 2221-6GHMQN issued to Holly Downs Developments Inc. at 66-68 Grangeway Avenue, Former City of Scarborough; and
- Permit 8588- 6J6PVH issued to Holly Downs Developments Inc. at 68 Grangeway Avenue Former City of Scarborough.

Given the nature (i.e., construction dewatering) and locations of these permits, they are not a concern for the DSBRT project. The MECPs Environmental Activity and Sector Registry (EASR) was searched for construction dewatering EASRs within the study area in September 2021. four such EASRs were identified in the Study Area.

Water Wells

A search of the MECP water well records database was completed as part of the groundwater investigation. The locations of wells identified by the search are presented in **Appendix C** (Appendix E). In summary, a total of 558 wells were identified within the Study Area, including 41 in east Scarborough (Toronto), 167 in Pickering, 76 in Ajax, 188 in Whitby and 86 in Oshawa. **TABLE 3.8** summarizes relevant information from the water well records search by municipality.

Bedrock is relatively deep through the Project and was not required to be considered as part of the groundwater investigation. Despite the range for the maximum to minimum depth to groundwater, many records indicated shallower groundwater that may require construction dewatering during deeper excavations required for the Project.

TABLE 3.8. SUMMARY OF WELL RECORDS

Municipality	Average Well Depth (m)	Average Depth to Bedrock (m)	Minimum Depth to Groundwater (m)	Maximum Depth to Groundwater (m)	Average Depth to Groundwater (m)
East Scarborough (Toronto)	7.9	Not Encountered	NA	NA	NA
Pickering	10.2	18.6	0.3	27.4	5.0
Ajax	17.5	13.8	0.9	17.1	5.9
Whitby	9.9	19.7	0.6	25.9	5.1
Oshawa	5.6	Not Encountered	2.1	9.8	2.1

All water well records from Toronto were recent (2005 and later) and did not include static groundwater levels indicating these were unlikely to be water supply wells and more likely to be test holes where no wells were installed (i.e., holes abandoned upon completion). Water well records for Pickering, Ajax, Whitby and Oshawa dated back to 1947, 1946, 1956 and 1955, respectively, indicating that some older water wells may still exist in the Study Area and these wells may still be in use by their owner.

At the request of Metrolinx, the water well records search was modified to include only the area within the construction footprint of the DSRBT to generate a list of potentially existing wells that may need to be abandoned before construction begins. This search produced a subset of 94 well records of the 558 over the Groundwater Study Area.

3.4 Tree Inventory

The Arborist Report prepared by LGL Limited in January 2021 (see **Appendix D**) documents the results of the tree inventory undertaken by LGL Limited in winter and spring 2020. A summary of the existing tree resources within the Study Area is provided in the sections below.

3.4.1 Methodology

3.4.1.1 Policy Context

Section 2.0 in the Arborist Report (LGL 2021) (**Appendix D**, Section 2.0) outlines the policy context for the protection of trees and provides a summary of the relevant legislation, guidelines and upper and lower tier municipal tree by-laws within the Study Area. The following are discussed:

- Modernizing Ontario's Municipal Legislation Act, 2017;
- Forestry Act, 1990;
- Upper and lower tier municipal tree protection by-laws including:
    - City of Toronto Tree Protection By-laws (Trees on City Streets, City of Toronto Municipal Code Chapter 813, Article II; Private Tree By-law, City of Toronto Municipal Code Chapter 813, Article III; Ravine and Natural Feature Protection By-law, City of Toronto Municipal Code Chapter 658; Parks By-law, City of Toronto Municipal Code Chapter 608, Article VII),
    - City of Pickering Tree Protection By-laws (City of Pickering Tree Protection By-Law 6108/03; City of Pickering Boulevard Maintenance By-law 6831/08),
    - Town of Ajax Tree Protection By-laws (Tree Protection By-Law 137-2006; Boulevard Tree Protection By-Law 138-2006),

- Town of Whitby Tree Protection By-laws (Town of Whitby By-law: Tree Protection By-Law 4640-00; Town of Whitby Property and Boulevard Maintenance By-law 6937-15),
- City of Oshawa Tree Protection By-laws (City of Oshawa City Trees By-Law 78-2008; City of Oshawa Boulevard By-law 136-2006), and the
- Region of Durham Tree Protection By-law (The Regional Municipality of Durham Regional Woodland By-Law 30-2020).

- Metrolinx Vegetation Guideline, 2020;
- TRCA Guideline for Determining Ecosystem Compensation, 2018; and,
- TRCA Forest Edge Management Plan Guidelines, 2004.

3.4.1.2 Tree Inventory

An LGL ISA Certified Arborist conducted an inventory of tree resources in the winter and spring of 2020 within the Study Area. The Study Area for the arborist investigation included the DSBRT right-of-way (ROW)/project limits and adjacent zones of influence in areas that have the potential to be impacted by the proposed development. Generally, this included up to 6 m beyond the DSBRT ROW/project limits with the exception of lands within the City of Toronto Ravine and Natural Feature Protection (RNFP) boundary, which requires trees to be surveyed within 12 m of the zones of influence/project limits. The determination of the Study Area took into account the requirements of upper and lower tier municipal tree by-laws.

The tree inventory was conducted in accordance with standard arboricultural practices and as per the *DSBRT Arborist Work Plan* (LGL 2019), and municipal requirements including the *Guidelines for the Completion of an Arborist Report* (City of Toronto 2011). The survey included all planted trees regardless of size within the DSBRT ROW/project limits and 6 m beyond, to the extent possible, with the exception of trees within the RNFP boundary in the City of Toronto. Within the RNFP boundary all trees ≥ 10 cm DBH were assessed and georeferenced, and all trees and shrubs that did not meet the size requirements were included as a stem count. Trees within the RNFP boundary were surveyed within the DSBRT ROW/project limits and 12 m beyond, to the extent possible.

Each tree was surveyed using the following methodology:

- Species: each tree was identified to species level using common and scientific name;
- Size: DBH was recorded in centimetres and measured 1.4 m above ground level; and,
- Health: tree condition was assessed based on a matrix of trunk integrity, crown structure and crown vigour. Each tree surveyed was assigned a ranking of poor, fair and good.

- Poor: more than 50% dead branches, weak compartmentalization, early leaf drop, presence of insects/disease, major structural defects;
- Fair: 10-50% dead branches, size or occurrence of wounds present some concerns, minor structural defects; and,
- Good: dead branches less than 10%, signs of good compartmentalization, none or minor wounds, no structural defects.

Collected information specific to individual trees included species (common and scientific name), size (diameter at breast height (DBH)), municipal and Conservation Authority jurisdiction, property PINs, tree condition assessed in a matrix of trunk integrity, canopy structure, and crown vigour, and general comments as warranted. The minimum tree protection zone was determined for each tree based on municipal requirements. Tree locations were captured during the topographic survey undertaken as part of the Project, to the extent possible. Where additional tree locations needed to be captured, a mapping grade GPS unit with accuracy of +/- 1 m was used.

3.4.1.3 Ownership

The ownership for each tree (where ownership information was available) within the Study Area was determined (municipal, provincial, federal or private) and is listed in **Appendix D** (Appendix B) including the property PIN for each tree. All remaining ownership information will be determined during detail design. Addresses for trees on private property are provided in **Appendix D** (Appendix B) where available. All remaining private property ownership data (including names, addresses and emails) for trees on private property that are proposed to be removed/impacted will be provided by the Contractor at the time of permit application during the detail design phase.

In addition, for those trees located within the City of Toronto, each tree was assigned a Toronto tree By-law category based the criteria outlined below with the exception of private trees measuring less than 30 cm DBH in the City of Toronto. These trees do not meet the requirements of the five tree categories as outlined in the City of Toronto *Guidelines for the Completion of an Arborist Report, 2011*.

- **Category 1**: Trees with a diameter of 30 cm or more on private property;
- **Category 2**: Trees with a diameter of 30 cm or more on private property, within 6 m of the Study Area;
- **Category 3:** Trees of all diameters on City owned parkland;
- **Category 4:** Trees of all diameters within the Ravine and Natural Feature Protection Limit; and,
- **Category 5:** Trees of all diameters within the City road allowance, adjacent to the Study Area.

Shared Boundary Trees

Under the Ontario *Forestry Act*, a shared boundary tree is 'a tree whose trunk is growing on the boundary line between adjoining properties.' The trunk is defined as the entire portion of the tree below the first branches. During the field investigations, shared boundary trees were identified and are summarized in **Appendix D** (Appendix B).

3.4.1.4 Heritage Trees

A review of the Forest Ontario website and relevant policy was undertaken to determine if any designated heritage trees occur within the Study Area. The results of this assessment are summarized in the **Section 3.4.2** and are presented in **Appendix D** (Appendix B).

3.4.2 Existing Tree Inventory

A total of 8,050 trees consisting of 86 species were inventoried within the Study Area during the field investigations. The majority of the trees within the Study Area are planted amenity trees in road ROWs, front and rear yards of residences. A detailed summary of all trees surveyed is presented in **Appendix D** (Appendix B) and the locations of each tree (by identifier number) are presented in **Appendix D** (Figures 2.1 to 2.108). These figures also present the following information: grading limits (as of March 2020), municipal boundaries, dripline, tree protection zone (including RNFP tree protection zone), stem count zone (LGL), and the City of Toronto RNFP By-law boundary.

Overall, trees within the study limits range in size from 1 to 160 cm DBH and are generally considered to be in good to fair condition. Trees in poor condition displayed signs of a number of abiotic and biotic defects. In addition, ash trees throughout the Study Area were generally in varying levels of decline which is likely a result of Emerald Ash Borer (*Agrilus planipennis*). A total of 65 trees within the Study Area measure 80 cm DBH and greater. Trees of this size should be considered in the urban landscape and as such, efforts should be made to protect these trees. **TABLE 3.9** provides a summary of the number of trees surveyed within each municipality and Conservation Authority jurisdiction within the Study Area.

TABLE 3.9. SUMMARY OF TOTAL NUMBER OF TREES BY MUNICIPALITY AND CONSERVATION AUTHORITY JURISDICTION

Toronto and Region Conservation Authority Jurisdiction	
Municipality	**Number of Trees**
City of Toronto	4,162
City of Pickering	1,643
Town of Ajax	988
Central Lake Ontario Conservation Authority Jurisdiction	
Municipality	**Number of Trees**
Town of Ajax	53
Town of Whitby	600
City of Oshawa	567
Total	7,926

3.4.3 Existing Stem Count

As per the requirements of the City of Toronto RNFP By-law, a stem count of woody stems less than 10 cm DBH was undertaken within RNFP lands. For ease of assessment and comparison, the RNFP boundary was divided into thirteen different stem count zones. The limits of the stem count zones are presented in **Appendix D** (Figures 2.1 to 2.35).

In general, the shrub layer within each of the stem count zones contained high proportions of non-native and invasive tree/shrub species whereas the trees were generally native species. Common buckthorn (*Rhamnus cathartica*) and black locust (*Robinia pseudoacacia*) were prevalent across the stem count zones. A higher proportion of woody stems were identified in the stem count zones associated with woodland habitat in comparison to stem count zones associated with thicket habitat. Overall, the woody stems across the Study Area are generally in good to fair condition. The results of the stem count are presented in tabular format in **Appendix D** (Appendix C).

3.4.3.1 Species at Risk

As noted in **Section 3.2.7**, two tree species that are regulated under the Ontario *ESA* and the Canada *SARA* were identified within the Study Area during LGL's tree inventory including Kentucky coffee tree (*Gymnocladus dioicus*) and butternut (*Juglans cinerea*). See **Section 3.2.7** for further details.

3.4.3.2 Heritage Trees

As noted in **Section 3.4.1.4**, an assessment was undertaken to determine if any heritage trees occur within the Study Area. A review of the Forest Ontario website indicates that no heritage trees as designated by Forest Ontario occur within the Study Area. However, a total of 445 trees located on heritage properties occur within the Study Area. These trees are presented in **Appendix D** (Figures 2.1 to 2.108 (triangle symbol)) and are listed in **Appendix D** (Appendix B).

3.5 Cultural Environment

3.5.1 Built Heritage Resources (BHRs) and Cultural Heritage Landscapes (CHLs)

The Cultural Heritage Report: Existing Conditions and Preliminary Impact Assessment (Cultural Heritage Report) prepared by ASI (See **Appendix E**) in 2019 and 2020 includes a detailed description of the results of background historic research, background document review, and field review. A summary of the existing BHRs and CHLs within the Study Area is provided in the sections below.

3.5.1.1 Methodology

The objective of this study is to identify all known and potential BHRs and CHLs in the study area, and to provide a preliminary understanding of anticipated project impacts to identified known and potential BHRs and CHLs. The identification of BHRs and CHLs in the Cultural Heritage Report is based on background historic research, desktop data collection and field review.

A Cultural Heritage Report Project Study Area has been established and generally described as the existing road ROW and all properties adjacent to it, along:

- Ellesmere Road from McCowan Road easterly to Kingston Road in the City of Toronto[1];
- Kingston Road/Highway 2 easterly through the City of Toronto, City of Pickering, Town of Ajax, Town of Whitby[2]; and
- Along Highway 2 through the City of Oshawa to Ontario Street where the route loops to Bond Street East and travels westerly until it returns with Highway 2 west of Stevenson Road.

1 – The proposed limits of impact (November 2020) shows the western terminus of the Project Study Area as beginning approximately 126 m east of the intersection of Ellesmere Road and McCowan Road in the City of Toronto.

2 – An additional gap in the preliminary design footprint is located along Kingston Road from Raspberry Road easterly to Notion Road in the Cities of Toronto and Pickering as the design will be utilizing existing infrastructure and no work is planned in that section.

A field review of Pickering Village in the Town of Ajax and other sections of the Study Area where the Study Area narrows, including the east portion of Ellesmere Road, downtown Whitby, and downtown Oshawa was undertaken on 14 November 2019. A field survey of the remaining Study Area was undertaken on 11, 12, 14, 15 May; and 11 June 2020 to document the existing conditions from the existing ROW. The Cultural Heritage Report identifies a property as a potential BHR or CHL based on background historical research, the MHSTCI screening tool Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes (Ministry of Heritage, Tourism and Sport 2016, now administered by the Ministry of Heritage, Sport, Tourism and Culture Industries), and professional expertise. In addition, use of a 40-year-old benchmark is a guiding principle when conducting a preliminary identification of BHRs and CHLs. While identification of a resource that is 40 years old or older does not confer outright heritage significance this benchmark provides a means to collect information about resources that may retain heritage value. Similarly, if a resource is slightly younger than 40 years old, this does not preclude the resource from having cultural heritage value or interest.

3.5.1.2 Description of Existing Conditions

This section provides a summary of known and potential BHRs and CHLs identified during desktop review and a field review of the Study Area. Each of the known and potential BHRs and CHLs identified as part of this assessment have been assigned a

reference number (Ref #) and which have been organized by municipality (TO = Toronto; PK = Pickering; AJ = Ajax; WI = Whitby; OS = Oshawa).

A total of 235 BHRs and CHLs have been identified within the Study Area. Of these:

- 15 BHRs and CHLs are located in the City of Toronto:
    - Two are designated under Part IV of the *Ontario Heritage Act;*
    - One is a commemorative feature;
    - One is a National Urban Park; and,
    - 11 were identified during desktop/field review.
- 18 BHRs and CHLs are located in the City of Pickering:
    - One is designated under Part IV of the *Ontario Heritage Act;*
    - One is listed on the municipal heritage register;
    - One is identified on Inventory of Potential BHRs (but not listed); and,
    - 15 were identified during desktop/field review.
- 59 BHRs and CHLs are located in the Town of Ajax:
    - 13 are designated under Part IV of the *Ontario Heritage Act;*
    - One Heritage Conservation District designated under Part V of the *Ontario Heritage Act;*
    - 41 are listed on the municipal heritage register; and,
    - Four were identified during desktop/field review.
- 66 BHRs and CHLs are located in the Town of Whitby:
    - Two are designated under Part IV of the *Ontario Heritage Act;*
    - One Heritage Conservation District designated under Part V of the *Ontario Heritage Act;*
    - Two Heritage Conservation Districts proposed under Part V of the *Ontario Heritage Act;*
    - 15 are listed on the municipal heritage register;
    - One is a commemorative feature; and,
    - 45 were identified during desktop/field review.

- 77 BHRs and CHLs are located in the City of Oshawa:
    - One is designated under Part IV of the *Ontario Heritage Act;*
    - 22 are listed on the municipal heritage register;
    - One is a commemorative feature; and
    - 53 were identified during desktop/field review.

Mapping and Description of known and potential Built Heritage Resources and Cultural Heritage Landscapes is presented in Appendix A and Appendix B of **Appendix E**. A summary of the identified known and potential Built Heritage Resources and Cultural Heritage Landscapes is presented by municipality in **TABLE 3.10** to **TABLE 3.14**.

TABLE 3.10. SUMMARY OF KNOWN AND POTENTIAL BUILT HERITAGE RESOURCES AND CULTURAL HERITAGE LANDSCAPES IN THE STUDY AREA WITHIN THE CITY OF TORONTO

Reference Number	Type of Cultural Heritage Resource	Type of Property	Location	Heritage Recognition
TO-001	CHL	Park	Ellesmere Road and Military Trail, Toronto	Commemorative Feature
TO-002	CHL	University Campus	University of Toronto Scarborough Campus; 1265 Military Trail, Toronto	Identified During Desktop/Field Review
TO-003	BHR	Residence	3307 Ellesmere Rd, Toronto	Identified During Desktop/Field Review
TO-004	BHR	Residence	3344 Ellesmere Rd, Toronto	Identified During Desktop/Field Review
TO-005	BHR	Church	525 Morrish Rd, Toronto	Identified During Desktop/Field Review
TO-006	BHR	Residence	3682 Ellesmere Rd, Toronto	Identified During Desktop/Field Review
TO-007	BHR	Residence	3695 Ellesmere Rd, Toronto	Identified During Desktop/Field Review
TO-008	BHR	Residence	3701 Ellesmere Rd, Toronto	Identified During Desktop/Field Review
TO-009	BHR	Commercial	103 Deep Dene Dr, Toronto	Identified During Desktop/Field Review
TO-010	BHR	Residence	6 Zaph Ave, Toronto	Identified During Desktop/Field Review
TO-011	BHR	Residence	3832 Ellesmere, Rd Toronto	Identified During Desktop/Field Review
TO-012	BHR	Residence	726 Meadowvale Rd, Toronto	Part IV Designation (By-law #21790)
TO-013	CHL	Church and Residence	6540-6550 Kingston Rd, Toronto	Part IV Designation (By-law #19127)
TO-014	CHL	Park	Rouge National Urban Park, 72 and 98 Old Kingston Rd, Toronto	National Urban Park
TO-015	BHR	Commercial	7451 Graham Farm Ln, Toronto	Identified During Desktop/Field Review

TABLE 3.11. SUMMARY OF KNOWN AND POTENTIAL BUILT HERITAGE RESOURCES AND CULTURAL HERITAGE LANDSCAPES IN THE STUDY AREA WITHIN THE CITY OF PICKERING

Reference Number	Type of Cultural Heritage Resource	Type of Property	Location	Heritage Recognition
PK-001	BHR	Commercial	1320 Altona Rd, Pickering	Identified During Desktop/Field Review
PK-002	BHR	Residence	301 Kingston Rd, Pickering	Identified During Desktop/Field Review
PK-003	BHR	Commercial	357 Kingston Rd, Pickering	Identified During Desktop/Field Review
PK-004	BHR	School	401 Kingston Rd, Pickering	Identified During Desktop/Field Review
PK-005	BHR	Residence	422 Kingston Rd, Pickering	Identified During Desktop/Field Review
PK-006	BHR	Residence	420 Kingston Rd, Pickering	Identified During Desktop/Field Review
PK-007	BHR	Commercial	1 Evelyn Ave, Pickering	Identified During Desktop/Field Review
PK-008	BHR	Church	882-886 Kingston Rd, Pickering	Identified During Desktop/Field Review
PK-009	BHR	CNR Bridge	Structure 6; 0.32 km west of Liverpool Rd, Pickering	Identified During Desktop/Field Review
PK-010	BHR	Commercial	898 Kingston Rd, Pickering	Identified During Desktop/Field Review
PK-011	BHR	Residence	1059 Dunbarton Rd, Pickering	Identified During Desktop/Field Review
PK-012	BHR	Residence	1283 Kingston Rd, Pickering	Identified During Desktop/Field Review
PK-013	BHR	Commercial	1294 Kingston Rd, Pickering	Listed on Municipal Heritage Register
PK-014	BHR	Commercial	1970 Brock Rd, Pickering	Part IV Designation (By-law #2570/87)
PK-015	CHL	Cemetery	1693 Kingston Rd, Pickering	Identified During Desktop/Field Review
PK-016	BHR	Residence	1994 Southview Dr, Pickering	Identified During Desktop/Field Review
PK-017	BHR	Residence	1892 Kingston Rd, Pickering	Identified During Desktop/Field Review
PK-018	BHR	Residence	1723 Dunchurch St Pickering	Identified on Inventory of Potential BHRs (but not listed)

TABLE 3.12. SUMMARY OF KNOWN AND POTENTIAL BUILT HERITAGE RESOURCES AND CULTURAL HERITAGE LANDSCAPES IN THE STUDY AREA WITHIN THE TOWN OF AJAX

Reference Number	Type of Cultural Heritage Resource	Type of Property	Location	Heritage Recognition
AJ-001	BHR	Residence	1898 Kingston Rd, Ajax	Identified During Desktop/Field Review
AJ-002	BHR	Commercial	777 Kingston Rd W, Ajax	Listed on Municipal Heritage Register
AJ-003	CHL	Heritage Conservation District (HCD)	Pickering Village HCD, Ajax	Part V Designation (By-law #102-2013)
AJ-004	CHL	Church and Cemetery	77 Randall Dr, Ajax	Part IV Designation (By-law #96-84; 78-2004)
AJ-005	BHR	Residence	625 Kingston Rd W, Ajax	Listed on Municipal Heritage Register
AJ-006	BHR	Commercial	613 Kingston Rd W, Ajax	Listed on Municipal Heritage Register
AJ-007	BHR	Commercial	607-611 Kingston Rd W, Ajax	Listed on Municipal Heritage Register
AJ-008	BHR	Commercial	605 Kingston Rd W, Ajax	Identified During Desktop/Field Review
AJ-009	BHR	Commercial	601 Kingston Rd W, Ajax	Listed on Municipal Heritage Register
AJ-010	BHR	Commercial	592 Kingston Rd W, Ajax	Part IV Designation (By-law #116-82)
AJ-011	BHR	Commercial	586 Kingston Rd W, Ajax	Listed on Municipal Heritage Register
AJ-012	BHR	Residence	582 Kingston Rd W, Ajax	Listed on Municipal Heritage Register
AJ-013	BHR	Commercial	578 Kingston Rd W, Ajax	Listed on Municipal Heritage Register
AJ-014	BHR	Commercial	579 Kingston Rd W, Ajax	Listed on Municipal Heritage Register
AJ-015	BHR	Commercial	577 Kingston Rd W, Ajax	Listed on Municipal Heritage Register
AJ-016	BHR	Commercial	575 Kingston Rd W, Ajax	Listed on Municipal Heritage Register
AJ-017	BHR	Commercial	571 Kingston Rd W, Ajax	Listed on Municipal Heritage Register
AJ-018	BHR	Commercial	572 Kingston Rd W, Ajax	Part IV Designation (By-law #43-93)
AJ-019	BHR	Commercial	567 Kingston Rd W, Ajax	Listed on Municipal Heritage Register
AJ-020	BHR	Commercial	566 Kingston Rd W, Ajax	Part IV Designation (By-law #113-97)
AJ-021	BHR	Commercial	562 Kingston Rd W, Ajax	Part IV Designation (By-law #112-97)

Reference Number	Type of Cultural Heritage Resource	Type of Property	Location	Heritage Recognition
AJ-022	BHR	Commercial	556 Kingston Rd W, Ajax	Listed on Municipal Heritage Register
AJ-023	CHL	Church, Manse and Cemetery	543-549 Kingston Rd W, Ajax	Listed on Municipal Heritage Register
AJ-024	BHR	Residence	539 Kingston Rd W, Ajax	Listed on Municipal Heritage Register
AJ-025	BHR	Commercial	536 Kingston Rd W, Ajax	Listed on Municipal Heritage Register
AJ-026	BHR	Residence	531 Kingston Rd W, Ajax	Listed on Municipal Heritage Register
AJ-027	BHR	Commercial	530 Kingston Rd W, Ajax	Listed on Municipal Heritage Register
AJ-028	BHR	Commercial	527 Kingston Rd W, Ajax	Listed on Municipal Heritage Register
AJ-029	BHR	Residence	526 Kingston Rd W, Ajax	Listed on Municipal Heritage Register
AJ-030	BHR	Residence	519 Kingston Rd W, Ajax	Listed on Municipal Heritage Register
AJ-031	BHR	Residence	522 Kingston Rd W, Ajax	Listed on Municipal Heritage Register
AJ-032	BHR	Residence	515 Kingston Rd W, Ajax	Listed on Municipal Heritage Register
AJ-033	BHR	Commercial	516 Kingston Rd W, Ajax	Identified During Desktop/Field Review
AJ-034	BHR	Residence	511 Kingston Rd W, Ajax	Listed on Municipal Heritage Register
AJ-035	BHR	Commercial	510 Kingston Rd W, Ajax	Listed on Municipal Heritage Register
AJ-036	BHR	Residence	505 Kingston Rd W, Ajax	Listed on Municipal Heritage Register
AJ-037	BHR	Commercial	504 Kingston Rd W, Ajax	Part IV Designation (By-law #67-2001)
AJ-038	BHR	Residence	497 Kingston Rd W, Ajax	Part IV Designation (By-law #112-82; 78-2012)
AJ-039	BHR	Commercial	489 Kingston Rd W, Ajax	Listed on Municipal Heritage Register
AJ-040	BHR	Commercial	479 Kingston Rd W, Ajax	Part IV Designation (By-law #8-89)
AJ-041	BHR	Church	465 Kingston Rd W, Ajax	Identified During Desktop/Field Review
AJ-042	BHR	Residence	456 Kingston Rd W, Ajax	Listed on Municipal Heritage Register
AJ-043	BHR	Church	457 Kingston Rd W, Ajax	Part IV Designation (By-law #53-2018)
AJ-044	BHR	Residence	419 Kingston Rd W, Ajax	Listed on Municipal Heritage Register

Reference Number	Type of Cultural Heritage Resource	Type of Property	Location	Heritage Recognition
AJ-045	BHR	Residence	411 Kingston Rd W, Ajax	Listed on Municipal Heritage Register
AJ-046	BHR	Residence	408 Kingston Rd W, Ajax	Listed on Municipal Heritage Register
AJ-047	BHR	Residence	407 Kingston Rd W, Ajax	Listed on Municipal Heritage Register
AJ-048	BHR	Commercial	368 Kingston Rd W, Ajax	Listed on Municipal Heritage Register
AJ-049	BHR	Residence	2 Ritchie Ave, Ajax	Listed on Municipal Heritage Register
AJ-050	BHR	Commercial	244 Kingston Rd E, Ajax	Part IV Designation (By-law #41-2010)
AJ-051	CHL	Farmstead	380 Kingston Rd E, Ajax	Listed on Municipal Heritage Register
AJ-052	CHL	Cemetery	Kingston Rd E - Hicksite / Brown Quaker Cemetery, Ajax	Part IV Designation (By-law #14-2007)
AJ-053	BHR	School	365 Kingston Rd E, Ajax	Part IV Designation (By-law #148-92; #125-2009)
AJ-054	BHR	Mixed Use	462 Kingston Rd E, Ajax	Listed on Municipal Heritage Register
AJ-055	CHL	Farmstead	320 Audley Rd N, Ajax	Listed on Municipal Heritage Register
AJ-056	CHL	Farmstead	644 Kingston Rd E, Ajax	Listed on Municipal Heritage Register
AJ-057	CHL	Residence	704 Kingston Rd E, Ajax	Listed on Municipal Heritage Register
AJ-058	CHL	Farmstead	744 Kingston Rd E and 709 Audley Rd N, Ajax	Listed on Municipal Heritage Register
AJ-059	CHL	Farmstead	775 Kingston Rd E, Ajax	Listed on Municipal Heritage Register

TABLE 3.13. SUMMARY OF KNOWN AND POTENTIAL BUILT HERITAGE RESOURCES AND CULTURAL HERITAGE LANDSCAPES IN THE STUDY AREA WITHIN THE TOWN OF WHITBY

Reference Number	Type of Cultural Heritage Resource	Type of Property	Location	Heritage Recognition
WI-001	BHR	Residence	1610 Dundas St W, Whitby	Identified During Desktop/Field Review
WI-002	BHR	Park	1605 Dundas St W, Whitby	Commemorative Feature
WI-003	BHR	Residence	925 Dundas St W, Whitby	Identified During Desktop/Field Review
WI-004	BHR	Residence	816 Dundas St W, Whitby	Identified During Desktop/Field Review
WI-005	BHR	Residence	915 Dundas St W, Whitby	Identified During Desktop/Field Review
WI-006	BHR	Residence	812 Dundas St W, Whitby	Identified During Desktop/Field Review
WI-007	BHR	Residence	808 Dundas St W, Whitby	Identified During Desktop/Field Review
WI-008	BHR	Residence	752 Dundas St W, Whitby	Identified During Desktop/Field Review
WI-009	BHR	Residence	859 Dundas St W, Whitby	Identified During Desktop/Field Review
WI-010	BHR	Residence	738 Dundas St W, Whitby	Identified During Desktop/Field Review
WI-011	BHR	Commercial	843 Dundas St W, Whitby	Identified During Desktop/Field Review
WI-012	BHR	Residence	724 Dundas St W, Whitby	Listed on Municipal Heritage Register
WI-013	BHR	Residence	708 Dundas St W, Whitby	Identified During Desktop/Field Review
WI-014	BHR	Residence	723 Dundas St W, Whitby	Identified During Desktop/Field Review
WI-015	BHR	Residence	610 Dundas St W, Whitby	Identified During Desktop/Field Review
WI-016	BHR	Residence	600 Dundas St W, Whitby	Identified During Desktop/Field Review
WI-017	BHR	Residence	504 Dundas St W, Whitby	Listed on Municipal Heritage Register
WI-018	BHR	Residence	501 Dundas St W, Whitby	Identified During Desktop/Field Review
WI-019	BHR	Commercial	500 Dundas St W, Whitby	Identified During Desktop/Field Review
WI-020	BHR	Church	300 Dundas St W, Whitby	Listed on Municipal Heritage Register This property is also included in the Perry's Plan Neighbourhood Proposed Heritage Conservation District (WI-066)

Reference Number	Type of Cultural Heritage Resource	Type of Property	Location	Heritage Recognition
WI-021	BHR	Commercial	132 Dundas St W, Whitby	Part IV Designation (By-law #1813-85) This property is also included in the Four Corners Proposed Heritage Conservation District (WI-065)
WI-022	BHR	Commercial	115 Dundas St W, Whitby	Identified During Desktop/Field Review This property is also included in the Four Corners Proposed Heritage Conservation District (WI-065)
WI-023	BHR	Commercial	130 Dundas St W, Whitby	Identified During Desktop/Field Review This property is also included in the Four Corners Proposed Heritage Conservation District (WI-065)
WI-024	BHR	Commercial	113 Dundas St W, Whitby	Identified During Desktop/Field Review This property is also included in the Four Corners Proposed Heritage Conservation District (WI-065)
WI-025	BHR	Commercial	128 Dundas St W, Whitby	Identified During Desktop/Field Review This property is also included in the Four Corners Proposed Heritage Conservation District (WI-065)
WI-026	BHR	Commercial	111 Dundas St W, Whitby	Identified During Desktop/Field Review This property is also included in the Four Corners Proposed Heritage Conservation District (WI-065)
WI-027	BHR	Commercial	126 Dundas St W, Whitby	Identified During Desktop/Field Review This property is also included in the Four Corners Proposed Heritage Conservation District (WI-065)
WI-028	BHR	Commercial	124 Dundas St W, Whitby	Listed on Municipal Heritage Register This property is also included in the Four Corners Proposed Heritage Conservation District (WI-065)

Reference Number	Type of Cultural Heritage Resource	Type of Property	Location	Heritage Recognition
WI-029	BHR	Commercial	109 Dundas St W, Whitby	Identified During Desktop/Field Review This property is also included in the Four Corners Proposed Heritage Conservation District (WI-065)
WI-030	BHR	Commercial	120 Dundas St W, Whitby	Identified During Desktop/Field Review This property is also included in the Four Corners Proposed Heritage Conservation District (WI-065)
WI-031	BHR	Commercial	105 Dundas St W, Whitby	Identified During Desktop/Field Review This property is also included in the Four Corners Proposed Heritage Conservation District (WI-065)
WI-032	BHR	Commercial	116 Dundas St W, Whitby	Listed on Municipal Heritage Register This property is also included in the Four Corners Proposed Heritage Conservation District (WI-065)
WI-033	BHR	Commercial	114 Dundas St W, Whitby	Identified During Desktop/Field Review This property is also included in the Four Corners Proposed Heritage Conservation District (WI-065)
WI-034	BHR	Mixed Use	110 Dundas St W, Whitby	Identified During Desktop/Field Review This property is also included in the Four Corners Proposed Heritage Conservation District (WI-065)
WI-035	BHR	Mixed Use	106-108 Dundas St W, Whitby	Listed on Municipal Heritage Register This property is also included in the Four Corners Proposed Heritage Conservation District (WI-065)
WI-036	BHR	Commercial	104 Dundas St W, Whitby	Identified During Desktop/Field Review This property is also included in the Four Corners Proposed Heritage Conservation District (WI-065)

Reference Number	Type of Cultural Heritage Resource	Type of Property	Location	Heritage Recognition
WI-037	BHR	Mixed Use	100 Dundas St W, Whitby	Identified During Desktop/Field Review This property is also included in the Four Corners Proposed Heritage Conservation District (WI-065)
WI-038	BHR	Commercial	101 Brock St S, Whitby	Listed on Municipal Heritage Register This property is also included in the Four Corners Proposed Heritage Conservation District (WI-065)
WI-039	BHR	Commercial	107 Brock St S, Whitby	Listed on Municipal Heritage Register This property is also included in the Four Corners Proposed Heritage Conservation District (WI-065)
WI-040	BHR	Commercial	103 Dundas St E, Whitby	Identified During Desktop/Field Review This property is also included in the Four Corners Proposed Heritage Conservation District (WI-065)
WI-041	CHL	Park	111 Dundas St E, Whitby	Identified During Desktop/Field Review
WI-042	BHR	Mixed Use	215 Dundas St E, Whitby	Listed on Municipal Heritage Register
WI-043	BHR	Mixed Use	218 Dundas St E, Whitby	Identified During Desktop/Field Review
WI-044	BHR	Commercial	318 Dundas St E, Whitby	Listed on Municipal Heritage Register
WI-045	BHR	Commercial	326 Dundas St E, Whitby	Listed on Municipal Heritage Register
WI-046	BHR	Residence	425 Dundas St E, Whitby	Listed on Municipal Heritage Register
WI-047	BHR	Commercial	500 Dundas St E, Whitby	Listed on Municipal Heritage Register
WI-048	BHR	Residence	528 Dundas St E, Whitby	Listed on Municipal Heritage Register
WI-049	BHR	Commercial	540 Dundas St E, Whitby	Identified During Desktop/Field Review
WI-050	BHR	Bridge	Structure 14, Pringle Creek, Whitby	Identified During Desktop/Field Review
WI-051	BHR	Commercial	519 Dundas St E, Whitby	Part IV Designation (By-law #2739-89)
WI-052	BHR	Residence	839 Dundas St E, Whitby	Identified During Desktop/Field Review

Reference Number	Type of Cultural Heritage Resource	Type of Property	Location	Heritage Recognition
WI-053	BHR	Residence	944 Dundas St E, Whitby	Identified During Desktop/Field Review
WI-054	BHR	Residence	991 Dundas St E, Whitby	Identified During Desktop/Field Review
WI-055	BHR	Bridge	Structure 15, CP Railway, Whitby	Identified During Desktop/Field Review
WI-056	BHR	Commercial	1635 Dundas St E, Whitby	Identified During Desktop/Field Review
WI-057	BHR	Commercial	1750 Dundas St E, Whitby	Listed on Municipal Heritage Register
WI-058	CHL	Park	1801 Dundas St E, Whitby	Identified During Desktop/Field Review
WI-059	BHR	Residence	1917 Dundas St E, Whitby	Identified During Desktop/Field Review
WI-060	BHR	Residence	1919 Dundas St E, Whitby	Identified During Desktop/Field Review
WI-061	BHR	Residence	1921 Dundas St E, Whitby	Identified During Desktop/Field Review
WI-062	CHL	Cemetery	2000 Dundas St E, Whitby	Identified During Desktop/Field Review
WI-063	BHR	Commercial	207 Dundas St W, Whitby	Identified During Desktop/Field Review
WI-064	CHL	Heritage Conservation District	Werden's Plan Neighbourhood Heritage Conservation District	Part V Designation (By-law #7297-17)
WI-065	CHL	Proposed Heritage Conservation District	Four Corners Proposed Heritage Conservation District	Proposed Part V Designation
WI-066	CHL	Proposed Heritage Conservation District	Perry's Plan Neighbourhood Proposed Heritage Conservation District	Proposed Part V Designation

TABLE 3.14. SUMMARY OF KNOWN AND POTENTIAL BUILT HERITAGE RESOURCES AND CULTURAL HERITAGE LANDSCAPES IN THE STUDY AREA WITHIN THE CITY OF OSHAWA

Reference Number	Type of Cultural Heritage Resource	Type of Property	Location	Heritage Recognition
OS-001	BHR	Residence	797 King St W, Oshawa	Identified During Desktop/Field Review
OS-002	BHR	Residence	791 King St W, Oshawa	Identified During Desktop/Field Review
OS-003	CHL	Cemetery	760 King St W, Oshawa	Listed on Municipal Heritage Register
OS-004	BHR	Residence	773 King St W, Oshawa	Listed on Municipal Heritage Register
OS-005	BHR	Residence	767 King St W, Oshawa	Identified During Desktop/Field Review
OS-006	BHR	Commercial	731 King St W, Oshawa	Listed on Municipal Heritage Register
OS-007	BHR	Residence	707 King St W, Oshawa	Identified During Desktop/Field Review
OS-008	BHR	Residence	705 King St W, Oshawa	Identified During Desktop/Field Review
OS-009	BHR	Residence	703 King St W, Oshawa	Identified During Desktop/Field Review
OS-010	BHR	Residence	697 King St W, Oshawa	Identified During Desktop/Field Review
OS-011	BHR	Residence	696 King St W, Oshawa	Identified During Desktop/Field Review
OS-012	BHR	Residence	688 King St W, Oshawa	Identified During Desktop/Field Review
OS-013	BHR	Residence	678 King St W, Oshawa	Identified During Desktop/Field Review
OS-014	BHR	Residence	685 King St W, Oshawa	Identified During Desktop/Field Review
OS-015	BHR	Residence	673 King St W, Oshawa	Identified During Desktop/Field Review
OS-016	BHR	Church	611 King St W, Oshawa	Identified During Desktop/Field Review
OS-017	BHR	Residence	36 Fernhill Blvd, Oshawa	Identified During Desktop/Field Review
OS-018	BHR	Commercial	460 King St W, Oshawa	Identified During Desktop/Field Review
OS-019	BHR	Residence	456 Bond St W, Oshawa	Identified During Desktop/Field Review
OS-020	BHR	Residence	454 Bond St W, Oshawa	Identified During Desktop/Field Review
OS-021	BHR	Residence	36 Rosehill Blvd, Oshawa	Identified During Desktop/Field Review
OS-022	BHR	Church	19 Rosehill Blvd, Oshawa	Identified During Desktop/Field Review
OS-023	BHR	Residence	35 Rosehill Blvd, Oshawa	Identified During Desktop/Field Review

Reference Number	Type of Cultural Heritage Resource	Type of Property	Location	Heritage Recognition
OS-024	BHR	Mixed Use	18-26 Gibbons St, Oshawa	Identified During Desktop/Field Review
OS-025	BHR	Residence	36 Gibbons St, Oshawa	Identified During Desktop/Field Review
OS-026	BHR	Residence	35 Gibbons St, Oshawa	Identified During Desktop/Field Review
OS-027	BHR	Commercial	403 King St W, Oshawa	Identified During Desktop/Field Review
OS-028	BHR	Commercial	399 King St W, Oshawa	Identified During Desktop/Field Review
OS-029	BHR	Residence	367 Buena Vista Ave, Oshawa	Identified During Desktop/Field Review
OS-030	BHR	Residence	363 Buena Vista Ave, Oshawa	Identified During Desktop/Field Review
OS-031	BHR	Commercial	343 King St W, Oshawa	Identified During Desktop/Field Review
OS-032	BHR	Residence	329 Buena Vista Ave, Oshawa	Identified During Desktop/Field Review
OS-033	BHR	Residence	325 Buena Vista Ave, Oshawa	Identified During Desktop/Field Review
OS-034	BHR	Mixed Use	282 King St W, Oshawa	Identified During Desktop/Field Review
OS-035	BHR	Commercial	270 Bond St W, Oshawa	Identified During Desktop/Field Review
OS-036	BHR	Commercial	42 Warren Ave, Oshawa	Listed on Municipal Heritage Register
OS-037	BHR	Residence	41 Warren Ave, Oshawa	Identified During Desktop/Field Review
OS-038	BHR	Residence	27 Warren Ave, Oshawa	Identified During Desktop/Field Review
OS-039	BHR	Commercial	223-229 King St W, Oshawa	Identified During Desktop/Field Review
OS-040	BHR	Mixed Use	29 Gladstone Ave, Oshawa	Identified During Desktop/Field Review
OS-041	BHR	Mixed Use	205 Bond St W, Oshawa	Identified During Desktop/Field Review
OS-042	BHR	Commercial	210 Bond St W, Oshawa	Identified During Desktop/Field Review
OS-043	BHR	Residence	204 Bond St W, Oshawa	Identified During Desktop/Field Review
OS-044	CHL	Cemetery	185-201 Bond St W, Oshawa	Part IV Designation (By-law #68-2015)
OS-045	BHR	Commercial	145 King St W, Oshawa	Identified During Desktop/Field Review
OS-046	BHR	Commercial	92 Bond St W, Oshawa	Identified During Desktop/Field Review
OS-047	BHR	Commercial	90 Bond St W, Oshawa	Identified During Desktop/Field Review
OS-048	BHR	Commercial	88 Bond St W, Oshawa	Identified During Desktop/Field Review

Reference Number	Type of Cultural Heritage Resource	Type of Property	Location	Heritage Recognition
OS-049	BHR	Commercial	25 McMillian Dr, Oshawa	Identified During Desktop/Field Review
OS-050	BHR	Residence	89 Bond St W, Oshawa	Identified During Desktop/Field Review
OS-051	BHR	Residence	85 Bond St W, Oshawa	Identified During Desktop/Field Review
OS-052	BHR	Residence	81 Bond St W, Oshawa	Identified During Desktop/Field Review
OS-053	BHR	Residence	77 Bond St W, Oshawa	Identified During Desktop/Field Review
OS-054	BHR	Mixed Use	84 King St W, Oshawa	Identified During Desktop/Field Review
OS-055	BHR	Commercial	78-82 King St W, Oshawa	Listed on Municipal Heritage Register
OS-056	BHR	Commercial	74-76 King St W, Oshawa	Identified During Desktop/Field Review
OS-057	BHR	Mixed Use	62-70 King St W, Oshawa	Listed on Municipal Heritage Register
OS-058	CHL	Park	61-67 King St W, Oshawa	Commemorative Feature
OS-059	BHR	Mixed Use	21-23 King St W, Oshawa	Listed on Municipal Heritage Register
OS-060	BHR	Mixed Use	19 King St W, Oshawa	Listed on Municipal Heritage Register
OS-061	BHR	Mixed Use	17 King St W, Oshawa	Listed on Municipal Heritage Register
OS-062	BHR	Mixed Use	15 King St W, Oshawa	Listed on Municipal Heritage Register
OS-063	BHR	Mixed Use	13 King St W, Oshawa	Listed on Municipal Heritage Register
OS-064	BHR	Commercial	9 Bond St W, Oshawa	Identified During Desktop/Field Review
OS-065	BHR	Mixed Use	10-16 Bond St W, Oshawa	Listed on Municipal Heritage Register
OS-066	BHR	Mixed Use	4-8 Bond St W, Oshawa	Identified During Desktop/Field Review
OS-067	BHR	Commercial	26-28 Simcoe St N, Oshawa	Listed on Municipal Heritage Register
OS-068	BHR	Commercial	27 Simcoe St N, Oshawa	Identified During Desktop/Field Review
OS-069	BHR	Mixed Use	1-5 Simcoe St S, Oshawa	Listed on Municipal Heritage Register
OS-070	BHR	Commercial	27 Bond Street East, Oshawa	Listed on a Municipal Heritage Register
OS-071	BHR	Commercial	17 Ontario St, Oshawa	Listed on Municipal Heritage Register
OS-072	BHR	Commercial	11 Ontario St, Oshawa	Identified During Desktop/Field Review
OS-073	BHR	Commercial	6-18 King St E, Oshawa	Listed on Municipal Heritage Register

Reference Number	Type of Cultural Heritage Resource	Type of Property	Location	Heritage Recognition
OS-074	BHR	Commercial	20-22 King St E, Oshawa	Listed on Municipal Heritage Register
OS-075	BHR	Commercial	27-33 King St E, Oshawa	Listed on Municipal Heritage Register
OS-076	BHR	Commercial	35-37 King St E, Oshawa	Listed on Municipal Heritage Register
OS-077	BHR	Bridge	Structure 16; Oshawa Creek	Identified During Desktop/Field Review

3.5.2 Archaeological Resources

3.5.2.1 Methodology

A Stage 1 archaeological assessment was undertaken in 2021 by ASI for the Study Area. A Stage 1 AA consists of a review of geographic, land use and historical information for the property and the relevant surrounding area, a property visit to inspect its current condition and contacting MTCS to find out whether, or not, there are any known archaeological sites on or near the property. Its purpose is to identify areas of archaeological potential and further archaeological assessment (e.g., Stage 2-4) as necessary. The Stage 1 AA is included in **Appendix F**.

The Stage 1 Study Area follows Ellesmere Road from just east of McCowan Road to Kingston Road, and Kingston Road from Rougemount Drive to the Highway 401 interchange in the City of Toronto; along Kingston Road from just west of Walnut Lane to Lake Ridge Road in the City of Pickering and Town of Ajax; on Dundas Street from Lake Ridge Road to in the Town of Whitby to where it becomes King Street in the City of Oshawa to Ontario Street; as well as a segment of Bond Street from King Street to Ontario Street in the City of Oshawa. Background Research included a review of the historical, archaeological, and geographical contexts within the Study Area, including previously completed archaeological assessments. Property Inspections were completed by ASI on May 11, 12, 14, 15, 25, 26, and 27, 2020 to document the existing conditions from the existing ROW.

3.5.2.2 Description of Existing Conditions

A Stage 1 archaeological assessment undertaken in 2021 by ASI (under Project Information Form number P1066- 0133-2020) has determined that some portions of the Study Area retain archaeological potential and further archaeological assessment is recommend in those areas. The outcomes of the Stage 1 archaeological assessment, including areas of archaeological potential are depicted graphically in Figures 25 to 71 of the Stage 1 Archaeological Assessment Report in **Appendix F**.

3.6 Socio-Economic Environment and Land Use

3.6.1 Methodology

The Study Area encompasses a variety of socio-economic and land use characteristics, as it crosses through a number of jurisdictions with different planning policy frameworks. For documentation purposes, the Project team divided the Study Area into five route segments, with one segment for each of the respective municipalities.

3.6.1.1 Existing Socio-Economic and Employment Characteristics

The existing socio-economic and business establishment characteristics in the Study Area were analyzed in the **Section 3.6.2** and **Section 3.6.3**. Existing conditions are centered on demographic characteristics, employment, and community resources within

the Study Area. The findings form the baseline conditions used to identify potential positive or adverse impacts that the Project will have on these environments.

Data sets were obtained from the following sources:

1. **Demographics:** 2016 Canadian Census, for Census Tracts within the Study Area, and for the corresponding Census Divisions and Census Subdivisions;
2. **Community Resources:** Community Services file available through Durham Region Open Data Portal, and data sets for schools, libraries, parks and community centers available through the City of Toronto Open Data Catalogue; and,
3. **Employment:** Durham Region Business Directory, available through Durham Region Open Data Portal, and Employment Survey Data sent to IBI Group from City of Toronto staff.

3.6.1.2 Planning Policy Review and Existing Land Use Conditions

The policy review is augmented by an analysis that quantifies the amount of land in each of the land use designations throughout the Study Area, as well as within each route segment. The project team identified a total of 49 land uses within the Study Area based on each respective municipal Official Plan. Official Plan land use designations were grouped into a set of standardized land uses that is applied across all municipalities within the Study Area. Combining land uses into broader categories allows the project team to take an approach to compare land use characteristics throughout the Study Area in a more straightforward manner.

Official Plan land use designations are categorized into the following standardized designations:

- Mixed-use;
- Residential;
- Multi-family Residential;
- Commercial;
- Institutional;
- Open Space;
- Industrial;
- Village;
- Rural;
- Centre; and,

- Other.

A description of each standardized land use designation can be found in **Appendix G**. The project team also quantified the amount of land in each land use designation by Official Plan designation and standardized designation. Quantifying the amount of land in each land use designation provides a basis for understanding the potential type and density of development that may be realized within the Study Area over the long-term. It also provides an insight into potential land use conflicts or synergies throughout the Study Area that informs the SWOT analysis, as well as the mitigation and monitoring measures.

3.6.2 Existing Community Resources

3.6.2.1 Existing Demographics

Demographics within the Study Area are reported by route segment. Each route segment is compared to the demographic profile of the municipality and region, where applicable, to understand unique attributes of the Study Area. Detailed demographic statistics are provided in **Appendix G**.

The following demographic characteristics are evaluated:

- Total Population;
- Population Density;
- Population by Age Group;
- Housing Distribution by Type and Tenure;
- Average Household Income;
- Period of Immigration; and,
- Educational Attainment.

A map of Census Tracts that are situated within the Study Area that were examined to complete the demographic analysis can be found in **Appendix G**.

3.6.2.2 Existing Community Resources

The community resources that are part of this overview include schools, libraries, parks, cemeteries and community centers. Federal and Provincial conservation area data were also examined. No conservation areas were identified in the Study Area. The data sets utilized for this analysis are available through the City of Toronto and Durham Region open data portals, which can be found in **Appendix G**. Mapping associated with the Community Resources Review that identifies the location of community resources can be found in Appendix A of **Appendix G**.

City of Toronto Route Segment

The City of Toronto Route Segment encompasses a total of 32 schools, with 16 being part of the Toronto District School Board, six as part of the Toronto Catholic District School Board, seven private schools, and the remainder being college or university campuses. The post-secondary institutions identified include the University of Toronto Scarborough Campus and Centennial College. In addition, two libraries are situated in the City of Toronto Route Segment, one of which is located within the Scarborough Civic Centre, the other is the Highland Creek Library. The Highland Creek Library encompasses an early years' centre that is joined by two other early years' centres. There are 117 parks within the City of Toronto Route Segment, providing a number of green spaces for residents to utilize. No cemeteries were identified in the City of Toronto Route Segment.

City of Pickering Route Segment

Within the City of Pickering Route Segment, there are a total of 12 schools, with five being part of the Durham District School Board, one is part of the Durham Catholic District School Board, and six private schools. In addition, two public libraries are situated in the City of Pickering Route Segment: the Petticoat Creek Branch and the Central Library. There are a total of 10 recreation facilities, which encompass parks, indoor pools, and a recreation complex. There are two community facilities located in the City of Pickering Route Segment, the Petticoat Creek Community Centre, which is located within the library, as well as the Pickering Civic Complex. No cemeteries were identified in the City of Pickering Route Segment.

Town of Ajax Route Segment

Within the Town of Ajax Route Segment there are a total of 13 schools, with seven being part of the Durham District School Board, three part of the Durham Catholic District School Board, one French Catholic school, and two private schools. In terms of community facilities and space, there are two public libraries, the Ajax Public Library Village Branch and the McLean Branch, and five public parks. In addition, there are three recreation facilities that include two community centres and an arena. One cemetery was identified in the Town of Ajax Route Segment, the Hicksite/Brown Quaker Cemetery.

Town of Whitby Route Segment

The Town of Whitby Route Segment encompasses a total of 14 schools. Of these, seven are part of the Durham District School Board, three are part of the Durham Catholic District School Board, and three are private schools, and one is a French Catholic school. There are a number of parks in this segment for residents to utilize, eight in total. In terms of community facilities, there is the Dundas Branch of the Whitby Public Library, as well as the Centennial Building. One cemetery was identified in the Town of Whitby Route Segment, the Mount Lawn Funeral Home and Cemetery.

City of Oshawa Route Segment

The City of Oshawa Route Segment comprises a total of eight schools. Of these, three are part of the Durham District School Board, two are private schools and three are post-secondary institutions, including Ontario Tech University, Durham College and Trent University. There are three parks in this segment, as well as the McLaughlin Public Library. There are 12 community facilities, including the Durham YMCA, several recreation complexes and community centres, a curling club, and a children's arena. One cemetery was identified in the City of Oshawa Route Segment, the Union Cemetery.

3.6.3 Existing Local Businesses

To display this information and highlight the areas where businesses are concentrated throughout the Study Area, the project team compiled hot spot maps for the entire corridor, as well as for each route segment, to identify areas with a high-density of businesses in each route segment, which can be found in **Appendix G** (Appendix A).

The Study Area encompasses a total of 4,285 business establishments. The City of Toronto Route Segment represents the largest share of total business establishments, with the City of Oshawa Route Segment, the City of Pickering Route Segment and the Town of Whitby Route Segments each accounting for approximately 20% of the total as shown in **TABLE 3.15**.

TABLE 3.15. DISTRIBUTION OF BUSINESSES BY ROUTE SEGMENT, STUDY AREA OVERVIEW

Municipality	Number of Business Establishments	Percentage Share
Toronto	1,398	33%
Pickering	793	18%
Ajax	451	11%
Whitby	783	18%
Oshawa	860	20%
TOTAL	4,285	100%

Over 50% of the businesses situated in the Study Area operate within the retail and service category, with the second largest share of businesses falling within the institutional category. It was observed that 17% of the businesses are classified as office employment, and 8% are classified as employment area employment, as shown in **TABLE 3.16**.

TABLE 3.16. DISTRIBUTION OF BUSINESSES BY TYPE, STUDY AREA OVERVIEW

Municipality	Number of Business Establishments	Percentage Share
Employment Area Employment	324	8%
Retail and Service	2,302	54%
Office	714	17%

Municipality	Number of Business Establishments	Percentage Share
Institutional	945	22%
TOTAL	4,285	100%

Overall, the major business clusters identified within the Study Area are located at the Scarborough Centre, Pickering Centre, Downtown Whitby, Downtown Oshawa and the areas surrounding these nodes.

3.6.4 Existing Land Use

3.6.4.1 Existing Land Use

In the City of Toronto Official Plan, the Scarborough Centre is identified as a centre and is also an Urban Growth Centre mandated by the Province as identified in A Place to Grow: Growth Plan for the Greater Golden Horseshoe. Urban Growth Centres are focal points for growth in the region. Additionally, Ellesmere Road is designated as a transit priority corridor that intersects with the GO Lakeshore East Rail Line and current and planned TTC lines, providing connectivity to the greater transit system.

In the Durham Region Official Plan (DROP), Kingston Road, which transitions into Dundas Street, is identified as a Regional Corridor and a Transit Spine, which are intended to promote public transit ridership through well designed, mixed-use development of higher densities. In July 2018, through Durham Regions Transportation Master Plan Amendment (ROPA #171), the Transit Spine designation has been updated to become a Rapid Transit Spine. Rapid Transit Spines within Regional Corridors are intended to support higher order transit services and pedestrian oriented development to connect residents to Urban Growth Centres, Regional Centres, and centres in adjacent municipalities. The DROP includes planning provisions that guide development in the Regional Centres, and along the Regional Corridor between the Regional Centres along Highway 2.

The Study Area is located in several jurisdictions. The jurisdictions and associated land area within each jurisdiction or Route Segment are provided in **TABLE 3.17.**

TABLE 3.17. LAND AREA BY ROUTE SEGMENT

Route Segment	Area (Ha)	Percentage of Study Area
City of Toronto Route Segment	1,840.2	33.3%
City of Pickering Route Segment	1,223.74	22.1%
Town of Ajax Route Segment	1,081.56	19.5%
Town of Whitby Route Segment	824.82	14.9%
City of Oshawa Route Segment	564.45	10.2%
Durham Region Total	3,694.57	66.7%
TOTAL	**5,534.77**	**100%**

The Study Area encompasses a wide range of land use designations that have been standardized. The standardized land use designations and associated land area is displayed in **TABLE 3.18**.

TABLE 3.18. BREAKDOWN OF STANDARDIZED LAND USE DESIGNATIONS, STUDY AREA

Land Use	Area (Ha)	Percentage of Study Area
Centre	224.48	3.81%
Commercial	560.78	9.51%
Industrial	89.57	1.52%
Institutional	88.52	1.50%
Mixed-use	421.9	7.15%
Multi-Family Residential	237.94	4.03%
Open Space	1,114.16	18.89%
Other	318.26	5.40%
Residential	2,654.79	45.02%
Rural	121.83	2.07%
Village	64.84	1.10%
Total	5,897.07	100%

Areas with Low Growth Potential

Nearly 50% of the land area within the Study Area is designated for Residential uses. The majority of the residential land area identified is comprised of low-density uses such as stable neighborhoods, while roughly 4% is identified for high-density, multi-family residential uses. Residential uses are distributed along the entire corridor abutting commercial and mixed-use areas, as well as the Centres. A number of low-density, stable residential neighborhoods have already been built out. It is not anticipated that these areas will redevelop over the short or medium-term. The second largest share of land area within the Study Area is designated for Open Space Uses. Open Space uses are also not anticipated to redevelop, as these areas will remain intact to preserve recreational spaces.

Other designations that are considered to have low growth potential are rural areas, village areas and other.

Areas with Medium and High Growth Potential

The project team has identified standardized land use designations that can support medium to high growth in order to inform the Strength, Weaknesses, Opportunities and Threats analysis, and to provide an overview of what portions of the Study Area are more receptive to redevelopment or intensification as a result of the Project. Designations that have been identified as having high growth potential for the purposes of this exercise are: Centres, Commercial, Mixed-use, Institutional, and to a lesser extent Industrial uses. Together, these areas represent roughly 1,385 hectares, or 23%

of the Study Area, and will continue to provide a number of trip generators for the Project.

Of these medium to high growth areas, Commercial designations made up the largest share of acreage. These areas are scattered along the corridor, with notable areas being the Employment Area adjacent to Scarborough Centre, SmartCentres Pickering, a Prestige Employment zone surrounding Casino Ajax, as well as Downtown Whitby, Oshawa Centre, and Downtown Oshawa. These areas accommodate power retail, main street retail, office, and employment areas, which are generally surrounded by large, open surface parking lots to accommodate users and employees.

Centres and Mixed-use areas, which are designations that closely resemble each other in terms of permissions and growth potential, make up roughly 11% of the Study Area. Notable Centres and Mixed-Use areas within the Study Area include Scarborough Centre, Pickering City Centre, Ajax Uptown Regional Centre, and the area surrounding the intersection of Dundas Road West and Thickson Road in Whitby. These designations have the potential to accommodate intensification to create complete communities connected by transit.

Industrial and Institutional designations have the potential to intensify as well, albeit to a lesser extent than the designations noted above. In particular, the University of Toronto Scarborough Campus is the largest area that can accommodate institutional uses, which is also surrounded by large surface parking lots.

3.6.4.2 Planning Policy Review in the City of Toronto

The provincial, regional and municipal planning policy framework in place within the Study Area is reviewed in Section 3.6.4.2 and Section 3.6.4.3. The intent of this review is to provide an understanding of the goals, objectives and built form that the policy framework aims to achieve. This section provides a summary of the pertinent planning policy documents that govern land use within the Study Area.

City of Toronto Official Plan

The City of Toronto Official Plan is in place to guide the growth and development of the City to the year 2031. In total, the City of Toronto Route Segment makes up a 33% share of the entire Study Area in terms of land area. **TABLE 3.19** listed the land use breakdown for the City of Toronto Route Segment.

TABLE 3.19. OFFICIAL PLAN LAND USE BREAKDOWN, CITY OF TORONTO ROUTE SEGMENT

Land Use	Area (Ha)	Percentage of Toronto segment
Apartment Neighborhoods	20.79	1.13%
Core Employment Areas	41.18	2.24%
General Employment Areas	33.54	1.82%
Institutional Areas	75.19	4.09%
Mixed-use Areas	162.3	8.82%

Land Use	Area (Ha)	Percentage of Toronto segment
Natural Areas	325.69	17.70%
Neighborhoods	874.58	47.53%
Other Open Space Areas	3.65	0.20%
Parks	80.18	4.36%
Roads	178.24	9.69%
Utility Corridors	44.86	2.44%
Total	1,840.2	100%

Highland Creek Secondary Plan (2012)

The Highland Creek Secondary Plan area is located north and south of Kingston Road, between Sheppard Avenue and Morningside Avenue within the Study Area and encompasses a portion of the Project route. The Highland Creek Community includes the University of Toronto Scarborough campus, residential areas characterized by detached dwellings on spacious, treed lots, and the mixed-use Highland Creek Village, which forms the core of the Highland Creek Community.

The policies within the Secondary Plan are focused on preserving the character of existing residential uses and supporting new infill that is compatible with this character. The built form in residential neighborhoods is primarily single detached dwellings with spacious treed lots. Highland Creek Village is envisioned to become re-urbanized into a vibrant mixed-use, pedestrian focused community that will promote a variety of new commercial and residential building types to attract new businesses and residents to the community.

Scarborough Centre Secondary Plan (2018)

The Scarborough Centre Secondary Plan was approved in 2005 to support the vision of becoming an urban focal point for eastern Toronto that comprises a mix of uses and community services that are well connected to transit. The Centre is situated at the core of an employment corridor along Highway 401 at the western edge of the Study Area at Ellesmere Road and McCowan Road, which has a growing population and a mix of uses that include retail, government, institutional, employment and residential. Scarborough Centre is an Urban Growth Centre identified in the Growth Plan that covers roughly 180 hectares and is one of four designated Centres in the City of Toronto.

Scarborough Centre is expected to experience a great deal of population and employment growth over the next 30 years - upwards of 40,000 residents and 23,000 jobs, as a result of development, redevelopment and public sector investments. Realizing this growth potential is contingent on having the required transportation infrastructure in place to ensure adequate mobility to and from the Centre.

The City of Toronto is currently undertaking a focused review of the Scarborough Centre Secondary Plan. The intent of this study is to update and further articulate the secondary plan by clarifying and updating the vision, planning framework and policies of the plan, while also recognizing the significant investment in civic infrastructure with new station entrances and a new bus terminal associated with the Scarborough Subway Extension.

The study will guide and support positive change and placemaking over the coming decades and support the development of Scarborough Centre as a vibrant urban node.

Scarborough Centre Transportation Master Plan (2018)

In May 2018, Official Plan Amendments 408 and 409 were adopted by Toronto City Council as a result of the Scarborough Centre on the Move Transportation Master Plan Study. The associated by-laws came into force in June 2018. The Scarborough Centre is located at the west end of the Study Area at the intersection of Ellesmere Road and McCowan Road.

The development of the transportation network that will support growth in the Scarborough Centre will be guided by the Scarborough Centre on the Move Transportation Master Plan Study in order to provide greater connectivity the rest of the City and the greater region. The Scarborough Centre on the Move Transportation Master Plan Study is intended to foster a public realm that is attractive to people and employers, offer mobility options for users of all ages, abilities, and incomes, and support the future growth and development of the Scarborough Centre.

One of the primary objectives of the Scarborough Centre on the Move Transportation Master Plan Study vision is to create a transportation network that will be fully integrated into the regional transportation system. This includes transit, pedestrian and cycling networks, as well as connections to neighbouring communities. Current changes to the transportation network include extending the Bloor-Danforth Subway from Kennedy Station to Scarborough Centre. In total, there are 16 proposed projects to improve the transportation network, one of which is the Durham-Scarborough Bus Rapid Transit project. One of the pillars that supports these projects as part of the master plan is to integrate land use and transportation.

Small development blocks have been recommended in the Scarborough Centre on the Move Transportation Master Plan Study to spur high-density, mixed-use development that is supportive of transit use, with the overall goal of reducing dependency on private vehicles.

University of Toronto Scarborough Campus Master Plan (2011) and Proposed Secondary Plan

The University of Toronto Scarborough Campus (UTSC) has experienced robust growth over the past decade and is located within the Study Area at the intersection of Ellesmere Road and Morningside Avenue. This growth has allowed the campus to transition from a satellite campus into a mid-sized university. To prepare for future growth, UTSC implemented a master plan for the campus in 2011 that is based on a new vision for campus expansion. The document guides the development of the built environment to ensure that any expansions are compatible with the surrounding community, integrate a mix of land uses, are well-connected by transit and active transportation networks, and feature pedestrian-centered design.

Growth will be focused on the North Campus precinct, which is located along Military Trail and Ellesmere Road. The vision for this area is to accommodate a mix of uses through mid-rise and high-rise development, connected by open space and pedestrian routes. The Campus Core, located at the intersection of Military Trail and Ellesmere Road, will be the focal point of the campus. This area is envisioned to become a high-density, mixed-use hub that encompasses office and residential uses. Retail, restaurant, entertainment and cultural uses will also be integrated to support the surrounding community. There is a rapid transit station planned to be accommodated within a mixed-use building in the Campus Core, which will provide connectivity to the greater region and is envisioned to be a point of convergence for multiple travel modes.

The guiding principles that underpin the master plan include maximizing transportation options, with the intention of transit becoming the primary means for enhancing access to campus. Streetscape improvements, which include bicycle lanes, will be focused along rapid transit corridors. Pedestrian and bicycle networks are envisioned to connect to transit stops, to provide a seamless network capable of facilitating active transportation throughout the campus.

The University has proposed a new Secondary Plan for the campus. This proposal was submitted to the City for review as an Official Plan Amendment application in 2016. The objective of this document is to guide future growth and development of a campus that is compact and integrated, connected, open and green. It is intended to guide the growth of the campus to support a long-term projected future population of approximately 35,000 students and 2,500 faculty and staff. The draft Secondary Plan is currently under review.

3.6.4.3 Planning Policy Review in the Durham Region

Durham Region Official Plan

The Durham Region Official Plan (ROP) builds on the direction of the PPS and Growth Plan to implement a coordinated approach to directing growth and development in Durham Region. The ROP was approved by the Ministry of Municipal Affairs and Housing in 1993, which replaced the former iteration prepared in 1976. A consolidated version was released in 2020.

The ROP imposes a regional structure that all local area municipalities must conform to. The regional structure delineates the urban area boundary, identifies regional centres and corridors and directs growth to these areas, as well as living areas, employment areas, and includes provisions regarding the greenlands system and the transportation system.

The goals of the ROP are centred on promoting managing growth to support economic development and aligning infrastructure investments, accordingly, providing housing options in Urban Areas that accommodate the social and economic needs of current and future residents, creating complete and sustainable communities, and managing resources in the region responsibly. One of the primary directions that underpins

realizing these goals is to improve transportation linkages within the Region, as well as to adjacent areas.

Kingston Road, which transitions into Dundas Street, King Street and Bond Street are identified as a Regional Corridor and a Rapid Transit Spine. Regional Corridors are intended to promote public transit ridership through well designed, mixed-use development of higher densities, as well maintain and enhance historical main streets through integrating new forms of development with existing development patterns (8A.1.5). To support higher density and mixed-use areas, Rapid Transit Spines within Regional Corridors are intended to support higher order transit services and pedestrian oriented development to connect residents to Urban Growth Centres, Regional Centres, as well as centres in adjacent municipalities (11.3.19).

City of Pickering Official Plan

The City of Pickering Official Plan builds on the Durham Region Official Plan policy framework to set out the land use policy direction to guide the long-term growth and development of the City to the year 2031. The most recent Official Plan consolidation, Edition 8 was released in October 2018.

The land directly adjacent to Kingston Road is primarily comprised of Mixed-use Areas with a portion of the corridor encompassing the Pickering City Centre. In the 1970s there was a shopping mall built on the land that the Pickering City Centre is situated on. In the 1980s and 1990s, the area began to see expansion with higher density development. Today, the City Centre is one of many provincially designated Urban Growth Centres, which has the highest diversity and intensity of uses throughout the City, including higher density residential, office, shopping, civic and recreational uses, and includes a GO Station.

The City Centre is anticipated to continue to have the highest mix and intensity of uses and activities of all neighborhoods, in order to transform the area into a liveable, walkable and human-scaled neighborhood (12.10, 12.10A). Mixed-use Areas subcategories include: Local Nodes, Community Nodes, Mixed Corridors, Speciality Retailing Nodes and the City Centre. These areas and corridors are intended to accommodate the highest concentration of development activity in the City, as well as community services and facilities.

A significant share of the City of Pickering Route Segment is designated as Low-density Areas. The majority of these areas are fully built-out and will likely not experience a great deal of redevelopment in the short to medium-term.

The City of Pickering Route Segment makes up a 22% share of the Study Area in terms of total land area, see **TABLE 3-20**.

TABLE 3.20. OFFICIAL PLAN LAND USE BREAKDOWN, CITY OF PICKERING ROUTE SEGMENT

Land Use	Area (Ha)	Percentage of Pickering segment
Active Recreational Centres	10.55	0.86%

Land Use	Area (Ha)	Percentage of Pickering segment
City Centre	114.61	9.37%
Controlled Access Areas	92.2	7.53%
High-density Areas	6.31	0.52%
Local Nodes	2.99	0.24%
Low-density Areas	508.91	41.59%
Medium Density Areas	128.05	10.46%
Mixed-Corridors	137.03	11.20%
Mixed Employment	7.14	0.58%
Natural Areas	125.09	10.22%
Potential Multi Use Areas	28.36	2.32%
Prestige Employment	32.01	2.62%
Specialty Retailing Node	30.49	2.49%
Total	1,223.74	100%

Town of Ajax Official Plan

The Town of Ajax Official Plan conforms to the regional policy direction to manage physical, social and economic development and change within the Town over a 25-year period. The most recent iteration of the Official Plan was consolidated in January 2016. The original iteration of the Official Plan was approved for the entire municipality in 2000, which later was brought into conformity with provincial plans and policies in 2008 and 2010.

The Town of Ajax Route Segment comprises both a Village Regional Centre, as well as an Uptown Regional Centre. Regional Centres are intensification areas that are planned to absorb the majority of urban growth and development, which require higher density development formats that encompass a wide variety of land uses. These uses include retail, commercial, office, cultural, entertainment, community facilities, as well as medium to high transit-supportive density residential uses.

The largest retail commercial focus in the Town is the Uptown Regional Centre, which is envisioned to become a primary intensification area, as it is a central location with significant commercial and mixed-use potential. Improvement of transit nodes is required to support the intended densities of the Uptown Regional Centre, which are to be provided in immediate proximity to existing commercial uses.

The Village Centre, known as Pickering Village, contains a number of heritage assets and has an old village character that is intended to be preserved. The vision for Old Kingston Road is intended to become a thriving shopping street that is pedestrian oriented. A more detailed overview of the Pickering Village Heritage Conservation District is provided in *Pickering Village Heritage Conservation District Plan (2013)***.**

A large share of the land area adjacent to the Centres is made up of Low-density Residential uses, along with areas zoned for Environmental Protection. These areas will not likely experience a great deal of development over the short to medium-term.

The Town of Ajax Route Segment makes up a 19% share of the Study Area in terms of total land area, see **TABLE 3.21**.

TABLE 3.21. OFFICIAL PLAN LAND USE BREAKDOWN, TOWN OF AJAX ROUTE SEGMENT

Land Use	Area (Ha)	Percentage of Ajax segment
Active Recreational Centres	10.55	0.86%
City Centre	114.61	9.37%
Controlled Access Areas	92.2	7.53%
High-density Areas	6.31	0.52%
Local Nodes	2.99	0.24%
Low-density Areas	508.91	41.59%
Medium Density Areas	128.05	10.46%
Mixed-Corridors	137.03	11.20%
Mixed Employment	7.14	0.58%
Natural Areas	125.09	10.22%
Potential Multi Use Areas	28.36	2.32%
Prestige Employment	32.01	2.62%
Specialty Retailing Node	30.49	2.49%
Total	1,223.74	100%

Town of Whitby Official Plan

The initial Town of Whitby Official Plan was adopted by Council in 1994 and approved by Durham Region Council in 1995. Since then, there have been a number of iterations released that have incorporated various amendments, with the most recent consolidation being approved in June 2018.

The majority of the land situated within the Town of Whitby Route Segment is designated Residential and Major Open Space. The goal in residential areas is to create complete communities that are safe and attractive through developing and redeveloping neighborhoods with a diversity of housing options and ancillary uses (4.4.1.1). Permitted ancillary uses include recreational, institutional, and community uses. Residential intensification is encouraged in suitable locations and must maintain or enhance the character and identity of existing residential neighborhoods. New development and redevelopment in these areas is to be transit-supportive and focused on pedestrian-oriented design (4.4.2.3).

Along Dundas Street East, there is a large swath of land that is designated Mixed-use and Major Commercial, generally from the rail line west of Anderson Street to Garrard Road. This area is identified in Schedule B as an intensification area. Intensification areas are where the majority of intensification is expected to occur over the planning horizon.

Mixed-use areas situated in intensification areas are intended to encourage both residential and commercial development and redevelopment that is comprised of a built

form that is intensive and transit-supportive (4.6.2.1). Permitted land use designations in these areas include: residential, office, retail, restaurant, personal service, and community and/or institutional uses.

The Town of Whitby Route Segment also encompasses Downtown Whitby, which is another intensification area that is primarily designated Commercial, and surrounded largely by medium to high-density residential uses, as well as institutional uses. A summary of the goals and objectives for this area is covered in *Downtown Whitby Secondary Plan (2017)*, which is an overview of the Downtown Whitby Secondary Plan.

The Town of Whitby Route Segment makes up a 14% share of the Study Area in terms of total land area, see **TABLE 3.22**.

TABLE 3.22. OFFICIAL PLAN LAND USE BREAKDOWN, TOWN OF WHITBY ROUTE SEGMENT

Land Use	Area (Ha)	Percentage of Whitby segment
Community Commercial	3.91	0.44%
General Industrial	13.14	1.47%
Major Commercial	29.8	3.34%
Major Open Space	256.15	28.70%
Mixed-use	56.49	6.33%
Prestige Industrial	76.4	8.56%
Residential	465.32	52.15%
Total	892.21	100%

City of Oshawa Official Plan

The City of Oshawa Official Plan is a policy framework that is in place to the guide the land use planning system to direct the physical development and redevelopment pattern of the City. The most recent official consolidation of the Official Plan was updated and released in August 2021.

The majority of the City of Oshawa Route Segment is comprised of land designated Residential. Residential uses are predominately used to accommodate residential dwellings, with other uses such as schools, places of worship, nursing homes, homes for the aged, day care centres and libraries permitted. The majority of the residential area within the Oshawa segment is built out; it is unlikely that these areas will redevelop in the short to medium-term.

The second largest share of land within the City of Oshawa Route Segment is designated as the Downtown Oshawa Urban Growth Centre (UGC), which is an Urban Growth Centre established through the Growth Plan for the Greater Golden Horseshoe. The UGC is a Central Area that encompasses a Planned Commercial Centre, as well as a Planned Commercial Strip along King Street West. Central Areas are intended to become the focal points of activity and development, interest and identity for residents.

The UGC is envisioned to serve as a major employment centre and as such is a primary focus area for major office uses and will accommodate a built form that is compact and affords residents the ability to access commercial, retail, institutional, recreational, and cultural uses, and entertainment. Higher density residential uses, public services and the planned Central Oshawa Transportation Hub are intended to be located in the UGC.

The City of Oshawa Route Segment makes up a 10% share of the Study Area in terms of total land area, see **TABLE 3.23**.

TABLE 3.23. OFFICIAL PLAN LAND USE BREAKDOWN, CITY OF OSHAWA ROUTE SEGMENT

Land Use	Area (Ha)	Percentage of Oshawa segment
Deferred by Regional Council	2.96	0.52%
Downtown Oshawa Urban Growth Centre	175.21	31.04%
Open Space and Recreation	86.08	15.25%
Residential	300.23	53.19%
Total	564.47	100%

Durham Region Transportation Master Plan (2017)

The Durham Region Transportation Master Plan (TMP) provides strategic planning policy direction to guide the development of programs and infrastructure required to manage expected long-term transportation demands in the Region. The primary directions of the TMP are to:

- Ensure that the transportation network supports compact, mixed-use land patterns; and,
- Strengthen the role of public transit in meeting travel demand, making walking and cycling more practical to promote sustainable travel choices, while improving goods movement and making strategic investments in the transportation system.

These strategic directions support the following goals that are relevant to the Project:

- Ensure direct, safe and accessible connectivity between existing transportation networks and new neighborhoods (3.4.1);
- Promote Transit Oriented Development to create clusters of compact, high-density development in close proximity to current and planned transit infrastructure to support achieving intensification targets, and to drive transit ridership to capitalize on infrastructure investments (3.4.3);
- Deliver a convenient and reliable transit system through providing service options for residents in urbanized areas within walking distance to residences or workplaces, enhance connections between rural areas and nearby population centres, and introducing transit to developing areas as early as possible through service agreements (4.4.1);

- Utilize Higher Order Transit Corridors such as Highway 2 and Simcoe Street to provide connectivity to major destinations like Regional Centres, Transit Hubs, and Urban Growth Centres (4.4.6); and,
- Ensure new development will support sustainable travel through development regulations and approvals (7.4.10).

Durham Regional Cycling Plan (2012)

The 2012 Durham Regional Cycling Plan (DRCP) proposes a cycling and active transportation network plan that aims to expand the existing network and enhance routes to accommodate a variety of users and trip types. Durham Region is currently undertaking an update to the DRCP that is anticipated to be released in late 2020.

Segments of the proposed cycling network upgrades and expansions are planned to be implemented within the Study Area along the Highway 2 corridor. The planned cycling upgrades along the Highway 2 corridor include:

- Buffered cycle lanes along Kingston Road and Dundas Street from Altona Road to Notion Road, and from Westney Road to Henry Street. The buffered cycle lanes provide connectivity to several north/south running multi-use paths, and one north/south cycle lane on Cochrane Street;
- Cycle lanes that do not provide a buffer are planned along Kingston Road and Dundas Street from Notion Road to Westney Road, and from Henry Street to Anderson Street. These cycle lanes are contiguous to the buffered cycle lanes, with the Westney Road to Salem Road component already completed; and
- At Kingston Road and Whites Road there is a provision for cycling facilities to be considered with future MTO interchange/bridge projects.

There are several existing and planned cycling facilities that intersect the DSBRT corridor in Durham Region. To compliment the Project, the proposed cycling facilities will provide a larger, more connected active transportation network. According to the network phasing, the balance of cycling network upgrades are expected to be completed within the 2017 to 2032 timeframe.

Kingston Road Corridor and Specialty Retailing Node Intensification Study (2019)

The Kingston Road Corridor and Specialty Retailing Node Intensification Study is an ongoing project in South Pickering, located within the Study Area along Kingston Road from Altona Road to Dixie Road. The Study is aimed at creating a new vision and strategy for intensification and redevelopment along the Kingston Road corridor and within the Speciality Retailing Node to prepare the area for infill and redevelopment. The area is planned to transition into a vibrant, mixed-use and transit supportive community as part of the City's larger Growth Management Program.

The Study builds on the South Pickering Intensification Study, otherwise known as Phase 1, which developed a suite of key themes, including direction to focus on

intensification and higher density development along Corridors like Kingston Road. From this work, Phase 2 of the study established a preferred intensification scenario that is centred on the Kingston Road Corridor and Speciality Retailing Node. The Specialty Retailing Node is defined as the area east of Brock Road and south of Kingston Road. Phase 3 is now closed and resulted in an Intensification Plan and Draft Urban Design Guidelines.

The Recommended Intensification Scenario is broken out into four precincts with tailored land-use strategies that are in place to improve the connectivity, place-making, land-use and built form in each precinct. The precincts and associated planned residents and jobs at build-out based on potential redevelopment sites are listed below.

Pickering Village Heritage Conservation District Plan (2013)

Pickering Village is a neighborhood in the Town of Ajax that comprises a collection of heritage buildings and open spaces that are of significance to the community. The District is located along Old Kingston Road within the Study Area, generally between Church Street North and Elizabeth Street, with heritage buildings on either side of Elizabeth Street. The Pickering Village Heritage Conservation District Plan was established to preserve the heritage buildings and open spaces to maintain the character of the community's only historic main street.

Infill development in the District must enhance the heritage character and be compatible with the village-like, human scale of development. Development on adjacent lands to the District must demonstrate that the heritage attributes of the District will be preserved. New residential buildings will have a similar height, width, setback, design and orientation as adjacent buildings, and should not be less than 80% or more than 120% of the average height of adjacent properties. New commercial buildings cannot exceed 4 stories or a height of 12.5 metres.

Downtown Whitby Secondary Plan (2017)

The Downtown Whitby Secondary Plan is in place to guide growth and development in Downtown Whitby to enhance the role of the downtown as a focal point and foundation of identity for the Town. Downtown Whitby is located in the Study Area, surrounding the intersection of Dundas Street East and Brock Street.

The primary objectives of the plan are to foster a compact, pedestrian-oriented built form in order to support the retail and personal service uses within the commercial core, as well as provide a range of housing types through intensification that are of higher density. Redevelopment and intensification must ensure that stable neighborhoods, and buildings of architectural and historical significance are preserved. In this regard, the character of the downtown ought to be maintained or enhanced through redevelopment. Efficient movement of traffic through the downtown is a priority in order to curb traffic congestion to the greatest extent possible.

Within the downtown, commercial designations permit retail, personal service, office uses, entertainment, open space, institutional and parking uses. Retail and service uses

are to be located on the ground floor in order to maintain the main street character, with a minimum height of two storeys. The use of public transit to and from the downtown will be encouraged. As such, the downtown will continue to act as an integral node of convergence for the Town's transit system.

West Whitby Secondary Plan (2014)

The West Whitby Secondary Plan is in force to ensure that significant natural heritage features and ecological functions situated within the Secondary Plan Area are protected or enhanced. As part of the Secondary Plan, development must have regard for the approved Lynde Creek Watershed Plan. The West Whitby Secondary Plan area is located within the Study Area, at the intersection of Dundas Street West and Halls Road North.

The Plan also encourages the development of an integrated transportation system that minimizes the impacts on the natural environment. When designing Arterial Roads, public transit will be a priority to ensure that required facilities such as stops, shelters, and dedicated lanes are built into the arterial road network. Higher density development is promoted along Arterial Roads, which is to be supported by a pedestrian-oriented, transit supportive environment.

Werden's Plan Neighbourhood Heritage Conservation District (2017)

In 1994, as part of the Town of Whitby Official Plan adoption, there was a policy direction to examine identifying Downtown Whitby or a portion thereof as a heritage conservation district. The heritage conservation district is located in the Study Area, at the intersection of Dundas Street and Centre Street. The formation of the draft Werden's Plan Neighborhood Heritage Conservation District Plan commenced in 2014 by the Town of Whitby Council to identify and protect the neighborhood as a heritage conservation district. The draft plan was reviewed by Town Planning staff in 2016 and received approval from the Local Planning Appeal Tribunal on May 13, 2019.

The intent of the Plan is to manage the long-term physical change of the neighborhood in a manner that preserves the small-town, historic character of the area. This will be achieved through aligning land use to the neighborhoods existing character in order to maintain the low-density residential appearance. The Plan specifies neighborhood changes that would trigger a heritage review, and those that are exempt from heritage review. The Plan does not exclude redevelopment in the area, however, the opportunities for new construction are limited to additions to existing buildings or to new single-detached dwellings on lots that have been identified for building replacement. The Plan discourages widening any Town roadway or road allowance in the district.

Town of Whitby Transportation Master Plan Study (2010)

The Town of Whitby Transportation Master Plan Study is a strategic policy planning document that is intended to support the development of a diversified transportation network to underpin long-term growth and the efficient movement of people and goods. One of the fundamental principles of the Study is to integrate the local transportation

system with Regional and Provincial transportation infrastructure and transit services. As part of this, the transportation system should provide for all trip types and uses, which include accommodating residents, businesses and visitors. This requires that the transportation system supports greater use of transit, pedestrian and cycling facilities in order to curb automobile dependence.

In order to encourage and facilitate public transit, Section 8 of the Plan includes the following actions:

- Position land use planning and local road network decisions to support transit usage in order to realize the 15% auto mode share reduction target;
- Develop a Transit Oriented Development Policy to establish guidelines for Greenfield development and intensification around primary transit corridors and nodes. This includes aligning the urban structure, mix of land uses, density of development, and distances to transit facilities to support transit-supportive development;
- Encourage high-density development with mixed-uses in locations at origins and destinations;
- Promote mixing compatible land uses and live/work opportunities; and,
- Implemented as required to provide strategic connections to existing infrastructure, which will maximize and integrate mobility opportunities for people and goods.

City of Oshawa Integrated Transportation Master Plan (2015)

The Oshawa Integrated Transportation Master Plan is in place to provide a framework to guide the long-term growth of the transportation system in Oshawa in order to build a balanced, sustainable, and multi-modal network. Section 5 of the Plan put forward a number of goals that are largely centred on improving mobility, alleviating congestion and encouraging sustainability through promoting and providing access to multiple modes of transportation.

- In order to realize these goals, the Plan identifies a number of action items. These action items include:
- Facilitate the development of and connectivity to the two designated Mobility Hubs located in Downtown Oshawa and around the Oshawa Go Train Station. This includes amending land use planning policy and zoning regulations to maximize intensification of land uses and transit-oriented development surrounding mobility hubs;
- Improving connectivity in the downtown through providing a variety of transportation options and repurposing the road network with people in mind;

- Ensure that active transportation is a priority in planning moving forward through adhering to the Active Transportation Master Plan in order to develop a comprehensive active transportation network; and,
- Increase transit ridership through providing active transportation linkages to mobility hubs, other transit stations and stops.

City of Oshawa Draft Active Transportation Master Plan (2015)

Due to the interest in active transportation expressed by the public through the City of Oshawa's development of an Integrated Master Plan starting in 2014, a separate Active Transportation Master Plan was also developed concurrently.

This Plan's vision is to enhance the quality of life for residents and employees in the City of Oshawa by providing an active transportation system that offers a high degree of comfort and safety, expands recreation options, encourages sustainable modes of transportation, respects the natural scenic character, and supports economic development.

As part of this ongoing study, a draft cycling and trail network was created. There are no planned or existing cycling facilities shown along the DSBRT corridor in the City of Oshawa. Instead, the primary east-west cycling route is a proposed bicycle lane along Adelaide Avenue.

Ajax Integrated Transportation Master Plan (2019)

The Town of Ajax recently released an Integrated Transportation Master Plan to guide transportation planning in the Town over the short, medium and long-term planning horizons. The Plan is a multi-modal planning tool that is intended to improve walking, cycling, public transit, and driving in Ajax to the year 2031 and beyond.

The objectives of the Plan are to address the impacts that population and employment growth will have on the transportation network, align the plan with Provincial and Regional government policies, enhance community benefits, respond to new transportation trends, and encourage public engagement and participation in decision making. The Plan emphasizes the importance of integrating active transportation systems in order to support the achievement of a multi-modal transportation network.

The Plan aims to:

- Shift the existing travel mode split to have 30% of all commuter trips accommodated by transit, cycling and walking by 2031 (1.5);
- Apply complete streets polices to all existing, retrofitted and new transportation projects and provide multi-function street corridors to better provide accessibility and access to different users (6.1.4); and
- Integrate land use planning in infrastructure projects to promote short distance trips and reduce auto dependency (6.1.6).

3.6.5 Existing Aesthetics / Visual Character

The DSBRT corridor is comprised of various land use and physical contexts across multiple municipalities. Because the route passes through multiple jurisdictions, there are several standards for streetscape elements and multiple existing and planned right-of-way widths. A site visit was conducted to confirm existing conditions along the corridor.

Generally, the corridor is not comprised of an active public realm and does not have high volumes of pedestrian activity or active transportation use. The policy direction speaks to the need for public realm improvements, including upgrades that will increase walkability and active transportation connections along the corridor. The Project provides an opportunity to upgrade the public realm and use the streetscape design to celebrate the natural and cultural heritage features along the corridor.

3.6.5.1 Pinch Points

There are five pinch point areas with particularly constrained right-of-way conditions: Ellesmere Road in Scarborough (Military Trail to Meadowvale Road and Meadowvale Road to Kingston Road), Pickering Village in Ajax, Downtown Whitby, and Downtown Oshawa. A site visit was conducted to confirm streetscape conditions in these areas in order to identify where typical streetscape typologies will need to be modified. A memo documenting the existing conditions is included in **Appendix G** (Appendix E).

3.6.5.2 Typical DSBRT Corridor

Generally, the corridor does not have an activated street edge. With the exception of some commercial mixed-use areas, urban / town centres and institutional areas, the streetscape is predominantly adjacent to strip malls and commercial establishments buffered with surface parking, some naturalized areas, and some low-density residential uses. These uses do not typically encourage pedestrian activity along the streetscape. Some areas along the corridor will likely intensify. In the areas that are not likely to transform into active street edges, appropriate streetscape treatments should be used that provide safe and comfortable travel for pedestrians and cyclists.

3.6.5.3 Green Space and Open Space Areas

The DSBRT corridor passes through several naturalized and open space areas, including Highland Creek / Greenvale Park, Colonel Danforth Park, the Rouge Valley, South Petticoat Ravine, Steeple Hill Park, Diana Princess of Wales Park, Duffins Creek, and Lynde Creek. Trail systems pass through these areas.

The streetscape existing conditions generally do not celebrate the connections to these naturalized areas and systems or provide sufficient active transportation connections or wayfinding. The DSBRT streetscape provides an opportunity to strengthen multi-modal connectivity to these areas and create gateways to announce and celebrate the entry into these spaces.

3.6.5.4 Streetscape Policy Review

The intent of this review is to understand the streetscape and landscape design guidelines, policies and directions in place along the corridor to help inform the streetscape design for the DSBRT system.

Markham-Ellesmere Revitalization Study (2009)

The Revitalization Study provides additional detail on the Site and Area Specific Policy Number 311 in **Appendix G**. The Study presents a conceptual Master Plan for the area around Ellesmere Road and Markham Road, recommending improved pedestrian connections, additional traffic signals, new road connections, and tree planting in the public realm. Additionally, planted medians are proposed on Ellesmere Road to enhance safety and restrict turning movements. The Study provides direction on intersection conditions that will inform the streetscape design. The document also includes land use related policies for Parks and Open Space, Mixed Use Development/Commercial Uses, New Residential Development, Potential Tower Renewal and Built Form. This Study will be consulted with regards to roadway and streetscape design in the area.

Scarborough Centre Public Space + Streetscape Master Plan (2012)

Scarborough Centre is bordered by Highway 401, Ellesmere Road, Brimley Road and McCowan Road. The Public Space and Streetscape Master Plan provides an approach and implementation strategy to shape outdoor public space through creating a pedestrian scaled grain of streets, a connected network of legible urban spaces, and a cohesive landscape and streetscape palette. Ellesmere Road has been proposed as an Arterial Corridor within the Streets Hierarchy. Streetscape and open space recommendations will be considered in the design the Scarborough Centre area.

Highland Creek Community Secondary Plan (2017)

The Highland Creek Community Secondary Plan area seeks to ensure that development and infill reinforces the spacious residential character of the area. Ellesmere Road is in the centre of the Highland Creek Secondary Plan area. One of the major policy objectives is to create a comfortable pedestrian environment and transition to protect adjacent neighbourhoods. Preservation of mature trees and enhanced landscaping is encouraged.

University of Toronto Scarborough Campus Master Plan (2011)

The Campus Master plan provides a vision, master plan, and implementation strategy for the University of Toronto Scarborough Campus. The Plan provides recommendations for the open space network and prioritizes mobility. The modal split indicates that 35% of trips to campus are by transit and 10% by cycling, with an initiative to grow these modes. The Plan also recommends that transit is integrated into the campus, with transit stops serving as important hubs that seamlessly connected to active transportation networks.

Scarborough Centre on the Move Transportation Master Plan Study (SCTMP 2018)

The SCTMP builds off of the pre-existing planning framework to provide detailed transportation policies, initiatives, strategies, and implementation priorities to transform Scarborough Centre into a vibrant mixed-use urban hub. One of the key Guiding Principles of the TMP is serving people through providing transportation modal choices that encourage sustainable transportation and integration of different transportation modes. The Plan recommends a ROW width of 36 m for Ellesmere Road adjacent to the centre. The DSBRT corridor design should integrate with the SCTMP design strategy.

Complete Streets Guidelines

The Guidelines provides a vision and goals for fostering complete streets in the City of Toronto. The document outlines a variety of street types and provides guidelines and standards for the design of complete streets, including the pedestrian realm, cycling infrastructure, green infrastructure, transit design, roadway, and intersection design. These guidelines will be consulted for functional design of the City of Toronto portion of the corridor.

Cycling Network Plan

The City's cycling network plan will inform the type of cycling facilities along the corridor.

Eglinton East LRT (EELRT) Design

The Eglinton East LRT design is at the 5% conceptual design phase. There is overlap between the EELRT and the DSBRT between Morningside Avenue and Military Trail, where the right-of-way is relatively narrow. In this area, the DSBRT will run in the curb lanes to accommodate the LRT.

Durham Region Official Plan

The Durham Region Official Plan, described in **Appendix G**, provides classification for the road network and land uses which inform the more specific planning studies, as well as the DSBRT corridor design.

Arterial Corridor Guidelines (2007)

The Arterial Corridor Guidelines provide standards for Arterial Road design within Durham Region and serve as the basis for the roadway and streetscape design. The Guidelines provide a framework for the transportation priorities along the corridor, including the types of transportation infrastructure recommended and their geometry. The Guidelines also provide recommended street tree species.

City Centre Urban Design Guidelines (2017)

The Urban Design Guidelines provide a vision and guidelines for the City of Pickering City Centre, including built form, landscape, and mobility networks. The document prioritizes an integrated mobility system including transit, pedestrian and cycling

networks. Recommendations are made for the type of roadway infrastructure that should be implemented on different road classifications. Guidelines are established for 2.5 to 3.0 metre-wide sidewalks on arterial roads, with pedestrian space for street furnishing, tree planting, transit shelters, and sidewalk cafes etc. in high pedestrian areas. Guidelines are also provided for transit stops and hubs, transit networks, street tree planting, street furnishing, street lighting, cycling networks, and pedestrian crossing.

Downtown Pickering Vision & Redevelopment Framework (2013)

The document provides a vision and strategies for mobility, the public realm, place-making, sustainability, built form, growth, and implementation for Downtown Pickering. Kingston Road is classified as a Major Street within the Street Network, with a conceptual cross section provided illustrating the DSBRT corridor with a pedestrian zone, bike lane, landscaped area, and landscaped centre median that is transition into a transit platform over time. Policy recommendations are provided for transit, pedestrian, and cycling infrastructure.

Kingston Road Corridor and Specialty Retail Node Urban Design Guidelines (2019)

The Intensification Study provides a vision and recommendations for built form, place-making, and connectivity for the Pickering Kingston Road Corridor. The document provides a framework for the existing conditions, land use, proposed future intensification and built form, and mobility improvements around Kingston Road from Altona Road to Squires Beach Road. The corridor is broken down into four Precincts: Rougemount Precinct, Whites Precinct, Dunbarton/Liverpool Precinct, and Brock Precinct. The Downtown Pickering Study Area is not included in the study, as this area has been captured in the Downtown Pickering planning documents. The Study outlines a cycling network (existing and/or planned) along the entirety of Kingston Road within the corridor. The study also provides design guidelines for transit infrastructure.

Kingston Road Corridor and Specialty Retail Node Intensification Plan (2019)

The Intensification Plan provides a comprehensive framework and strategy for development along the Kingston Road corridor in the City of Pickering. The document outlines detailed plans for land use, built form, and area character, establishing place-making priorities related to natural heritage, public realm and open space. Improvements to the street, transit, cycling, and pedestrian network are recommended. The Cycling Network recommendations propose on-street bike lanes or in-boulevard cycling tracks, and/or Multi-Use Paths for new streets.

Design Criteria (2011)

The Ajax Design Criteria provides an overview of the Town's Engineering review processes and design standards. Relevant Sections include: Section B Roadways, Section C Stormwater Management and Storm Drainage, Section D Storm Drainage Connections, Section F Traffic and Signs, Section G Street Tree Planting, Section I

Street Lighting and Section M Street Furniture. These standards will be referred to throughout the design process.

Employment Areas Urban Design Guidelines (2006)

The Guidelines provide clear urban design criteria to be incorporated within development proposals for employment areas, including the public realm. The three major areas of employment areas are outlined as Carruthers Creek Employment Properties, Established Core Area, and Audley Road Area. Notion Road Area is also listed as subject to a land use and urban design study jointly prepared by the Town of Ajax and City of Pickering (2001). The document prioritizes creating a legible identity for the Town through urban design, celebrating heritage, and enhancing multi-modal linkages. Recommendations are made for the employment area public realm including creating active street edges, ensuring a balance of unity and variety in urban form, promoting complete streets, investing in highly visible and utilized streets, and providing landscape buffers where there are larger setbacks.

Pickering Village Community Improvement Plan (2013)

The Pickering Village Heritage Conservation District extends north of Kingston Road West from Elizabeth Street to Church Street North. The Community Improvement Plan builds off of the vision of Pickering Village, providing tools to stimulate implementation. The vision includes ensuring “Old Kingston Road becomes a vibrant, thriving, beautiful shopping street filled with pedestrians at all times of day” and “streetscapes and sidewalks are attractive and inviting both for passersby and pedestrians.” The vision is elaborated on through principles and evaluation criteria that include increasing pedestrian friendliness and cycling amenities, enhancing connectivity, and preserving and enhancing the heritage character.

Urban Design and Built Form Guidelines for Pickering Village (2008)

Pickering Village extends along Kingston Road east of Duffins Creek to Rotherglen Road South, and along Church Street south to Highway 401. The Guidelines provide a framework for the public realm, streetscape design, and built form in the area. The Guidelines seek to support an active pedestrian realm through streetscape elements such as trees, benches, signage and lights, and reinforce the character of the area. The document outlines that transit stops should be treated as important public places. The Guidelines seek to utilize the streetscape as a unifying element for the neighbourhood with a strong identity. Streetscape guidelines are provided for street furniture, lighting, paving, planting, signage, public art, and utilities.

West Whitby Community Urban Design / Architectural Design Guidelines (2016)

The West Whitby Community is bound by Lyndebrook Road to the north, Whitby’s existing Built Boundary to the east (west of Lynde Creek), Highway 401 to the south, and Lake Ridge Road to the west. The document provides a vision and guidelines for sustainability, public realm design, low-rise, mid-rise and high-rise development design, mixed-use and non-residential design, and implementation in the West Whitby

Community. The Guidelines set out to foster a vibrant, high quality, cohesive and complete urban community through ensuring the urban design is appropriate to the local context, environmentally sustainable, achieves design excellence in the pedestrian realm, respects natural features, creates an attractive and safe public realm, and supports active transportation and trail connections. The Guidelines identify Dundas Road West east of Lynde Creek as a Mixed-Use Node, with the surrounding areas as Gateway Areas. Dundas Road West is identified as a Type 'B' Arterial Road, with a Proposed Walkway / Multi-Use Path / Bike Way.

Downtown Whitby Action Plan (2016)

The Action Plan provides the Vision, Goal, Objectives, and Action Items to guide Downtown Whitby towards renewal. The Plan's Objectives are to: enable new opportunities for a prosperous and innovative Downtown, create Downtown Whitby as a walkable pedestrian-focused destination, inspire and enhance cultural life, and cultivate downtown connections and promotions. Promoting walkability is a key Objective to the plan, with Action Items including supporting a pedestrian friendly historic core around Brock Street and Dunas Street, providing urban forest canopy, and developing a Streetscape Improvement Master Plan. The intersection of Dundas Street and Brock Road has been identified as an activated Commercial Area.

Downtown Whitby Action Plan Update (2019)

The Action Plan Update provides updates to the 2016 Action Plan, including additional information on the Business Improvement Area (BIA).

Landscape Plan Guidelines for Site Plan and Subdivision Developments

The document provides guidelines for landscape site plan submissions including street tree requirements, utility clearance requirements, and landscape standards and specifications.

Oshawa Downtown Streetscape Design Vision

The Oshawa Downtown Streetscape Design Vision (O.D.S.D.V) guides development within the public realm, with a focus on the Downtown Oshawa Business Improvement Area. The document provides a streetscape vision that centres on the core principles of functionality, aesthetics, accessibility, safety, environment, and seasonality.

3.7 Infrastructure

3.7.1 Methodology

3.7.1.1 Utilities and Municipal Services

A number of QL-C and QL-B job site investigations have been performed to collect and depict data within the project area between November and December 2020. The site

investigation was performed based on the record data and visible features. The list will be confirmed and refined during detail design.

3.7.1.2 Drainage and Stormwater Management

An overall review was conducted to understand the existing conditions of stormwater management within the DSBRT corridor and documented in **Appendix J** – Stormwater and Hydrology Report. The methodology for evaluating existing conditions is summarized in **Section 3.7.1** and description of existing conditions is provided in **Section**.

A review of applicable guidelines by Metrolinx, MECP, CAs and Municipalities, were undertaken to determine the existing stormwater management requirements. The information sources revised included but were not limited to:

References and Guiding Documents:

- Highway Drainage Design Standards (HDDS), Ministry of Transportation, January 2008;
- Drainage Management Manual (DMM), Ministry of Transportation, October 1997;
- Gravity Pipe Design Guidelines, Ministry of Transportation, May 2007;
- MTO Stormwater Management Requirements for Land Development Proposals, March 1999;
- Stormwater Management Planning and Design Manual, Ministry of the Environment, March 2003;
- Technical Guide, River and Stream Systems; Flooding Hazard Limit, Ministry of National Resources, 2002;
- Technical Guide, River and Stream Systems, Erosion Hazard Limit, Ministry of National Resources, 2002;
- Wet Weather Flow Management Guidelines (WWFMG), City of Toronto, November 2006;
- Wet Weather Flow Management Master Plan, City of Toronto, April 2017;
- Stormwater Management Criteria, TRCA, August 2012;
- Crossing Guideline for Valley and Stream Corridors, TRCA, September 2015;
- Technical Guidelines for Flood Hazard Mapping, TRCA, March 2017;
- Erosion and Sediment Control Guide for Urban Construction, TRCA, 2019;
- Engineering Design Criteria and Standard Drawings, Town of Ajax, 2011;
- Stormwater Management Design Guidelines, City of Pickering, 2019;

- Engineering Design Criteria, City of Oshawa, 2020;
- Technical Guidelines for Stormwater Management Submissions, Central Lake Ontario Conservation Authority (CLOCA), 2020;
- City of Toronto InfoWorks CS Basement Flooding Model Studies Guideline, October 2014;
- User's Guide to SWMM5, 13th Edition, CHI, November 2010;
- Toronto Requirements for Surface Light Rail Transit, Toronto Water, 2014;
- Low Impact Development Stormwater Management Planning and Design Guide, TRCA, 2010;
- Highland Creek Watershed Hydrologic Model Update, Matrix Solutions, 2020;
- Amberlea Creek Hydrology and Floodline Mapping Study, City of Pickering, 2005;
- Pine and Dunbarton Creeks Hydrologic and Hydraulic Study, TRCA, 2007;
- Carruthers Creek Flood Management and Analysis, Cole Engineering, 2011;
- Hydrologic Modelling for Lynd Creek, CLOCA, 2010;
- Digital Floodline Mapping update for the Corbett Creek Watershed, Greck and Associates limited, 2006;
- Pringle Creek Master Drainage Plan Update, CANDEVCON Limited, 2018;
- Lynde Creek Floodplain Mapping, EarthTech, 2008;
- Oshawa Creek Hydrologic and Hydraulic Modelling, CLOCA, 2014;
- Frenchman's Bay Watershed Masterplan, MMM; and
- Highway 2 Transit Priority Measures Drainage and SWM Report, AECOM, 2012.

Mapping and Data:

- Highland Creek Watershed Hydraulic Model Update, Sheet No. 1, No. 3, TRCA, 2020;
- Floodplain Mapping Program, Petticoat Creek, Sheet No.1, No. 2, TRCA, 2005;
- Floodplain Mapping Program, Frenchman's Bay, Sheet No.1, No. 2, No. 6, TRCA, 2002;
- Floodplain Mapping Program, Duffins Creek, Sheet No.1, No. 4, No. 5, No. 6, TRCA, 2020;

- Carruthers Creek Floodplain Mapping Update Sheet No. 2, TRCA, 2020;
- City of Toronto Open Data;
- Durham Region Open Data;
- TRCA Open Data;
- Aerial Survey within DSBRT corridor, JD Barnes, 2019; and
- Ellesmere Road Record Drawings, City of Toronto.

Watercourse Crossing Design Criteria

The hydraulic performance of watercourse crossings (**TABLE 3.24)** were assessed against the following standards from MTO Highway Drainage Design Standards (HDDS), Gravity Pipe Design Guidelines (GPDG), and Canadian Highway Bridge Design Code (CHBDC).

TABLE 3.24 SUMMARY OF HYDRAULIC DESIGN CRITERIA (MTO)

Crossing Type	Criteria	Condition	Value	References
Bridges & Culverts	Design Flow	Total Span ≤ 6.0m	25-year	WC-1 HDDS
		Total Span > 6.0m	50-year	
	Regulatory Flow	-	Hurricane Hazel	
	Check Flow	-	115% of 100-year	
Bridges	Minimum Freeboard	Design Flow	1m	WC-2, HDDS
	Minimum Clearance	Design Flow	1m	
	Water Level	Check Flow	≤ Edge of Travelled Lane	
	Design Service Life (DSL)	-	75 years	CHBDC
Culverts	Minimum Freeboard	Design Flow HWL	1m	WC-7, HDDS
	Desirable Freeboard	Design Flow EGL	1m	
	Water Level	Check Flow	≤ Edge of Travelled Lane	
	Flood Depth at Culverts	Diameter/Rise < 3m	HW/D ≤ 1.5	
		Diameter/Rise 3m to 4.5m	HW ≤ 4.5m	
		Diameter/Rise > 4.5m	HW/D ≤ 1.0	
	Minimum Diameter	Circular	800 mm	WC-8, HDDS
	Minimum Rise	Box	900 mm	
	Minimum Rise	Elliptical or Arch	800 mm	
	Design Service Life (DSL)	Freeway	50 years	GPDG

Hydraulic analyses have also been conducted following technical guidelines published by MNDMNRF, TRCA, and CLOCA, which recommends providing a 0.3 m freeboard

from the Regulatory Floodline for new infrastructure to ensure sufficient flood protection. It is also desirable to confine the overland flow to outside lanes on Regional roads such that one lane in each direction is maintained during the 100-year rainfall to facilitate safer passage of emergency vehicles and accommodate evacuation routes. As the DSBRT builds on existing infrastructure where pre-existing roads may be sub-standard, the hydraulic criteria has been identified to maintain or lower pre-existing Regulatory flood elevation under post-development condition.

A few crossing structures were designed with Relief Flow passage, where a fraction of the Regulatory Flow would bypass the main structure at a stream crossing by flowing over the roadway. When passage of Relief Flow is incorporated in the design of a crossing structure, the depth and velocity of Relief Flow needs to be verified against the overland flow characteristics criteria. The maximum depth and velocity of flow over the roadway is listed in the **Table 3.25**.

TABLE 3.25 SUMMARY OF RELIEF FLOW CRITERIA

	Flow Velocity (m/s)	Permissible Depth (m)
WC-13, HDDS	The product of the velocity and depth on the roadway shall not exceed 0.8m2/s	0.3
MNDMNRF	1.7	0.8
	A product depth and velocity less than or equal to 0.4 m^2/s defines the low risk area	

Fish Passage needs to be considered on fish bearing streams. The requirements to facilitate Fish Passage through Culverts are listed in the **Table 3.26**.

TABLE 3.26 SUMMARY OF FISH PASSAGE DESIGN CRITERIA

Criteria	Value
Design Flow	2-year
Maximum Velocity	≤ natural channel velocity
Minimum Flow Depth	The average depth immediately upstream and downstream of the culvert

Corridor Drainage and Stormwater Management Criteria

The proposed DSBRT is designed with dual drainage considerations. Major system conveyance is only considered at this stage of design, while Minor System capacity will be evaluated during detail design. Major System flow is conveyed by the streets and major drainage channels. For segments with depressed roadways where viable overland escape routes cannot be accommodated, storm trunk sewers are proposed and sized to Major System conveyance capacity (**TABLE 3.27)**.

TABLE 3.27 SUMMARY OF CORRIDOR DRAINAGE CRITERIA

Drainage System Type	Criteria	Functional Road Classifications	Value	References
Major System	Design Flow	Rural Arterial	100-Year	SD-1, HDDS

	Design Flow	Depressed Roadways	100-Year	SD-7, HDDS
Side Storm Sewer	Design Service Life (DSL)	Freeway	75 years	GPDG

Through consultation with the TRCA, CLOCA, City of Toronto, and Local Municipalities, the following SWM criteria applies to the DSBRT corridor (**TABLE 3.28)**.

TABLE 3.28 SWM CRITERIA

Control Objectives	Watersheds	Requirements
Quantity Control	Highland Creek	Control post development peak flows to pre-development levels for all storms up to and including the 100-year storm (i.e., 2, 5, 10, 25, 50 and 100-year storms).
	Petticoat Creek	No flood flow requirements downstream of Finch Ave.
	Frenchman's Bay	No quantity control required for sites draining directly to Frenchman's Bay.
	Amberlea Creek	Control post-development peak flows to pre-development levels for all storms up to and including the 100-year storm (i.e., 2, 5, 10, 25, 50, and 100-year storms) for all other areas.
	Dunbarton Creek	Control post-development peak flows to pre-development levels for all storms up to and including the 100-year storm (i.e., 2, 5,10, 25, 50, and 100-year storms).
	Pine Creek	For all other areas, control post-development peak flows to pre-development levels for all storms up to and including the 100-year storm (i.e., 2, 5, 10, 25, 50, and 100-year storms).
	Carruthers Creek	Control post-development peak flows to pre-development levels for all storms up to and including the 100-year storm (i.e., 2, 5, 10, 25, 50, and 100-year storms) using the unit flow relationships that have been established for the entire watershed (0.006 m3/s/ha in 5-year, 0.012 m3/s/ha in 25-year, 0.026 m3/s/ha in 100-year).
	Lynde Creek	Quantity control is only required on the Kinsale Branch, between Rossland Road and the confluence with the Main branch (post development peak flow rates must not exceed corresponding pre-development rates for the 2-year through 100-year design storm events).
	Pringle Creek	Quantity Control (2-100 and Regional Storm) required unless otherwise noted in Master Plans.
	Corbett Creek	Quantity Control (2-100 and Regional Storm) required unless otherwise noted in Master Plans.
	Oshawa Creek (including Goodman Creek)	Quantity Control (2-100 and Regional Storm) required unless otherwise noted in Master Plans.
	City of Toronto	• The required level of peak flow control from a development site contributing flow to a specific watercourse at the point of discharge shall follow Toronto and Region Conservation Authority (TRCA) Flood Flow Criteria Map. • The City of Toronto has adopted the 100-year storm as the level of protection for properties where feasible, against surface flooding from ponding on streets, particularly, in areas of the City experiencing chronic basement flooding,

Control Objectives	Watersheds	Requirements
		and/or when a proper major (overland flow) stormwater drainage system does not exist.
Quality Control	TRCA	Enhanced protection (Level-1, 80% Total Suspended Solids (TSS) removal) criteria to determine the minimum permanent pool size for wet pond facilities .
		Table 3.2 of the Stormwater Management Planning and Design Manual (MECP, 2003).
	CLOCA	Quality control must be provided for every site that is greater than 0.25 ha.
	City of Toronto	• Require long-term average removal of 80% of TSS on an annual loading basis from all runoff leaving the site. (Suspended solids removal efficiency is to be calculated based on 100% of the total runoff volume resulted from all storm events that occur in an average year). • Overall efficiency in TSS removal can be considered in combination with minimum on-site runoff retention and other conveyance & end-of-pipe controls (i.e., the treatment train approach)
Erosion Control	All Watersheds	Extended detention of 25 mm storm for 24-48 hours.
	City of Toronto	Not applicable unless the infill site is located in close proximity (within 100 m) to natural watercourses.

3.7.2 Existing Utilities and Municipal Services

The updated and detailed position of the utilities was confirmed, and the lines were designated in the project area. These utilities include:

- Enbridge Gas lines Gas main;
- Water main;
- Bell;
- Hydro cable (H);
- Fiber Optic cable (FO);
- Bell FO (BT-FO);
- Street Light (SL);
- Electrical Cable;
- Traffic Light (TL);
- TV Cable (TV); and,
- Rogers FO (R-FO).

3.7.3 Existing Drainage and Stormwater Management

3.7.3.1 Hydrology and Hydraulic Conditions

The topography of the study watersheds is generally sloping from north to south with watercourses conveying flow crossing the corridor. Urbanization has occurred upstream of the DSBRT corridor throughout majority of the watershed areas. As urbanization in the upstream areas contributes significant peak runoff increase and the hydrologic impacts could not be accurately estimated without evaluating the effectiveness of stormwater management facilities in detail, flow rates from previous studies were summarized and reviewed to be adopted for watercourse crossing analysis.

Notably, A new hydrology model was developed using Visual OTTHYMO for crossing B-07 in the Lynde Creek Watershed. The model was calibrated to the stream flow monitoring station to update the design flow for watercourse crossing analysis. The results of hydrologic modelling are listed in **TABLE 3.29**.

TABLE 3.29 FLOWS TO WATER CROSSINGS WITHIN THE DSBRT CORRIDOR

	Crossing ID	NER ID	Design Flows (m^3/s)				Source
			Regulatory	100-Year	50-Year	25-Year	
TRCA	B-01	1	435.8	294.9	258.9	223	Matrix Solutions, 2020
	RC-01	2	28.8	17.2	13.9	12.1	Matrix Solutions, 2020
	ST-01	3	17	12.05	10.7	9.4	Matrix Solutions, 2020
	C-01	5	169.3	40.3	34.3	28.7	CLOCA Hydrologic Model
	C-02	10	19.9	17.5	14.9	12.7	Green Land, 2006
	B-05	12	371.3	89.42	76.8	64.9	Aquafor Beech, 2013
	C-04	13	93.5	28.1	23.8	19.1	Aquafor Beech, 2012
	C-05	14	89.6	20.1	17.4	14.9	Cole Engineering, 2011
CLOCA	RC-06	15	5.5	4.2	3.7	3.1	CLOCA. 2007
	C-06	16	134.5	42.9	36.1	29.1	CLOCA, 2007
	B-07	18	161.3	61.5	54.6	46.8	-
	C-07	19	-	92.2	78.2	65.2	CANDEVCON, 2018
	RC-11	20	13.8	13.1	10.8	9.4	Greck and Associated, 2006
	RC-12	21	36.8	29.4	24.4	21.1	Greck and Associated, 2006
	RC-13	22	52.66	9.6	8.9	8.2	CLOCA, 2014
	B-10	23	636.65	178.1	150.4	124.7	CLOCA, 2014
	B-09	23	636.65	178.1	150.4	124.7	CLOCA, 2014

An overall review was conducted to understand the existing hydrology and hydraulic conditions of the DSBRT corridor. A majority of the watercourses have existing watercourse crossing structures to convey flood flows. The existing structures have defined centrelines and hydraulic conditions for most watercourses within the DSBRT corridor. Field investigations were carried out in 2020 to document conditions of existing

crossing structures, stream channels, and surrounding environment. The field notes, summary of findings and site photos are included in **Appendix J**, Stormwater and Hydrology Report.

The Study Area traverses several main watersheds under the jurisdictions of TRCA and CLOCA. The watercourses, watershed boundaries, and watercourse IDs, together with the conservation authority boundaries are shown in **Appendix J**. A list of watercourses is identified in **TABLE 3.30.** In summary, there are 28 watercourses or drainage ditch that need to be accommodated within the project limits. 23 are mapped regulated watercourses of which current hydraulic models characterizing headwater and tailwater conditions have been identified. Five (5) watercourses are minor, unregulated watercourses where the associated upstream drainage catchments are small, and no hydraulic model was available at the time of this study.

Existing hydrologic study reports were reviewed to quantify the peak runoff rate of existing crossing structures. Flow rates for return periods ranging from 2-year to 100-year, and Regulatory Flood events have been adopted for hydraulic analysis. Available HEC-RAS models were obtained from TRCA and CLOCA to identify headwater levels. No additional verification of flow attenuation capacity was conducted as part of this study.

As shown in the **TABLE 3.30**, a total of 28 watercourses or drainage ditch and 29 crossing structures are listed and grouped by Conservation Authorities having jurisdiction. The hydraulic performance of the crossing structures was evaluated against criteria listed in guidelines published by MTO, Conservation Authorities, and local Municipalities. Existing flooding issues were identified. The hydraulic conditions of each crossing structures are discussed in detail as below.

B-01 Highland Creek Bridge

B-01 is a 3-span bridge over the Highland Creek – Miliken branch. The design flow is 100-yr storm as the span is more than 6 m based on MTO hydraulic criteria. Based on the hydraulic analysis from hydraulic model obtained from TRCA, under existing conditions, the headwater level in Regulatory flood is more than 0.3 m below the elevation of road centreline, indicating the bridge opening provides sufficient hydraulic capacity. The bridge is at the low point of this segment of road, and no relief flow passage point is identified.

RC-01 Highland Creek Culvert

RC-01 is a corrugated steel pipe arch (CSPA) culvert that runs under the Ellesmere Road on Highland Creek. The design flow is 50-yr storm as the span is less than 6 m based on MTO hydraulic criteria. Based on the hydraulic analysis from hydraulic model obtained from TRCA, under existing conditions, the headwater level in Regulatory flood is more than 0.3 m below the elevation of road centreline, indicating the culvert opening provides sufficient hydraulic capacity. As the culvert has capacity to convey Regulatory flows through the Ellesmere Road, no overland flow route over the Ellesmere Road was identified.

ST-01 Centennial Creek Storm Trunk

Centennial Creek is piped through Ellesmere Road by a large diameter storm trunk identified as ST-01 that runs under the Ellesmere Road and a residential area from north to southeast discharging into a stormwater management pond east of Meadowvale Road. The hydraulic performance is evaluated with design flow derived from 1-hr AES design storm. Based on the modelling results, the road section around the crossing is within the Regulatory flood limit delineated by TRCA. An overland flow route is provided on the south side of the Ellesmere Road between the residential houses from Ellesmere Road to Dalmatian Crescent to manage the excess flow and convey the major system flow to drainage systems within Dalmatian Crescent.

C-01 Petticoat Creek Box Culvert

Petticoat Creek Box Culvert is a concrete box culvert with a span greater than 6 m. the design flow for this culvert under MTO hydraulic criteria would be 100-year flood flow. Based on the hydraulic analysis using existing HEC-RAS model provided by TRCA, the existing condition meets the MTO hydraulic criteria, as the freeboard under 100-year flood is greater than the 1 m freeboard requirement. The culvert C-01 has sufficient capacity to convey the flood flow up to 100-year. Notably, in regulatory flood event, the Kingston Road around crossing C-01 is within the regulatory flood limit delineated by TRCA due to downstream constraints at culvert crossings under Highway 401 and the CN Railway. The upstream channel width has been identified as 3 m while the existing structure spans to around 6 m. The existing structure span is larger than the channel width.

RC-02 Petticoat Creek Road Culvert

Petticoat Creek Road Culvert is a culvert with small associated upstream drainage catchment. The existing HEC-RAS model does not extend to upstream of Highway 401. The existing hydraulic condition needs to be assessed further if culvert modification is proposed to accommodate the road widening.

RC-03 Amberlea Creek Culvert 300 m East of Whites Road

RC-03 is a road culvert that is assessed under other projects. The existing hydraulic condition is listed in **TABLE 3.30**.

RC-04 Amberlea Creek Culvert 300 m West of Fairport Road

RC-04 is a road culvert that is assessed under other projects. The existing hydraulic condition is listed in **TABLE 3.30**.

ST-02 Amberlea Creek Storm outlet pipe around Fairport Road

ST-02 is a storm sewer outlet pipe that is assessed under other projects. The existing hydraulic condition is listed in **TABLE 3.24**.

C-02 Dunbarton Creek Culvert

On Dunbarton Creek near the CN Railway crossing, a series of existing culverts carry the Dunbarton Creek from north to south under the CN Railway, Kingston Road and Highway 401. Based on the existing hydraulic analysis using hydraulic model provided by the TRCA, the headwater elevation in Regulatory, 100-year and 50-year flood events are higher than the elevation of road centreline, indicating the flood flow would spill over the road at this location. Additional assessment of the hydraulic characteristics of the spill flow shows the depth and velocity of overland flow meet the criteria set out by MTO and TRCA.

C-03 Pine Creek Culvert

C-03 is a box culvert that is assessed and designed under other projects. The existing hydraulic condition is listed in **TABLE 3.30**.

B-05 West Duffins Creek Bridge

Crossing B-05 on West Duffins Creek is located adjacent to the Pickering (Village East) and Notion Road/Pickering Village Special Policy Areas (SPA's). Passage of Relief Flow was identified west of the bridge under Regulatory Flood Event, and the flow characteristics does not meet velocity and depth criteria set out by MTO. In addition, the headwater elevation identified with 50-year design flow is higher than the elevation of road low point where the Relief Flow spills over the roadway, indicating the MTO hydraulic criteria was not met. A Class Environmental Assessment (EA) on rehabilitation of the flood control dykes to mitigate the existing flooding issue upstream of the crossing is being carried out by TRCA.

C-04 Miller's Creek Culvert

C-04 is a 3-cell box culvert that coveys flow of Miller's Creek crossing the Kingston Road. The design flow is 100-year storm as the span is more than 6 m based on MTO hydraulic criteria. Based on the hydraulic analysis from hydraulic model obtained from TRCA, under existing conditions, the headwater level is below the elevation of road centreline. In addition, the headwater level in 100-year storm is more than 1 m below the elevation of edge of travelled lane and road centreline, indicating the hydraulic condition meets the MTO hydraulic criteria.

C-05 Carruthers Creek Culvert

C-05 is a box culvert that conveys flow of Carruthers Creek crossing Kingston Road with a span of 5.5 m. The design flow is 50-year storm as the span is less than 6 m based on MTO hydraulic criteria. Based on the results of hydraulic analysis from HEC-RAS model obtained from the TRCA, under existing conditions, the headwater level is around 0.86 m below the centreline of the road. This is very close the MTO freeboard requirement of 1 m. Notably, the headwater level in Regulatory flood event is higher than the elevation of road centreline indicating this segment of road is within the Regulatory floodline. The overland flow route is from upstream to downstream over the

Kingston Road at the crossing location. The flow characteristics do not meet the velocity-depth criteria.

Adjacent to the Carruthers Creek Watershed, an additional road culvert located 425 m east of Harwood Avenue, downstream of a stormwater management pond is not expected to be affected by the DSBRT project. Therefore, it was not included in the summary table.

RC-05 Lynde Creek Culvert Outlet

RC-05 is a box culvert that outlets to the south of a drainage channel south of Dundas Street, where it discharges to a ditch that runs further south as a tributary of Lynde Creek. No existing information was found on this crossing structure. Further consultation is needed to understand the drainage areas serviced by the culvert.

RC-06 to RC-09 Lynde Creek Road Culverts

RC-06 is a box culvert with small associated upstream drainage catchment. The hydraulic model of Lynde Creek obtained from CLOCA does not include the crossing RC-06. An HEC-RAS model that includes the crossing structure and 300 m upstream channel has been developed to verify the existing hydraulic condition. The design flow and hydraulic conditions have been identified based on modelling results, indicating the existing condition meets the MTO hydraulic criteria for freeboard requirements of culvert crossings.

RC-07 and RC-08 are road culverts that are part of the Highway 412 drainage systems. As the culverts are not expected to be affected by the road widening needed for the DSBRT project, further hydraulic analysis was not included in the table. RC-09 is a road culvert with no associated drainage area, the hydraulic capacity was not assessed further.

Notably, an existing drainage channel on the north side of the Dundas Street needs to be realigned to provide drainage outlet for the upstream external drainage areas to crossing RC-06. Detailed discussion of the realignment is included in **Section 4.7.3.3**.

C-06 Lynde Creek Structural Culvert

Lynde Creek Structural Culvert is an Arch Culvert with a span of 12.8 m in watersheds under the jurisdiction of CLOCA, crossing C-06 is designed with Relief Flow for Regulatory flood event. Further evaluation of the Relief Flow shows the spill flow depth exceeds the maximum flow depth allowed by MTO. However, the flow depth and velocity conform with flow characteristics required by MNDMNRF.

RC-10 Lynde Creek Road Culvert

RC-10 is a long CSP culvert that outlets approximately 150 m downstream south of the commercial development. Based on hydraulic analysis from HEC-RAS model obtained from CLOCA, the headwater level in Regulatory flood event is 0.3 m higher than the elevation of road centreline, indicating a small segment of road is within the Regulatory floodline.

B-07 Lynde Creek Bridge

B-07 is a single span bridge on Lynde Creek crossing Dundas Street with a total span of 19.2 m. The design flow is 100-yr storm as the span is more than 6 m based on MTO hydraulic criteria. Based on hydraulic analysis from HEC-RAS model obtained from CLOCA, under existing conditions, the headwater level is 0.56 m higher than the elevation of road centreline, indicating this segment of road is within the Regulatory floodline. The overland flow route has been identified at 100 m east of the bridge crossing. The depth and velocity of the overland flow in Regulatory flood event also exceed the physical criteria set out by both MTO and MNDMNR. For MTO design flow, the headwater level is around 1.3 m below the elevation of the road centreline. Indicating the clearance is less than 1 m and does not meet the MTO hydraulic criteria.

C-07 Pringle Creek Structural Culvert

C-07 is a 3-cell structural culvert crossing Dundas Street on Pringle Creek. The design flow is 100-year storm as the span is more than 6 m based on MTO hydraulic criteria. And the level of protection has been identified to be 100-year flood by MNDMNRF. Based on hydraulic analysis from HEC-RAS model obtained from CLOCA, the headwater level in 100-year storm is higher than the elevation of road centreline. In addition, the headwater level in 50-year storm is lower than the elevation of the road centreline with a freeboard less than 1 m. Future consultation is needed to mitigate the existing issues.

RC-11 Corbett Creek Culvert – West Branch

RC-11 is a box culvert on Corbett Creek – West Branch crossing Dundas Street. The design flow is 50-year storm as the span is less than 6 m based on MTO hydraulic criteria. Based on the hydraulic analysis from HEC-RAS model obtained from CLOCA, under existing conditions, the headwater level in Regulatory flood event is 0.34 m below the elevation of road centreline. An overland flow route has been identified from north to south over the Dundas Street at 50 m east of the crossing location. The depth and velocity meet the characteristic criteria set out by MTO. Notably, the elevation of road low point is around 0.2 m lower than the headwater lever in 50-yr storm indicating the MTO hydraulic criteria was not met with existing crossing structure.

RC-12 Corbett Creek Culvert – East Branch

RC-12 is a double barrel culvert on Corbett Creek – East Branch crossing Dundas Street. The design flow is 50-yr storm as the span is less than 6 m based on MTO hydraulic criteria. Based on hydraulic analysis from HEC-RAS model obtained from CLOCA, under existing conditions, the headwater level in the Regulatory flood event is the same as the elevation of road centreline. Overland flow route has been identified from north to south over the Dundas Street at the crossing location and the hydraulic characteristic of the overland flow indicates the depth and velocity conform with flow characteristics required for overland flow by MTO. In addition, the headwater level in 25-year storm is more than 1 m below the elevation of the edge of travelled lane, indicating the hydraulic condition meet the MTO hydraulic criteria.

RC-13 Goodman Creek Culvert

RC-13 is a box culvert located at Goodman Creek crossing the Dundas Street. As the DSBRT would not result in modification to the culvert structure, the hydraulic condition was not assessed further in detail.

B-09 and B-10 Oshawa Creek Bridges

B-09 and B-10 are two bridges on Oshawa Creek at Bond Street and King Street. The design flow is 100-yr storm as the span is more than 6 m based on MTO hydraulic criteria. Based on the hydraulic analysis from HEC-RAS model obtained from CLOCA, under existing conditions, the headwater levels at both bridges are higher than the elevation of road centreline, indicating this segment of Bond Street and King Street is within the Regulatory floodline. The headwater level is 0.05 m higher than the elevation of road centreline at Bond Street and less than 1 m below the elevation of road centreline at King Street, indicating the MTO hydraulic criteria was not met at these two crossing locations.

TABLE 3.30. INVENTORY OF EXISTING WATERCOURSE CROSSINGS DETAILS WITHIN THE DSBRT CORRIDOR

	Crossing ID	NER ID	Approx. Sta.	Locations	Existing Structure							Existing Headwater Level (m)				Road		Existing Criteria					
					U/S (m)	D/S (m)	Length (m)	Slope (%)	Rise (mm)	Total Span (mm)	Type	Regional/ Regulatory	100yr	50yr	25yr	C/L	Spill	Freeboard >= 0.3m	MTO Freeboard	HW/D <=1.5	Spill Velocity (m/s)	Spill Depth (m)	v-D Criteria
TRCA	B-01	1	13+400	Highland Creek - Milliken Branch	-	-	29	-	-	76809	3-Span Bridge	124.33	123.31	123.01	122.12	135.30	-	Yes	Yes	-	-	-	-
	RC-01	2	14+600	Highland Creek	112.0	111.2	71	2.00%	2210	3480	Pipe Arch	116.38	114.58	114.18	113.95	123.00	-	Yes	Yes	Yes	-	-	-
	ST-01	3	17+340	Centennial Creek, Meadowvale Road	112.0	111.0	78	1.29%	2500	-	Circular	117.40	116.80	116.60	116.43	116.90	116.90	No	No	No	2.4	0.36	No
	B-03	4	50+050	Rouge River	No info, no impact					220980	6-Span Bridge	-	-	-	-	-	-	-	-	-	-	-	-
	C-01	5	50+890	Petticoat Creek	90.5	90.3	43	0.54%	2450	6150	Conc Box	97.95	93.22	92.94	92.7	97.00	97.50	No	Yes	Yes	1.11	0.63	No
	RC-02	6	51+420	Petticoat Creek	-	-	168	-	1500	1800	Conc Box	To be evaluated during detail design											
	RC-03	7	52+450	Amberlea Creek, Whites Road	95.6	95.0	45	1.49%	1500	1800	Conc Box	97.83	96.76	97.34	97.15	98.60	98.60	Yes	Yes	Yes	-	-	-
	RC-04	8	52+760	Amberlea Creek, West of Fairport Road	91.7	90.4	51	2.45%	1500	2600	Conc Box	98.44	94.55	94.05	93.62	98.70	-	No	Yes	No	-	-	-
	ST-02	9	53+040	Amberlea Creek, Fairport Road	89.9	88.7	58	1.93%	1200	-	Conc Circular	93.19	93.09	92.60	92.06	96.30	-	Yes	Yes	No	-	-	-
	C-02	10	53+500	Dunbarton Creek	79.1	77.9	57	2.54%	1800	3000	Conc Box	86.72	86.28	85.93	84.52	85.30	85.70	No	No	No	0.59	0.25	Yes
	C-03	11	54+580	Pine Creek	80.2	80.2	42	0.22%	2250	7100	Conc Box	84.15	83.17	83.02	82.94	84.32	82.90	No	No	Yes	0.24	1.16	No
	B-05	12	60+150	West Duffins Creek	-	-	24	-	-	64008	3-Span Bridge	84.90	82.50	82.30	82.16	85.10	81.90	No	No	-	0.8	3.35	No
	C-04	13	62+350	Miller's Creek, Chapman Dr	89.1	88.6	59	0.86%	3000	12000	2-Cell Conc Box	92.55	90.74	90.57	90.30	93.70	-	Yes	Yes	Yes	-	-	-
					89.7	89.2	59	0.86%	1600	4800	Conc Box	-	-	-	-	-	-	-	-	-	-	-	-
	C-05	14	64+900	Carruthers Creek	83.5	83.5	34	0.03%	1900	5500	Conc Box	89.77	86.57	86.44	86.33	87.30	87.30	No	No	No	0.17	2.5	No
CLOCA	RC-05	14a	65+675	Audley Rd, Low Point	-	-	-	0.00%	1800	2400	Conc Box	To be evaluated during detail design											
	RC-06	15	70+350	Halls Road	83.5	83.0	35	0.95%	1500	1800	Conc Box	84.71	84.63	84.37	84.18	84.77	84.7	No	Yes	Yes	-	-	-
	C-06	16	70+620	216 m west of Hwy 412	81.7	81.3	28	1.61%	2350	12800	Structural Arch	84.87	83.99	83.81	83.62	86.80	84.20	Yes	No	Yes	1.09	0.75	No
	RC-07	-	70+950	Hwy 412 Road Ditch	81.5	81.0	61	0.82%	1650	-	Circular	No impact											
	RC-08	-	71+050	Hwy 412 Ramp	81.9	81.0	60	1.51%	3650	3280	Pipe Arch	No impact											
	RC-09	16a	71+200	Des Newman Blvd	83.0	82.9	41	0.25%	1200	-	CSP	To be evaluated during detail design-											
	RC-10	17	71+800	Lynde Creek, Storm Trunk	78.2	77.4	180	0.51%	2000	-	CSP	82.58	82.21	81.36	80.37	82.60	82.28	No	Yes	No	0.64	0.31	Yes
	B-07	18	72+150	Lynde Creek, McQuay Blvd	-	-	18	-		19200	Single Span Bridge	81.36	79.92	79.69	79.58	82.40	80.90	No	No	-	-	-	-
	ST-03	-	74+010	Ash Creek, Storm Trunk	-	-			2210	4572	Concrete	-	-	-	-	-	-	-	-	-	-	-	-
	C-07	19	74+610	Pringle Creek	83.0	83.0	26	-	2400	6100	Conc Box	-	86.58	86.31	86.02	86.47		-	No	Yes	-	-	-
					83.0	83.0	26	-	2400	9600	2-Cell Conc Box	-	-	-	-	-	-	-	-	-	-	-	-
	RC-11	20	76+610	Springwood St - Kathleen St	107.7	107.8	40	-0.30%	1250	1800	Conc Box	111.06	111.04	111.07	111.00	111.40	110.80	Yes	No	No	0.55	0.26	Yes
	RC-12	21	80+000	Corbett Creek, Thornton Rd	96.5	96.2	40	0.52%	2300	-	Circular	102.01	100.99	99.98	99.42	102.00	102.00	No	Yes	Yes	0.46	0.21	Yes
					96.4	96.2	40	0.38%	1900	2500	CSP Arch	-	-	-	-	-	-	-	-	-	-	-	-
	RC-13	22	80+715	Goodman Creek	103.8	103.0	120	1.35%	2150	3800	Conc Box	No impact											
	B-10	23	91+650	Oshawa Creek - Bond St	-	-	20	-	2900	16300	2-Span Bridge	103.60	102.52	102.15	101.33	102.10	101.25	No	No	-	2.01	1.5	No
	B-09	23	81+390	Oshawa Creek - King St	-	-	19	-	3700	17600	Arch Bridge	102.64	101.16	101.14	100.80	101.42	100.83	No	No	-	2.01	1.2	No

3.7.3.2 Stormwater Management

City of Toronto

Existing storm sewer systems are present within the proposed DSBRT corridor within the of City of Toronto limits. Runoff from Ellesmere Road and Kingston Road are collected by the existing catchbasins, conveyed, and eventually discharged to the watercourses located in separated watersheds including Highland Creek and Centennial Creek. **TABLE 3.31** listed the existing impervious ratio for each roadway segment discharging to each subwatershed.

No major existing stormwater management facilities were identified through reviewing the City Utility Mapping (CUMAP) provided by the City of Toronto. Further review of existing stormwater management plans and reports are needed to understand existing water quantity control and water quality treatment capacities within the BRT corridor.

TABLE 3.31. EXISTING SUBCATCHMENT (SC) DETAILS IN TORONTO

SC ID	Road Segment			Existing Imperviousness* (%)	Subwatershed
	Start Chain	End Chain	Length (m)		
1	10+000	11+700	1700	64%	West Highland
2	11+700	12+200	500	58%	East Highland
3	12+200	13+900	1700	61%	West Highland
4	13+900	15+300	1400	65%	Main Highland
5	15+300	17+700	2400	60%	Centennial
6	17+700	18+200	500	61%	Waterfront

*Analysis based on impermeable layer provided by City of Toronto Open Data (2019)

Durham Region

Runoff from the proposed DSBRT corridor is primarily collected and conveyed by existing storm sewer systems. Roadside ditches are present for a road segment from Galea Drive to Lake Ridge Road to convey the runoff. **TABLE 3.32** lists the existing drainage systems for roadway segments discharging to each subwatershed.

Stormwater management facilities were identified along the corridor based on preliminary review of the topography of the study area and aerial imagery. Further details from existing stormwater management plans and reports are needed to understand the existing water quantity control and water quality treatment capacities within the DSBRT corridor.

TABLE 3.32. EXISTING SUBCATCHMENT (SC) DETAILS IN DURHAM REGION

SC ID	Road Segment			Exist Imperviousness* (%)	Subwatershed	Total Site Area (ha)
	Start Chain	End Chain	Length (m)			
PIK-1	50+273	52+100	1827	70%	Petticoat Creek	8.5
PIK-2	52+100	53+070	970	70%	Amberlea Creek	5.2
PIK-3	53+070	53+900	830	70%	Dunbarton Creek	3.6

SC ID	Road Segment			Exist Imperviousness* (%)	Subwatershed	Total Site Area (ha)
	Start Chain	End Chain	Length (m)			
PIK-4	53+900	54+200	300	70%	Hwy 401	1.3
PIK-5	54+200	55+900	1700	70%	Pine Creek	1.9
PIK-6	55+900	57+730	1830	79%	Duffins Creek	8.5
AJX-1	60+000	61+200	1200	70%	Duffins Creek	10.0
AJX-2	61+200	62+680	1480	74%	Miller Creek	3.6
AJX-3	62+680	63+200	520	79%	Miller Creek	6.5
AJX-4	63+200	64+000	800	79%	Carruthers Creek	2.2
AJX-5	64+000	65+400	1400	79%	Carruthers Creek	4.1
AJX-6	65+400	66+100	700	70%	Lynde – Kinsale	5.5
AJX-7	66+100	66+500	400	70%	Lynde – Kinsale	3.6
WHT-1	70+000	70+400	400	70%	Lynde – Kinsale	3.5
WHT-2	70+400	70+800	400	70%	Lynde – Kinsale	1.6
WHT-3	70+800	71+500	700	70%	Lynde – Kinsale	2.0
WHT-4	71+500	72+000	500	70%	Lynde RC10	2.4
WHT-5	72+000	73+500	1500	70%	Lynde B07	2.3
WHT-6	73+500	74+300	800	70%	Lynde Creek	5.1
WHT-7	74+300	74+900	600	70%	Pringle C07	2.6
WHT-8	74+900	76+400	1500	70%	Corbett Creek	2.3
WHT-9	76+400	77+000	600	70%	Corbett RC-11	7.6
WHT-10	77+000	77+500	500	70%	Corbett RC12	2.5
OSH-1	80+000	80+400	400	83%	Corbett RC12	2.2
OSH-2	80+400	81+400	1000	83%	Goodman Creek	1.4
OSH-3	90+700	91+800	1100	83%	Oshawa Creek	5.2
OSH-3	81+400	82+600	1200	83%	Oshawa Creek	2.1
OSH-4	82+600	82+860	260	83%	Harmony Creek	1.5
OSH-4	91+800	92+140	340	83%	Harmony Creek	0.4

3.8 Air Quality

The Air Quality Impact Assessment (AQIA) includes a detailed analysis of existing air pollutant emissions and air quality conditions within the Study Area (see **Appendix H**). The methodology for evaluating existing air quality conditions is summarized in **Section 3.8.1** and description of existing conditions is provided in **Section 3.8.2**.

3.8.1 Methodology

The Study Area (Air Quality) for the AQIA is 300 metres (m) on either side of the DSBRT corridor. This Study Area captures the most significant project impacts as the impact from roadway and bus corridors are local in nature and tend to decrease significantly at downwind greater than 300 m.

3.8.1.1 Ambient Air Quality Criteria

Eleven (11) air contaminants of concern in three (3) categories were selected as ambient air quality criteria for the evaluation. The MECP has developed Ambient Air Quality Criteria (AAQC) as a measure to protect outdoor air quality. An AAQC is a desirable concentration based on the protection against adverse effects on health and/or the environment and is meant to be used to assess general or "ambient" air quality conditions from all sources (MECP 2020). Additionally, the Canadian Council of the Ministers of the Environment (CCME) has also developed Canadian Ambient Air Quality Standards (CAAQS) (CCME 2012, 2016, 2017) which has applied to selected air quality criteria as it is more stringent than AAQC requirements. The ambient air quality assessment criteria are listed in **TABLE 3.33** below.

TABLE 3.33. AMBIENT AIR QUALITY CRITERIA

Category	Pollutant	Averaging Period	Air Quality Criteria ($\mu g/m^3$)	Source
PM*	$PM_{2.5}$	24-hour	27	CAAQS
		Annual	8.8	CAAQS
	PM_{10}	24-hour	50	AAQC
Criteria Air Contaminants (CACs)	NO_2	1-hour	79	CAAQS
		24-hour	200	AAQC
		Annual	22.6	CAAQS
	SO_2	1-hour	100	AAQC
		24-hour	275	AAQC
		Annual	10	AAQC/CAAQS
	CO	1-hour	15,700	CAAQS
		8-hour	36,200	AAQC
Volatile Organic Compounds (VOCs)	Acetaldehyde	24-hour	500	AAQC
	Acrolein	1-hour	4.5	AAQC
		24-hour	0.4	AAQC
	Benzene	24-hour	2.3	AAQC
		Annual	0.45	AAQC
	1-3 Butadiene	24-hour	10	AAQC
		Annual	2	AAQC
	Formaldehyde	24-hour	65	AAQC
	Benzo(a)pyrene	24-hour	5.0E-05	AAQC
		Annual	1.0E-05	AAQC

*Particulate Matter

Greenhouse gas (GHG) emissions were evaluated to quantify the impacts of the Project on climate change and the results are presented in **Section 4.8**. For a given mixture of different GHGs, the carbon dioxide equivalent (CO_2e) is the unit of measure used to describe the amount of CO_2 that would have the same global warming potential as a mixture of GHGs when measured over a time period (typically a 100-year period). There are no ambient air quality criteria for GHGs.

3.8.1.2 Dispersion Modelling

Air dispersion modelling was completed using the MTO recommended air dispersion model (MTO 2020), CAL3QHCR, to calculate the concentrations of contaminants emitted from all sources within the Study Area.

According to Metrolinx's Draft Environmental Guide (Metrolinx, 2015), "Sensitive Receptor" refers to a home, school, daycare building, hospital, retirement home and other "permanent" structure where humans spend a large portion of a day over extended periods of time (days to years). Among these, daycare buildings, hospitals and retirement homes are deemed to deserve greater attention, since they house larger numbers of individuals who may be more sensitive to air quality. A total of 108 sensitive receptors were identified along the corridor within the AQIA Study Area using recent aerial photography and by field reconnaissance as listed in the **Appendix H**.

3.8.1.3 Air Pollutant Emissions

An emissions inventory for the Project including existing sources, along with an air dispersion modelling study, was completed. Emissions for pollutants of concern were estimated based on the number of vehicle-kilometers travelled (VKT) within the Study Area incurred by private passenger vehicles (cars and light trucks), public vehicles (i.e., transit buses) as well as heavy vehicles such as transport trucks. The pollutant of concern includes CO, NO_2, SO_2, VOCs, (including 1,3-butadiene, acrolein, acetaldehyde, benzene, and formaldehyde), benzo(a)pyrene, PM_{10}, and $PM_{2.5}$.

The vehicular exhaust emission rates were estimated by running the U.S. EPA MOVES2014 model. Emission factors for re-suspended particulate (PM_{10} and $PM_{2.5}$) created by vehicles travelling along the major arterial roadways included in the assessment area were estimated using the methodology contained in Chapter 13.2.1 of the U.S. EPA's AP-42 document (U.S. EPA 2011). The final emission factors used are summarized in **Appendix H**.

3.8.1.4 Ambient Background Concentrations

The MECP measures air contaminants at various locations throughout Ontario, and reports on the state of Ontario's air quality on an annual basis. A review of MECP monitoring stations in Ontario was undertaken to identify the monitoring stations that would be most representative of the DSBRT corridor and provide a conservative cumulative assessment.

Environment and Climate Change Canada (ECCC) measures air contaminants at various locations throughout Canada, including Ontario, through its National Air Pollution Surveillance program (NAPS). There are currently four (4) NAPS stations located in the general vicinity of the DSBRT corridor. To assess the current air quality, with respect to VOCs, in the DSBRT corridor the most recently available monitoring data from the closest NAPS stations were considered. Not all contaminants are monitored at each NAPS and MECP monitoring location. **TABLE 3.34** outlines the monitoring stations considered for the study of existing conditions for the Project.

TABLE 3.34. SUMMARY OF MONITORING STATIONS

NAPS Station ID	Station Name	Years of Ambient Data Available
060430	Toronto West	2014-2018
060410	Toronto East	2014-2018
060439	Wallberg Building at U of T	2014-2016
065101	Newmarket	2014-2018

The ambient background concentrations were added to modelled concentrations in order to assess the combined effect of all sources at each sensitive receptor location. As the background concentrations represent the cumulative contribution of upwind sources such as industrial facilities, other roadways and transboundary pollution that was not accounted for in the air dispersion model, it is important to include it to estimate the air contaminants concentrations.

3.8.2 Description of Existing Conditions

TABLE 3.35 summarizes the air quality statistics used as the ambient background concentrations.

TABLE 3.35. SUMMARY OF BACKGROUND AMBIENT AIR DATA

Contaminant	Averaging Period (hr)	NAPS Station Name	Ambient Contaminants Concentration – Max 90th Percentile (µg/m³)	AAQC / CCAAQS Standard (µg/m³)	% of AAQC/CAAQS
NO_2	1	Toronto West[a]	59	79	74.72%
	24	Toronto West[a]	49	200	24.25%
	Annual	Toronto West[a]	32	22.6	142.48%
CO[b]	1	Toronto West	458	36200	1.27%
	8	Toronto West	458	15700	2.92%
PM_{10}[d]	24	Toronto E/W[c]	30	50	59.26%
$PM_{2.5}$	24	Toronto E/W[c]	16	27	59.26%
	Annual	Toronto E/W[c]	9.0	8.8	102.27%
SO_2	1	Toronto West	4.7	100	4.72%
	24	Toronto West	4.7	275	1.71%
	Annual	Toronto West	2.6	10	26.20%
Acetaldehyde	24	Wallberg Building at U of T	2.0	500	0.40%
Acrolein[e]	1	Wallberg Building at U of T	0.072	4.5	1.60%
	24	Wallberg Building at U of T	0.072	0.4	18.00%
Benzene	24	Newmarket	0.82	2.3	35.45%
	Annual	Newmarket	1.160E04	0.00005	232.00%
Benzo(a)pyrene	24	Wallberg Building at U of T	1.010E04	0.00001	1010.00%

Contaminant	Averaging Period (hr)	NAPS Station Name	Ambient Contaminants Concentration – Max 90th Percentile (µg/m3)	AAQC / CCAAQS Standard (µg/m3)	% of AAQC/CAAQS
	Annual	Wallberg Building at U of T	2.8	65	4.31%
Formaldehyde	24	Wallberg Building at U of T	0.062	10	0.62%
1,3-Butadiene	24	Newmarket	0.033	2	1.65%
	Annual	Newmarket	1.160E04	0.00005	232.00%

Notes:

[a] Use the higher records at Toronto East or West
[b] CO is not monitored at Toronto East
[c] Toronto West recorded higher level of $PM_{2.5}$ tan in Toronto East during 2015
[d] PM10 was not included in NAPS Station measurements, and therefore was estimated using $PM_{2.5}$ measurements, assuming a ratio of 0.54 µg/m3
[e] Assume 1-hr concentration is save as 24-hr concentration

The ambient concentrations of benzene (annual average) and benzo(a)pyrene currently exceed their respective AAQCs. The stations are considered representative of ambient air within the DSBRT corridor due to their proximity and similar urban intensity. Ambient air quality was estimated using 90th percentile ambient pollutant concentrations for appropriate time averaging periods. Gaps of six (6) days or more in raw background data measurements were filled using the 90th percentile of the existing data set for each station. For each contaminant, the selected background concentrations the maximum values measured from 2014 to 2018, except for Acetaldehyde and Acrolein, where the maximum value measured from 2014 to 2016. It should be noted that historical monitoring data for PM_{10} are not available at any of these selected monitoring stations. However, PM_{10} background data were calculated using $PM_{2.5}$ monitoring data and an approved correlation factor of 0.54. The model-predicted concentrations of pollutants of concern (i.e., including background concentrations) for the 108 sensitive receptor locations are presented in **Appendix H**.

In summary, with the exception of NO_2, Benzene and Benzo(a)pyrene), all model-predicted concentrations of PM_{10}, SO_2, $PM_{2.5}$ and CO for all averaging periods are well below applicable ambient air quality criteria even with the addition of background concentrations at the modelled receptors. The maximum 1-hour NO_2 concentrations and annual NO_2 concentrations, in the existing conditions, exceed the 2025 CAAQS at several receptors. The maximum cumulative 24-hour NO_2 concentration predicted are in compliance with air quality limits currently enforced in the province of Ontario.

Model-predicted concentrations of VOCs for all averaging periods are well below applicable ambient air quality criteria when combined with their respective 90th percentile ambient background concentrations. The only exceptions are the 24-hour and annual average benzo(a)pyrene and annual average benzene concentrations, where the background concentrations are already above their respective AAQC without any contribution from the Project.

3.9 Noise and Vibration

The Noise and Vibration Impact Assessment (NVIA) includes a detailed analysis of the existing conditions related to noise and vibration within the Study Area (see **Appendix I**). The methodology for evaluating existing noise and vibration conditions is summarized in **Section 3.9.1** and description of existing conditions is provided in **Section 3.9.2**.

3.9.1 Methodology

The noise assessment was conducted on the most exposed side of each receiver, as per MECP and MTO guidelines (MTO, 2006a). Durham Region provides guidelines for noise assessment (The Regional Municipality of Durham, 2012) to be conducted at the OLA (the backyard), In this noise assessment, noise sources from the proposed BRT and vehicular traffic were both considered in evaluating the noise levels at the receivers. Moreover, the engine and exhaust noise from Diesel engine buses also contribute to the overall noise levels at the nearest receiver locations.

In accordance with FTA, if the roadway is fairly smooth, the vibration from rubber-tired traffic is rarely perceptible. No operational vibration impacts are anticipated due to the nature of BRT (rubber-tired) transit projects since the rubber-tires and smooth pavement surface does not generate ground-borne vibration and therefore, operational vibration impacts are not further assessed.

3.9.1.1 Noise Assessment

Identification of NSAs (Noise Receivers)

Existing Noise Sensitive Areas (NSAs) were identified using recent aerial photography and confirmed through site visit on September 30, 2020. Key points of reception (POR) were identified to represent groups of NSAs with similar exposure to the DSBRT project. As per MECP and MTO guidance, noise impacts are generally assessed in outdoor living areas (OLAs) of a noise sensitive land-use including private homes, townhouses, apartment buildings with OLAs, hospitals and nursing homes. For each NSA, the side of the building that will be most exposed to the DSBRT was assessed. In cases where the most exposed side is on the same side as the OLA, the OLA was selected as the POR of choice. Notably, shallow apartment balconies, churches, cemeteries, parks and picnic areas are not part of NSA. Commercial and industrial land uses are also not considered as NSAs. The noise receivers are listed and illustrated in **Appendix I**.

Land-use zoning was reviewed for the study area, and it was concluded that at the time of this report that there were three approved development applications and were further analyzed as part of this project. Based on the review of the available plans, the OLA at both 1744 & 1750 Ellesmere Road and 3300 Ellesmere Road is fully shielded by the building structure and therefore, further analysis was not performed. The development application at 550 Bond Street West was not available at the time this study was

conducted, therefore, future assessment should be undertaken once the plans are available.

Noise Modelling

The sound level predictions completed in support of transportation noise assessment was completed using the STAMINA 2.0 model developed by the U.S. Federal Transit Administration (FTA). As per MTO's Noise Guide requirements, for arterial roadways, all sound levels were assessed as 16-hour L_{eq} at a height of 1.5 m above ground at the MES, or OLA of each identified NSA (MTO 2006b).

Construction Noise Guidelines and Bylaws

Ministry of the Environment, Conservation and Parks

In Publication NPC-115 (Ontario Ministry of the Environment, 1977a), the MECP has outlined a series of equipment-specific sound level limits that must be met by individual pieces of construction equipment, depending on the location of use and date of manufacture (Ontario Ministry of the Environment, 1977a). In addition, any heavy vehicle (motorized conveyance with a gross weight >4,500 kg) with a diesel engine that is associated with a construction activity would be subject to the sound level limits prescribed in MECP Publication NPC-118 (Ontario Ministry of the Environment, 1977b). For vehicles manufactured after 1979, the maximum allowable sound level is 95 dBA at a distance of 15 m.

Municipal

City of Pickering, Town of Ajax, Town of Whitby, City of Oshawa, and City of Toronto regulates construction noise with various bylaws. The requirements are presented in **TABLE 3.36** below.

TABLE 3.36. SUMMARY OF CONSTRUCTION NOISE ASSESSMENT CRITERIA

Protocol	Criteria
City of Pickering Noise By-Law	• Activities Prohibited by Time: Operation of Construction Equipment 7:00 p.m. to 7:00 a.m. (all day on Sundays and statutory holidays) • Exemptions permitted.
City of Oshawa Noise By-law	• Permits any sound made by Construction between the hours of 7:00 am and 7:00 pm on any day that is not a Holiday. • Permits any sound made by Construction between the hours of 9:00 am and 5:00 pm on any Sunday.
City of Toronto Municipal Code and Noise By-law	• Quiet zone or Residential Area Prohibitions: between 19:00 and 07:00 hours on weekday, or 09:00 hours on Saturdays, and all day Sunday and statutory holidays. • Compliance with NPC-205 (now NPC-300) (MECP, 2013). • Requirements for Construction Vibrations. • Exemptions permitted.
Town of Whitby Noise Control By-law	• Residential and Parks Area Prohibition: between 8:00 p.m. and 07:00 a.m. all day Sundays and statutory holidays.

Protocol	Criteria
	• Commercial, Institutional Prohibition: between 8:00 p.m. and 07:00 a.m. all day Sundays and statutory holidays. • Exemptions permitted.
Town of Ajax Noise Control By-law	• Prohibits noise from any construction on: ▪ Statutory holidays; ▪ Between the hours of 8:00 p.m. one day to 7:00 a.m. the following day Monday to Friday; • 7:00 p.m. on Friday to 9:00 a.m. on Saturday; and 5:00 p.m. on Saturday to 7:00 a.m. on Monday. • Exemptions permitted.

Operational Noise Guidelines and Bylaws

The noise assessment criteria that have been adopted for operational noise assessment is summarized in **TABLE 3.37**.

TABLE 3.37. SUMMARY OF OPERATIONAL NOISE ASSESSMENT CRITERIA

Protocol	Criteria	Mitigation
MTO	Future ambient noise levels without the influence of the proposed improvement	To be considered when criteria is exceeded by more than 5 dB, or when sound levels increase are equal or greater to than 65 dBA
Durham Region	Predicted noise levels at existing dwelling and approved development application	To be considered when the criteria is exceeded 60 dBA or exceeded 55 dBA and the difference between existing and projected noise levels is 5 dBA or more

3.9.1.2 Vibration Assessment

Construction Vibration

In NPC-207 of the Ontario Model Municipal By-law (Ontario Ministry of the Environment, 1983), the MECP recommends limits for only impulse vibration, which may be applicable to some construction activities such as pile driving. Other types of construction equipment have potential to be sources of non-impulsive vibration, such as vibratory compaction. Therefore, construction vibration limits from the U.S. FTA are also considered (FTA, 2018).

Construction vibrations are generally assessed in terms of PPV rather than root mean square (RMS) levels. It is because public concerns are generally related more to the potential for building damage than perceptibility during construction (FTA, 2018). The MECP outlines the limits presented in **TABLE 3.38** for impulse vibration. The limits vary depending on the frequency of occurrence.

TABLE 3.38. MECP NPC-207 IMPULSE VIBRATION LIMITS

Time Required to Observe 20 Impulses (minutes)	Limit on the Average Peak Vibration Velocity (mm/s)	
	Daytime (07:00-23:00)	Night-time (23:00-07:00)

20 minutes or less	0.30	0.30
Less or equal to 60 minutes but more than 20 minutes	0.60	0.30
Less or equal to 120 minutes but more than 60 minutes	1.00	0.30
120 minutes	10.00	0.30

The FTA provides a series of criteria that vary depending on details of the building that is receiving the vibration and are set to protect against building damage (FTA, 2018). These criteria are summarized in **TABLE 3.39**. As a conservative measure, the vibration analysis in this assessment utilizes the Category III. Non-engineered timber and masonry buildings criteria of 5.1 mm/s.

TABLE 3.39. CONSTRUCTION VIBRATION DAMAGE CRITERIA

Building Category		PPV (mm/s)
I.	Reinforced concrete, steel, or timber (no plaster)	12.7
II.	Engineered concrete and masonry (no plaster)	7.6
III.	Non-engineered timber and masonry buildings	5.1
IV.	Buildings extremely susceptible to vibration damage	3.0

In 2008, the City of Toronto enacted a By-law (City of Toronto, 2008) that addresses vibration from construction activities. In general, the By-law provides a stepped approach to identifying whether vibration is a potential concern for the proposed construction activity, and how the potential vibration concerns are to be addressed. The By-law provides vibration limits that are not to be exceeded by any construction activity. These limits are summarized in **TABLE 3.40**.

TABLE 3.40. CITY OF TORONTO PROHIBITED CONSTRUCTION VIBRATIONS (BY-LAW 514-2008)

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

Operational Vibration

No vibration impacts from operation of BRT projects are anticipated according to Metrolinx guidelines (Metrolinx Environmental Guide for Noise and Vibration Impact Assessment, 2020) and from experience with other similar BRT projects in Ontario. Ground-borne vibration from rubber-tired transit projects (e.g., BRT) are negligible and unlikely to be of concern.

The vibration assessment criteria that have been adopted for construction vibration assessment is summarized in **TABLE 3.41**

TABLE 3.41. SUMMARY OF VIBRATION ASSESSMENT CRITERIA

Component	Protocol	Criteria	Mitigation
Operational Vibration	N/A[1]	Not Applicable	Not Applicable
Construction Vibration	MECP NPC-207	Impulse Vibration Limits	Adhere to limits stated in **TABLE 3.38**
	FTA (FTA, 2018)	Building damage	Adhere to limits stated in **TABLE 3.39**
	City of Toronto By-law 514-2008 (City of Toronto, 2008)	Frequency-based vibration limits	Adhere to limits stated in **TABLE 3.40**

Notes:

1- N/A: Not Applicable. No vibration impacts from operation of BRT projects are anticipated according to Metrolinx guidelines (Metrolinx Environmental Guide for Noise and Vibration Impact Assessment, 2020)

3.9.2 Description of Existing Conditions

As part of the Project, baseline noise and vibration levels are being collected and will be included in the report once the field work is completed. Field noise measurements will be used to validate the Cadna A model which was used to estimate baseline noise levels at Noise Sensitive Representative Receivers. Baseline vibration levels are also established by collecting vibration measurement at Representative Vibration Sensitive Receivers. This section discusses the procedures that was used to conduct baseline noise and vibration measurements as well as the existing noise wall inventory throughout the corridor.

3.9.2.1 Existing Noise Barriers

There are several existing noise barriers identified throughout the corridor and the locations and inventory are illustrated and listed in **Appendix I**. Condition (i.e., being in good structural condition), seamlessness (not having any gap in their construction), and review of the inventory of the previous reports were the criteria in identifying existing noise barriers as per MECP Publication NPC-300 (MECP, 2013). In most instances, the height of the existing noise barriers are assumed to be 2.0 m in the noise assessment, except where different heights are noted.

A summary of the existing noise walls information such as locations, lengths, and heights are listed in **TABLE 3.42**. Further details are provided in **Appendix I**. It is recommended that the survey and review of the existing noise barriers information should be completed at the Detailed Design stage to update the information based on the most recent condition of the noise walls at that time.

TABLE 3.42. EXISTING NOISE WALL INFORMATION

Noise Barrier Location (Closest Receiver ID)	Noise Barrier Height (m)	Noise Barrier Length (m)
OLA15	1.0	45
OLA21	1.5	34
OLA21a	1.5	27

Noise Barrier Location (Closest Receiver ID)	Noise Barrier Height (m)	Noise Barrier Length (m)
OLA21b	1.5	14
OLA24a-d	2.0	217
OLA25	2.0	245
OLA26a	2.0	36
OLA27	2.0	194
OLA29	2.0	921
OLA32a	2.0	32
OLA33	2.0	1411
OLA34	2.0	211
OLA34b	2.0	211
OLA34c	2.0	187
OLA34d-f	2.0	109
OLA35b	2.0	28
OLA36a	2.0	68
OLA36b	2.0	73
OLA38a	2.0	40
OLA39	2.0	45
OLA39a	2.0	37
OLA40	2.0	463
OLA41	2.0	53[1]
OLA41a	2.0	59
OLA45	2.0	227
OLA45a-d	2.0	227
OLA45e	2.0	32
OLA46	2.0	60
OLA55	2.0	227

Notes:

1- The entire length of the noise wall has been mentioned in the table. However, in our modeling only the effective portion of the noise wall length has been included. Effective length of the noise wall is a length extending the noise wall beyond which would not alter the sound level results.

3.9.2.2 Baseline Noise Level

Noise monitoring over a 24-hr period was conducted on fifteen (15) locations on publicly owned lands to confirm the accuracy of the noise modelling. The locations are listed in **TABLE 3.43**.

TABLE 3.43. LIST OF LOCATIONS FOR CONDUCTING BASELINE NOISE MONITORING

Receiver ID	Location	Address	Building Type
1	Centennial Recreation Center Scarborough	1967 Ellesmere Rd, Scarborough, ON M1H 2W5	Recreational
2	Metropolitan Toronto & Region Conservation Authority, Botany Hill Dog Park	325 Orton Park Rd #283, Scarborough, ON M1G 3T4	Recreational

Receiver ID	Location	Address	Building Type
3	The Corporation of the City of Scarborough Highland Creek Park	3500 Ellesmere Rd, Scarborough, ON M1C 1H5	Recreational
4	Her Majesty the Queen in Right of Canada	7298 Kingston Road, Scarborough	Vacant land
5	The Corporation of the City of Pickering Steeple Hill Park	Pickering, ON, L1V 0C3	Recreational
6	The Corporation of the City of Pickering Green space close to 1230 Kingston Rd	Pickering, ON L1V 1B4	Vacant land
7	The Corporation of the Town of Ajax Green space	close to intersection of the Kingston Rd and Westney Rd S	Vacant land
8	Regional Municipality of Durham Green space	close to intersection of the Kingston Rd and Durham 41	Vacant land
9	Regional Municipality of Durham Green space	space close to 1610 Dundas St W, Whitby, ON, L1P 1Y8	Vacant land
10	The Corporation of the Town of Whitby D'Hillier Park	128 Raglan St, Whitby, ON, L1N 2S9	Recreational
11	The Corporation of the Town of Whitby	69 Garden St, Whitby, ON, L1N 9E7	Vacant land
12	The Corporation of the City of Oshawa	close 1003 Dundas St E, Whitby, ON, L1N 2K4	Vacant land
13	Her Majesty the Queen in Right of Canada	close to 1507 Dundas Street East, Whitby	Vacant land
14	The Corporation of the City of Oshawa	close 847 King St W, Oshawa, ON, L1J 2L4	Vacant land
15	The Corporation of the City of Oshawa	50 Centre St S, Oshawa, ON, L1H 3Z7	Commercial

The modelling was completed using the Federal Highway Administration's (FHWA) Traffic Noise Model (TNM) (FHWA, 1998) which is a software application for the modelling of highway traffic noise impacts. The TNM is a component of the Computer Aided Noise Abatement (CadnaA) computer noise modelling software.

Traffic Movement Count (TMC) was conducted simultaneously during baseline noise measurements for a 24-hr period to ensure the traffic that is modelled in the software represent the same vehicular traffic condition.

The TNM model was then be updated for the fifteen (15) monitoring locations to reflect the traffic data collected as well as receptor heights including ground elevations. Any shielding effect from nearby structures was also inputted into the model by introducing buildings heights and locations.

The difference between the measured and predicted sound levels should be within 3 dB in order to calibrate and/or verify the modelling vs. monitoring results.

3.9.2.3 Baseline Vibration Level

Baseline vibration levels are established by 24-hr measurement of vibration levels at nineteen (19) representative vibration sensitive locations as listed in **TABLE 3.44**. In selecting representative vibration sensitive receivers, cultural heritage buildings and/or medical buildings hosting vibration sensitive equipment (e.g., X-Ray) were given priority over other types of buildings. The baseline vibration levels can be used to evaluate the variation in vibration levels of selected buildings during construction and operation Vibration levels were measured as close as possible to the building's foundations but within public ROW, due to COVID-19 constraints during this time.

TABLE 3.44. LIST OF LOCATIONS FOR CONDUCTING BASELINE VIBRATION MONITORING

Receiver ID	Location	Address	Type of Building
1	House/Residential Unit	34 Pendle Hill Ct, Toronto, ON, M1H 2L9	Residential
2	Townhouse owned by City of Toronto close to Scarborough Health Network - Centenary hospital	2867 Ellesmere Rd, Scarborough, ON M1E 4B9	Residential
3	House/Residential Unit	397 Morrish Rd, Scarborough, ON, M1C 1E9	Residential
4	Known BHR - Part IV Designation (By-law #21790)	726 Meadowvale Rd Scarborough, ON, M1C 1T2	Residential / Cultural Heritage Site
5	Known CHL - Part IV Designation (By-law #19127)	6540-6550 Kingston Rd, Scarborough, ON, M1C 1L4	Residential / Cultural Heritage Site
6	House/Residential Unit	575 Steeple Hill, Pickering, ON, L1V 7G3	Residential
7	St. Mary St. John The Beloved Coptic Orthodox Church	980 Kingston Rd Pickering, ON, L1V 1B2	Commercial
8	My Health Centre - Pickering - Ultrasound, X-ray	1105 Kingston Rd Pickering, ON, L1V 1B5	Medical/Lab
9	BROCK & KINGSTON HOLDINGS INC. Known BHR - Part IV Designation (By-law #2570/87)	1970 Brock Rd, Pickering, ON, L1V1Y3	Commercial/ Cultural Heritage Site
10	Smile line Orthodontics & Kids Dentistry Known CHL - Part V Designation (By-law #102-2013)	03 Old Kingston Rd, Ajax, ON L1T 3A6	Commercial / Medical/ Cultural Heritage Site
11	Health Movement Pilates Known BHR - Part IV Designation (By-law #116-82)	592 Kingston Rd W, Ajax, ON, L1T 3A2	Commercial / Cultural Heritage Site
12	Sunshine Learning Centre Inc. Known BHR - Part IV Designation (By-law #67-2001)	504 Kingston Rd W, Ajax, ON, L1T 3A3	Commercial / Cultural Heritage Site
13	House/Residential Unit	51 Chalmers Cres, Ajax, ON, L1S 6A1	Residential

Receiver ID	Location	Address	Type of Building
14	Known BHR - Part IV Designation (By-law #148-92; #125-2009)	365 Kingston Rd E, Ajax, ON	Commercial / Cultural Heritage Site
15	House/Residential Unit	114 Raglan St, Whitby, ON, L1N 2S9	Residential
16	Known BHR - Part IV Designation (By-law #1813-85)	132 Dundas St W, Whitby, ON	Commercial / Cultural Heritage Site
17	House/Residential Unit	991 Dundas St E, Whitby, ON, L1N 2K1	Residential
18	Bluewater Park Apartment	101 Kathleen St, Whitby, ON, L1N 6P8	Residential
19	House/Residential Unit	36 Fernhill Blvd, Oshawa, ON, L1J 5H9	Residential

4. Potential Impacts, Mitigation Measures and Monitoring

The *Transit Projects and Metrolinx Undertakings Regulation*, Ontario Regulation 231/08 under the *Environmental Assessment Act,* Section 9 (2) requires the proponent to prepare an Environmental Project Report (EPR) that contains the following information, among other requirements:

- Description of the environment that will be affected or might reasonably be affected;
- Anticipated potential impacts;
- Proposed mitigation measures to minimize, manage, prevent and avoid environmental effects; and,
- Proposed monitoring and contingency measures, if required.

The impacts of the preliminary design have been assessed by discipline-specific environmental studies to identify the footprint, construction and operation/maintenance impacts associated with the implementation of the DSBRT.

The impact assessment considered:

- Impacts identified through the completion of technical studies;
- All applicable federal and provincial regulatory requirements for the assessment of environmental effects;
- Issues raised by external agencies, the public, property owners, Indigenous Communities, and other persons of interest during consultation and participation activities conducted to date; and,
- Engineering design and programs for mitigation and monitoring.

If the proposed works change following the EPR, the proponent will be required to assess any change to the impacts following addendum process summarized in **Section 1.11**.

4.1 Traffic and Transportation

4.1.1 Methodology

The transportation analysis used the Greater Golden Horseshoe Model Version 4 (GGHMv4) as well as population and employment forecasts to prepare detailed travel

demand and transit ridership forecasts. The 2041 horizon year population and employment reflect the Growth Plan for the Greater Golden Horseshoe (GGH) with a transportation network including committed road and transit projects in the GGH.

Forecasts from the GGHMv4 were used to determine the background growth in travel demand associated with general increases to population and employment as well as travel demand changes associated with the DSBRT. Traffic demands were output from the travel demand model. Land use data/projections were used to account for non-linear traffic growth. Link segment background growth and change due to BRT implementation were each calculated. Link segment background growth and link segment BRT deltas was distributed amongst intersection turning movements.

Where BRT is centre-running and dedicated median transit lanes are introduced, general traffic will only be permitted to make left-turns into and out of the corridor at signalized intersections. Left-turn movements to and from all unsignalized intersections will be prohibited, and this traffic will instead need to re-route to an upstream or downstream signalized intersection.

For the purpose of the analysis, left-turn traffic from unsignalized side streets and driveways was modelled to divert to the next signalized intersection and make a U-turn. Signalized intersections will support safe U-turn movements from auxiliary during protected-only (green arrow) left-turn) signal phasing. Left-turn lanes will be provided at all signalized intersections along the 36 km corridor.

The need for right-turn lanes was reviewed based on forecasted traffic volumes, intersection operations, right-of-way constraints, and considering pedestrian crossing distances. In general, right-turn lanes are recommended as part of DSBRT at major intersections (arterial-arterial).

To test the implementation of Transit Signal Priority (TSP), the analysis used a 10-second exclusive transit phase prior to the protected left turn phase. The 10-second hold phase conservatively represents the impact of TSP or dedicated transit phases on signal operations. This approach is conservative because the resulting traffic operations would not be experienced every cycle, but only on cycles where TSP is activated. Activations would vary depending on the level of TSP implemented.

Future background traffic operations were analyzed for interim horizon years 2026 and 2031 to test construction traffic operations as input into the preliminary BRT phasing plan. This analysis is presented in **Appendix B1**. Specifically, this analysis focused on the eastbound and westbound through movements, as the LOS of those movements is indicative of delays to be experienced by buses operating in mixed traffic (i.e., without BRT lanes).

The traffic construction and operations impact of the undertaking and the proposed mitigation measures are described by comparing the future background scenario to the future BRT conditions. Findings are discussed in the following sections using the same analysis segments described in **Section 3.1**.

4.1.2 Future Background Conditions

Future background conditions consider the traffic operations in the year 2041 if the road configuration remains the same as it is today without the implementation of the BRT.

Segment 1 – Ellesmere Road from McCowan Road to west of Morningside Avenue

Under future background conditions, all intersections in this segment will operate at Level of Service (LOS) D or better. However, there are several critical movements in both a.m. and p.m. peak hours such as Ellesmere Road at McCowan Road and at Markham Road. At these two intersections, the left-turning movements from all approaches will operate close to capacity with v/c ratios larger than 0.88 and a LOS of E or F. Buses are routed via Grangeway Avenue to follow a shorter more direct route to the future bus terminal while avoiding the congestion at McCowan.

Following the main commuting direction, traffic is generally heavier in the westbound direction during the a.m. peak hour and in the eastbound direction during ithe p.m. peak hour.

Future scenarios without rapid transit service would require significant adjustments to traffic signal timing, cycle lengths, movement phasing structures, lane configurations and vehicle diversions to other routes. Without these changes at arterial intersections, it is expected that queue lengths would exceed the available storage capacity, resulting in excessive delays.

Segment 2 – Ellesmere Road at Morningside Avenue to west of Kingston Road at Altona Road

Under future background conditions, traffic will be more congested as expected. The arterial-arterial intersections at Morningside Avenue, Sheppard Avenue, and the Highway 401 eastbound off-ramp intersection, experience the highest congestion. Several of the other intersections face operational challenges such as an unprotected left turn phase with high opposing through volume. For these intersections, implementation of protected left-turn phasing is recommended.

Following the main commuting direction, traffic is generally heavier in the westbound direction during the a.m. peak hour and in the eastbound direction during the p.m. peak hour.

Future scenarios without rapid transit service would require significant adjustments to traffic signal timing, cycle lengths, movement phasing structures, lane configurations and vehicle diversions to other routes. Without these changes at arterial-arterial intersections, it is expected that queue lengths would exceed storage length, and volume will continue to exceed capacity even further resulting in excessive delays.

Segment 3 – Kingston Road from Altona Road to west of Elizabeth Street

The future background scenarios required various adjustments to traffic signal timings, cycle lengths, and movement phasing structures. With these changes, and despite numerous critical movements being identified particularly in the p.m. peak hour, all

intersections along this segment remain operating at overall LOS D or better with exception of the Brock Road intersection which will operate at overall LOS E in the p.m. peak.

Congestion is generally limited at the intersections with collector roads, although there are often delays on the minor approaches as green time is prioritized towards the heavy east-west a.m. movements and vice versa. At the major arterial-arterial intersections where crossing volumes are high, significant congestion is generally observed as all approaches compete for available green time. As was the case for existing conditions, traffic volumes are higher travelling westbound in the a.m. peak and eastbound in the p.m. peak.

Segment 4 – Kingston Road from Elizabeth Street to Rotherglen Road ('*Pickering Village*')

Segment 4 is located in Pickering Village and is identified as one of the 'pinch point' segments along the corridor. All intersections will operate at overall LOS C or better apart from the Church Street intersection which will operate at LOS E in the p.m. peak hour with several movements at capacity.

As was the case for existing conditions, traffic volumes are higher travelling westbound in the a.m. peak and eastbound in the p.m. peak.

Segment 5 – Kingston Road from east of Rotherglen Road to Lake Ridge Road

The future background scenarios required various adjustments to traffic signal timings, cycle lengths, and movement phasing structures. In addition to background growth along the corridor, the travel demand model also showed significant growth on major intersecting arterial roads. As expected, traffic is more congested in the future background and arterial-arterial intersections will operate at or over capacity. Specifically, the intersections of Harwood Ave, Salem Road, and Lake Ridge Road operate above capacity in the p.m. peak hour.

As was the case for existing conditions, traffic volumes are higher travelling westbound in the a.m. peak and eastbound in the p.m. peak.

Segment 6 – Dundas Street from Lake Ridge Road to west of Frances Street

The future background scenarios required various adjustments to traffic signal timings, cycle lengths, and movement phasing structures. With these changes, and despite numerous critical movements being identified particularly in the p.m. peak hour, all intersections along this segment would remain operating at overall LOS C or better. One exception is the Cochrane Street intersection which would operate at overall LOS D in the a.m. peak hour.

Congestion is generally limited at the intersections with collector roads, although there are often delays on the minor approaches as green time is prioritized towards the heavy east-west movements. At the major arterial-arterial intersections where crossing volumes are high, significant congestion is generally observed as all approaches compete for available green time.

As was the case for existing conditions, traffic volumes are higher travelling westbound in the a.m. peak and eastbound in the p.m. peak. This reflects the existing east-west commuting patterns along Dundas Street.

Segment 7 – Dundas Street at Frances Street to Garden Street ('*Downtown Whitby*')

Segment 7 is located in Downtown Whitby and is identified as one of the 'pinch point' segments along the corridor. While significant background growth was projected along this segment per the travel demand model, all intersections would remain operating at overall LOS D or better in both peak hours. However, the addition of background traffic growth results in the eastbound and westbound through movements, reaching capacity at the Brock Street and Garden Street intersections during the p.m. peak hour.

As was the case for existing conditions, traffic volumes are higher travelling westbound in the a.m. peak and eastbound in the p.m. peak. This reflects the existing east-west commuting patterns along Dundas Street.

Segment 8 – Dundas Street east of Garden Street to west of Thornton Road

The future background scenarios required various adjustments to traffic signal timings, cycle lengths, and movement phasing structures. However, even with these changes, the intersections at Anderson/Hopkins Street and at Thickson Road are expected to operate above capacity in the p.m. peak hour, with significant delays and congestion at certain movements. These intersections have high demand on all four approaches and could benefit from increased cycle lengths. Note that operational issues are limited to the p.m. peak hour, as all intersections have capacity remaining in the a.m. peak.

Congestion is generally limited at the intersections with collector roads, although there are often delays on the minor approaches as green time is prioritized towards the heavy east-west movements. As was the case for existing conditions, westbound and southbound volumes are higher in the a.m. peak hour, while eastbound and northbound volumes are higher in the p.m. peak. This reflects the existing east-west commuting patterns along Dundas Street.

Segment 9 – Bond Street from Thornton Road to Simcoe Street ('*Downtown Oshawa*')

Segment 9 is located in Downtown Oshawa, and it is identified as one of the 'pinch point' segments along the corridor. Bond Street operates westbound in conjunction with segment 10 (King Street, eastbound) as a one-way couplet. Under future background conditions, all intersections operate at overall LOS C or better. Most intersections have surplus capacity with the existing three to four lane configuration. This suggests that converting one lane for transit use will not have adverse traffic operations without widening Bond Street. Critical movements occur at the intersections with Stevenson Road and Park Road, however delays for these movements are limited.

Segment 10 – King Street from Thornton Road to Simcoe Street ('*Downtown Oshawa*')

Segment 10 is located in Downtown Oshawa and it is identified as one of the 'pinch point' segments along the corridor. King Street operates eastbound in conjunction with

segment 9 (Bond Street, westbound) as a one-way couplet. Under future background conditions, all intersections operate well during both peak hours, at overall LOS B or better. All intersections have surplus capacity with the existing lane configuration. This suggests that converting one lane for transit use will not have adverse traffic operations. One critical movement was identified at Stevenson Road intersection in the p.m. peak hour, however delays for that movement are limited.

4.1.3 Future BRT Conditions

Future BRT conditions consider the traffic operations in the year 2041 with the road configuration presented in Appendix A for this undertaking.

Segment 1 – Ellesmere Road from McCowan Road to west of Morningside Avenue

Segment 1 is proposed to be widened to six lanes to accommodate centre-median rapid transit lanes while maintaining two general traffic lanes per direction. At the west end of the study corridor, buses will turn at Grangeway Avenue to continue north to Scarborough Centre. Two new traffic signals are proposed: between 1960 and 1990 Ellesmere Road to align with the Centennial Recreation Centre access, and at Mornelle Court.

Traffic operations in 2041 with BRT are expected to be similar to 2041 without BRT since the number of through lanes for general traffic will be maintained. With the introduction of centre-median transit, traffic will no longer be able to make left-turns to/from unsignalized accesses and driveways, resulting in the need of U-turn movement at downstream signalized intersections. This will result in an increase in traffic making left turns / U-turns at signals, evolving in some increased delay for those movements.

Ellesmere Road at McCowan and Markham Roads are expected to have several movements with v/c ratio above 0.85, in particular left turns which approach or exceed v/c ratio of 1.0.

To mitigate queue interference, additional turn lane storage capacity is recommended for consideration in the preliminary design, specifically on McCowan Road and Markham Road.

Neilson Road is expected to experience heavy left-turning volumes during both a.m. and p.m. peak hours, resulting in an increase in queue lengths. Extending the left-turn lane storage is recommended. The analysis also noted that providing an advanced transit-only phase is not recommended as it may require a longer cycle length, as high as 140 seconds, to adequately serve all movements; cycle lengths of this duration have a negative effect on pedestrian operations and increase traffic queue lengths.

Overall, the diversion of left-turning traffic to U-turns will have an impact on traffic operations for left turns, in particular at major intersections of Markham Road and McCowan Road. These can be somewhat mitigated through appropriate turning lane lengths. Overall, the segment continues to operate well and similar to future background (2041 without BRT) conditions.

Segment 2 – Ellesmere Road at Morningside Avenue to west of Kingston Road at Altona Road

The recommended design for Ellesmere Road varies along Segment 2:

- East of Morningside Avenue, transit vehicles will merge from centre-running lanes to curbside operations. This design is consistent with the latest plans for the proposed Eglinton East LRT, which will run along the south side of Ellesmere Road between Morningside Avenue and the realigned Military Trail.
- East of Military Trail to Meadowvale Road, the recommended design for Ellesmere Road is to maintain one lane per direction for general traffic and convert one centre-running lane in each direction for transit vehicles.
- Between Meadowvale Road and Kingston Road, the recommended design is to maintain one lane per direction for general traffic and widen to provide one centre-running transit lane in each direction.

Along Kingston Road from Ellesmere Road to Raspberry Road the proposed design is to convert the existing five and six lane roadway to develop centre-median bus lanes while maintaining four lanes for general traffic (two lanes in each direction) plus turn lanes at intersections.

Traffic operations in 2041 with BRT are expected to be fairly similar to 2041 without BRT because the number of through lanes for general traffic will be maintained for most of Segment 2. With the introduction of centre-median transit, traffic will no longer be able to make left-turns to/from unsignalized accesses and driveways, resulting in U-turn traffic at downstream signalized intersections. This will cause an increase in traffic making left turns / U-turns at signals, evolving some increased delay for those movements.

In response to City of Toronto feedback, Metrolinx will conduct a Safety Audit of the preliminary design from Military Trail to Kingston Road, including considering and evaluating design alternatives without a curbed centre median. Recommendations from the Safety Audit will be explored as refinements to the design.

New traffic signals are proposed at Muirbank Boulevard. Additional opportunities for traffic signals on Ellesmere Road between Conlins Road and Meadowvale Road may be explored during detail design in consultation with City of Toronto. Transit signal priority for the proposed Eglinton East LRT at Ellesmere Road and Military Trail results in increased delays, mostly on the northbound and southbound approaches. Potential mitigation measures could include providing a longer cycle length, adding protected/permissive northbound and southbound left-turn phases, and/or implementing adaptive signal timings. Transit Signal Priority was also tested for Kingston Road and Ellesmere Road, where no major impacts to operations are expected.

Lastly, the intersections along Kingston Road east of Ellesmere Road operate fairly similar to future background conditions, but with higher delays on left-turning movements due to protected signal phasing. Transit signal priority was found to cause a

deterioration in performance at the intersection with Sheppard Avenue/Port Union Road, particularly for the westbound left-turn movement which serves a high volume, including traffic accessing Highway 401.

Segment 3 – Kingston Road from Altona Road to west of Elizabeth Street

Segment 3 is proposed to be widened to six lanes to accommodate centre-median rapid transit lanes while maintaining two general traffic lanes per direction. The existing dedicated bus lanes present from south of Steeple Hill to Delta Boulevard and from south of Liverpool Road to Glenanna Road will be converted to general traffic lanes. At the west end of Segment 3, west of Rosebank Road, the dedicated transit lanes transitions since the Rouge River bridge will not be widened.

Traffic operations in 2041 with BRT are expected to be similar to 2041 without BRT because the number of through lanes for general traffic will be maintained. With the introduction of centre-median transit, traffic will no longer be able to make left-turns to/from unsignalized accesses and driveways, resulting in U-turn traffic at downstream signalized intersections. This will cause an increase in traffic making left turns / U-turns at signals, resulting in some increased delay for those movements. Specifically, at Whites Road, Liverpool Road, and Brock Road, which were at overall LOS E during one or both peak hour periods in 2041 without BRT. Glenanna Road will operate at overall LOS F in the p.m. peak hour due to high turning volumes into and out of the Pickering Town Centre shopping mall. These impacts to traffic operations are largely a result of the eastbound and westbound left-turn movements operating during protected-only phasing, which introduces delays on these movements and changes the balance of green time for other movements.

Transit signal priority was tested at several intersections where Durham Region Transit routes may turn on or off the corridor. As expected, the conservative approach of calling TSP in every cycle result in increased delays for general traffic. Note that TSP may not be required at several intersections where it was tested if local transit were to continue operating in the curb lane. Future local transit routing may be subject to change following BRT implementation.

Overall, the diversion of left-turning traffic to U-turns was found to have an impact on traffic operations for left turns, in particular at major intersections of Brock Road, Whites Road, and Liverpool Road. Glenanna Road is also expected to experience increased delays. These can be somewhat mitigated through appropriate turning lane lengths. Overall, the segment continues to operate well and similar to future background (2041 without BRT) conditions.

Segment 4 – Kingston Road from Elizabeth Street to Rotherglen Road (‘*Pickering Village*’)

Segment 4 runs through Pickering Village and it is identified as one of the pinch-point locations. Due to right-of-way constraints, this segment is proposed to be widened to five lanes. Based on the afternoon eastbound travel demand, the proposed cross-section provides two eastbound lanes, two centre-running transit lanes, and one westbound lane.

Demand and traffic operations analysis accounted for diversion of traffic and proposed network changes. Traffic operations in 2041 with BRT are expected to shift longer distance auto trips to other roads in the network, particularly for westbound general traffic. Traffic modelling shows that about 30% of traffic will use other routes. Longer distance trips will use Rossland Road and Bayly Street. The proposed connection of Notion Road over Highway 401 also helps to add capacity to the network around Pickering Village.

Transit signal priority was tested at both Church Street and Rotherglen Road, where Durham Region Transit routes may turn on or off the corridor. As expected, the conservative approach of calling TSP in every cycle result in increased delays for general traffic. Note that TSP may not be required at several intersections if local transit were to continue operating in mixed traffic, which may be a preferable approach to maintain more frequent stops. Future local transit routing may be subject to change following BRT implementation.

Overall, the diversion of left-turning traffic to U-turns was found to have an impact on traffic operations for left turns. Kingston Road at Elizabeth Street operates at capacity in the a.m. peak hour, while the Church Street intersection continues to operate at capacity in the p.m. peak hour. Neither intersection operates at overall LOS F, despite some added delays to various movements, with the introduction of protected-only phasing for the eastbound and westbound left-turn movements.

Segment 5 – Kingston Road from east of Rotherglen Road to Lake Ridge Road

Segment 5 is proposed to be widened to six lanes to accommodate centre-median rapid transit lanes while maintaining two general traffic lanes per direction. The existing dedicated bus lanes provided between east of Rotherglen Road and the access to Whitetail Centre Plaza will be converted to general traffic lanes.

Traffic operations in 2041 with BRT are expected to be similar to 2041 without BRT because the number of through lanes for general traffic will be maintained. With the introduction of centre-median transit, traffic will no longer be able to make left-turns to and from unsignalized accesses and driveways, resulting in U-turn traffic at downstream signalized intersections. This causes an increase in traffic make left turns / u-turns at signals, resulting in some increased delay for those movements.

There are some increases to traffic congestion and delays compared to the future background conditions. At Lake Ridge Road, which is expected to operate over capacity in the future background scenario, overall LOS F is expected in the a.m. peak hour with BRT. The overall intersection performance is due to the operation of east-west lefts on fully protected phasing. Similarly, other intersections are expected to see an increase in delay for west-west left-turn movements, although it is noted this change does improve westbound left-turn operations at both the Harwood Avenue and Salem Road intersections.

Transit signal priority was tested at the Westney Road intersection, where existing Durham Region Transit routes may turn on or off the corridor. As expected, the

conservative approach of calling TSP in every cycle results in increased delays for general traffic. Note that TSP may not be required several intersections where it was tested if local transit were to continue operating in mixed traffic, which may be a more preferable approach to maintain more frequent stops. Future local transit routing may be subject to change following BRT implementation.

Overall, the diversion of left-turning traffic to u-turns was found to have an impact on traffic operations for left turns. Dundas Street at Lake Ridge Road is expected to operate over-capacity, in both the future background and future BRT scenarios. In general, the corridor operates similar to future background conditions.

Segment 6 – Dundas Street from Lake Ridge Road to west of Frances Street

Segment 6 is proposed to be widened to six lanes to accommodate centre-median transit lanes while maintaining two general traffic lanes per direction.

Traffic operations in 2041 with BRT are expected to be similar to 2041 without BRT because the number of through lanes for general traffic will be maintained. With the introduction of centre-median transit, traffic will no longer be able to make left-turns to and from unsignalized accesses and driveways, resulting in U-turn traffic at downstream signalized intersections. This will cause an increase in traffic making left turns / U-turns at signals, resulting in some increased delay for those movements. Specifically, Cochrane Street is expected to operate at LOS E in the a.m. peak hour and LOS D in the p.m. peak hour. Impacts to traffic operations are largely a result of the eastbound and westbound left-turn movements operating during protected-only phasing, which introduces delays on these movements and changes the balance of green time for other movements.

Transit signal priority was tested at the Cochrane Street intersection, where Durham Region Transit may turn on or off the corridor. As expected, the conservative approach of calling TSP in every cycle results in increased delays for general traffic. Note that TSP may not be required at several intersections if local transit were to continue operating in the curb lane. Future local transit routing may be subject to change following BRT implementation.

Overall, the diversion of left-turning traffic to U-turns was found to have an impact on traffic operations for left turns. Overall, the segment continues to operate well and similar to future background (2041 without BRT) conditions.

Segment 7 – Dundas Street at Frances Street to Garden Street (‘*Downtown Whitby*’)

Segment 7 runs through Downtown Whitby and it is identified as one of the pinch-point locations. This segment is proposed to provide 2 centre-median transit lanes and maintain two lanes for general traffic. Between Byron Street and Brock Street, the design proposes to provide an eastbound dedicated transit lane and an eastbound general traffic lane at Dundas Street and Brock Street intersection, but the westbound transit and traffic would operate in a mixed through lane with dedicated right turn lane at

Dundas and Brock. All left turns and right turns would be restricted at this intersection except the westbound right turn.

Segment 8 – Dundas Street east of Garden Street to west of Thornton Road

Segment 8 is proposed to be widened to six lanes to accommodate centre-median transit lanes while maintaining two general traffic lanes per direction.

Traffic operations in 2041 with BRT are expected to be similar to 2041 without BRT because the number of through lanes for general traffic will be maintained. With the introduction of centre-median transit, traffic will no longer be able to make left-turns to/ from unsignalized accesses and driveways, resulting in U-turn traffic at downstream signalized intersections. This will cause an increase in traffic make left turns / U-turns at signals, resulting in some increased delay for those movements. Specifically, the intersection with Thickson Road is expected to operate at LOS E in both peak hours, and the intersection with Thornton Road at LOS E in the p.m. peak hour. Impacts to traffic operations are largely a result of the eastbound and westbound left-turn movements operating during protected-only phasing, which introduces delays on these movements and changes the balance of green time for other movements.

Transit signal priority was also tested at several intersections where Durham Region Transit routes may turn on or off the corridor. As expected, the conservative approach of calling TSP in every cycle results in increased delays for general traffic, particularly at the Anderson/Hopkins intersection in the p.m. peak hour. Note that TSP may not be required at many of the intersections where it was tested if local transit were to continue operating in the curb lane. Future local transit routing may be subject to change following BRT implementation.

Overall, the diversion of left-turning traffic to U-turns was found to have an impact on traffic operations for left turns. Overall, the segment will continue to operate well and similar to future background (2041 without BRT) conditions.

Segment 9 – Bond Street from Thornton Road to Simcoe Street ('*Downtown Oshawa*')

Segment 9 is proposed to provide one curbside transit lane along the north side and maintain two lanes for general traffic. The curbside transit lane will not be physically separated from the general traffic lanes, meaning left-turn movements can continue at unsignalized side streets and driveways and no U-turn traffic will be generated.

The future background traffic analysis showed there is excess capacity. The proposed design will maintain two general traffic lanes through Segment 9, which is sufficient to accommodate demand to 2041. All intersections will continue operating satisfactorily in both peak hours at LOS D or better. Certain movements are expected to operate at capacity such as at Stevenson Road and Park Road.

Transit signal priority was not tested at any intersections along this segment, as none are expected to experience recurring TSP triggers. Because curbside transit lanes are proposed as opposed to centre-median transit lanes, buses can freely merge between

the transit lanes and general traffic lanes, and TSP is not required to facilitate turning buses.

Segment 10 – King Street from Thornton Road to Simcoe Street ('*Downtown Oshawa*')

Segment 10 is proposed to provide one curbside transit lane along the south side and maintain two lanes for general traffic. The curbside transit lane will not be physically separated from the general traffic lanes, meaning left-turn movements can continue at unsignalized side streets and driveways and no U-turn traffic will be generated.

The future background traffic analysis showed there is excess capacity. The proposed design will maintain two general traffic lanes through Segment 10, which is sufficient to accommodate demand to 2041. All intersections will continue operating satisfactorily in both peak hours at LOS D or better. Certain movements are expected to operate near capacity during the p.m. peak such as at Stevenson Road, Gibbons Road and Park Road.

Transit signal priority was not tested at any intersections along this segment, as none are expected to experience recurring TSP triggers. Because curbside transit lanes are proposed as opposed to centre-median transit lanes, buses can freely merge between the transit lanes and general traffic lanes, and TSP is not required to facilitate turning buses.

4.1.4 Active Transportation Network

4.1.4.1 Construction Impacts and Mitigation

The potential impacts to active transportation network during the construction include:

- Cycling facility will connect to the Meadoway Trail at the intersection of Ellesmere Road and Orton Park Road without impacting the Meadoway Trail;
- Pedestrian and cycling infrastructure may be closed during construction for an extended period, potentially resulting in pedestrian and cycling infrastructure gaps; and
- Safety concerns when using pedestrian and cycling infrastructure such as bike lanes and sidewalks due to reduced lanes and parked construction equipment.

The mitigation and monitoring measures to address potential construction impacts include:

- Determine if cycling infrastructure is safe to use during construction. If it is considered potentially unsafe, that facilities will be temporarily closed and cyclists will be re-routed, where possible, until the infrastructure is safe to use.

4.1.4.2 Operations Impacts and Mitigation

The potential impacts to active transportation network during the operational phase include:

- Given the high traffic volume and speed of arterial roads, cycling facilities may be unsafe without a separated bike lane.

The mitigation and monitoring measures to address potential operational impacts include:

- Physically separated cycling facilities have been included in the preliminary design in a context-sensitive manner consistent with active transportation plans in each municipality; and
- The 3-step Cycling Facility Type Selection process was performed for areas within the DSBRT corridor adjacent to MTO ROW (i.e., provincial highway interchanges). Detailed process and rationale for design are included in **Appendix B5**.

4.1.5 Summary of Potential Impacts, Mitigation Measures and Monitoring

The potential impacts, mitigation measures and monitoring are summarized in **TABLE 4.1**.

TABLE 4.1. SUMMARY OF POTENTIAL TRANSPORTATION IMPACTS, MITIGATION MEASURES AND MONITORING

Environmental Component	Potential Impacts (Design/Construction/Operation)	Mitigation Measures	Monitoring
During Detail Design			
Traffic	• Changes to left-turn traffic patterns • Changes to truck routes / haul routes	• Develop signal timing plans that provide protected-only (fully-protected) left-turn signal phasing at all signalized intersections; • Complete a haul route analysis to confirm that heavy single unit trucks are not subject to detour routes through residential areas, that turning radius is adequate for safe operation on detour routes, and that heavy single unit trucks can safely and easily access loading and unloading facilities; • Develop a Signage and Wayfinding Action Plan which directs vehicle and pedestrian traffic through the Study Area during construction by identifying appropriate locations and types of signage required. • Consider signal timing changes or additional turn lane storage in the detail design for Ellesmere Road at Markham Road, and Kingston Road from Altona Road to west of Elizabeth Street.	N/A
During Construction			
Traffic	• Changes to traffic capacity during construction	Complement a Traffic Staging and Management Plan in coordination with regions/municipalities. Within the City of Toronto, this plan is to meet City requirements for a Traffic and Transit Management Plan (TTMP) and an Access Management Plan (AMP). An updated Traffic Impact Assessment (TIA) may be required depending on the project implementation timeline.	Monitor traffic volumes and adjust signal timings as necessary before, during and after construction
Active Transportation Network	• Pedestrian and cycling infrastructure may be closed during construction for an extended period, potentially resulting in pedestrian and cycling infrastructure gaps; and • Safety concerns when using pedestrian and cycling infrastructure such as bike lanes and sidewalks due to reduced lanes and parked construction equipment.	Determine if cycling infrastructure is safe to use during construction. If it is considered potentially unsafe, that facilities will be temporarily closed and cyclists will be re-routed, where possible, until the infrastructure is safe to use	N/A
During Operation			
Traffic	• Changes to intersection traffic capacity during operation	Consider signal timing changes along Ellesmere Road from Morningside Avenue to Kingston Road, and along Kingston Road from Ellesmere Road to Raspberry Road: • Longer traffic signal cycle length; • Protected/permissive northbound and southbound left turn phases; and • Adaptive signal timing.	On-going monitoring of traffic flow and adjustments to signal timing accordingly as necessary.

4.2 Natural Environment

4.2.1 Methodology

Although impacts to the natural heritage features within the DSBRT study corridor have been avoided/minimized to the extent possible (since the BRT lanes and platforms/stops are generally in the median and curbside), some impacts are unavoidable in order to meet Metrolinx design standards and to accommodate the proposed widening and geometry associated with the DSBRT.

The environmental effects/impacts of the undertaking and the proposed environmental protection/mitigation measures are described separately for each natural heritage discipline under the following three categories and, as much as possible, are further separated for each municipality within the Study Area:

- Footprint Impacts – long-term/permanent impacts on the existing natural heritage features that will potentially be disturbed or displaced;
- Construction Impacts – potential short-term/temporary disruption effects on the existing natural heritage features resulting from construction activities; and,
- Operations Impacts – potential long-term disruption effects on the existing natural heritage features resulting from on-going operations and maintenance.

4.2.2 Watercourses and Hydrological Features

4.2.2.1 Footprint Impacts and Mitigation

A comprehensive assessment of the impacts of the DSBRT corridor on existing drainage patterns (storm and surface drainage) has taken place and will continue during the detail design phase. As a result of the introduction of new impervious areas, volumes of runoff and local peak flows will likely increase. There may also be water quality impacts in the form of increased erosion and contaminant (e.g., oils, road salt) input. A preliminary drainage and stormwater management plan has been prepared to address these potential impacts and will be updated as necessary during detail design in consultation with regulatory agencies. (including TRCA/CLOCA). The proposed drainage/stormwater management measures are discussed in detail in **Section 4.7**. Where feasible, the plan for the management of stormwater will adhere to the TRCA's The Living City Policies (TRCA 2014), at least within the TRCA's jurisdiction. Low impact development (LID) measures will be incorporated to the extent possible where stormwater management is required along the DSBRT to achieve stormwater management as per TRCA and CLOCA stormwater management criteria. Runoff generated by the new DSBRT lanes will be collected and treated using approved stormwater management practices employing a treatment-train approach including source, conveyance and end-of-pipe measures, where feasible. The stormwater management plan will minimize impacts and provide mitigation measures to ensure that

no negative impacts to the hydrological and ecological function of the receiving watercourses/ features will result from the project.

A total of 24 watercourses (with 25 crossings) cross the DSBRT corridor within 10 watersheds. Six of the watersheds are under TRCA's jurisdiction, and four of the watersheds are under CLOCA's jurisdiction. All watercourses are shown on **Appendix C** (Figures NER-1a to NER-1i).

Canadian Navigable Waters Act

All works on unscheduled waterways that were not opted-out are to be treated as 'legacy' works and must therefore be considered the same as any work on a scheduled waterway. An application must always be submitted for works proposed at these waterways and approval must be received prior to undertaking any activities. As a result, prior to the commencement of any work and during the detail design phase, for all proposed works on the waterways within the Study Area, the proponent will be required to either submit a voluntary application and receive an Approval document or undertake the owner-led Public Resolution Process with no Transport Canada involvement. During detail design, the proponent will make a determination regarding how to proceed and consultation with Transport Canada will take place as required. CNWA provisions will also be reviewed during the detail design phase and the proponent will be required to adhere to the current legislation and obtain/submit any required permits/approvals under the CNWA prior to construction, if required.

4.2.2.2 Construction Impacts and Mitigation

Impacts to watercourses and hydrologic features are most likely to occur during the construction phase of the DSBRT due to the exposure of soils from grading and vegetation removals, drainage improvements, culvert/structure modifications, excavations, stockpiling, vehicle refueling and maintenance and other construction-related activities.

Erosion and Sedimentation Control

An Erosion and Sediment Control Plan (including an erosion monitoring and sediment report program) will be developed during detail design prior to construction including measures to monitor and maintain erosion and sediment control during construction to ensure their effectiveness.

Additional general environmental protection measures that will be employed to reduce the potential effects on watercourses/hydrologic features (see **TABLE 4.5**).

These environmental protection measures will greatly reduce the potential for soil erosion and impairment of surface water quality.

Best Management/Construction Practices

There is also the potential for impacts to water quality from spills or other materials/equipment entering the water during construction. Implementation of best

management practices during construction will reduce the potential for spills or other materials/equipment from entering the water. The measures that will be employed are set out in **TABLE 4.5**.

Stormwater Management

A preliminary drainage and stormwater management plan has been prepared to ensure construction and post-construction conditions maintain flow to downstream habitats, maintain existing water temperatures and ensure water quality and quantity is not impaired. The drainage and stormwater management plan will be updated as necessary during detail design in consultation with regulatory agencies (including TRCA/CLOCA). The proposed drainage/stormwater management measures are discussed in detail in **Section 4.7**. Where feasible, the plan for the management of stormwater will adhere to the TRCA's The Living City Policies (TRCA 2014), at least within the TRCA's jurisdiction. Low impact development (LID) measures will be incorporated to the extent possible where stormwater management is required along the DSBRT to achieve stormwater management as per TRCA and CLOCA stormwater management criteria. Some of the general mitigation measures are set out in **TABLE 4.5**.

4.2.2.3 Operations Impacts and Mitigation

The potential impacts to the watercourses and hydrologic features from the operation of the DSBRT are generally limited to water quality alterations due to roadway contaminants, mainly salt application in winter. Mitigation for effects on water quality during operation of the DSBRT are included in **Section 4.7**. For road salt, mitigation will follow Environment Canada's *Code of Practice for the Environmental Management of Road Salts* (2004) as well as the *Five-year Review of Progress: Code of Practice for the Environmental Management of Road Salts* (2012).

4.2.3 Aquatic Environment

4.2.3.1 Footprint Impacts and Mitigation

A total of 24 watercourses (with 25 crossings total) cross the DSBRT corridor within 10 watersheds. All watercourses are shown on **Appendix C** (Figures NER-1a to NER-1i). All 24 watercourses support fish habitat. Impacts to the aquatic environment (fish and fish habitat) have been minimized to the extent possible by design refinements. However, work that could potentially affect the aquatic environment is proposed at 14 of the watercourse crossings (note that works at Crossings 7-9 and 11 are being designed by others and are not within the scope of the DSBRT project). Direct or indirect effects on these watercourses/the aquatic environment can result from culvert/bridge extensions/widenings, wingwall/headwall construction, channel/ditch realignment, riparian vegetation clearing, modifications to drainage due to increase in impermeable surfaces and the addition of stormwater management features.

The footprint of the DSBRT corridor (and associated culvert/structure modifications) will result in a number of permanent changes to the aquatic environment at 14 watercourse crossings within the study limits, all of which constitute fish habitat (directly or indirectly).

However, through proper mitigation measures and careful planning, the impacts can be minimized to prevent negative effects to fish and fish habitat.

A summary of the watercourse crossings, existing culvert/structure conditions, proposed works, the impacts/net environmental effects of those works on the aquatic environment and site-specific mitigation at each watercourse (separated by municipality) is provided in **TABLE 4.2**.

Effects to aquatic habitat from the DSBRT corridor will mainly involve the alteration of habitat through enclosure within/under culverts/bridges, almost exclusively due to extensions of existing culverts and bridge widenings/replacements. There may also be affects due to channel realignments (Crossing 15), the construction of retaining walls (Crossing 5) and extensions of in-water bridge piers (Crossing 12). The area of aquatic habitat that may potentially be altered through the proposed works at watercourse crossings was calculated using the channel widths and proposed lengths of disturbance. This information is presented in **TABLE 4.2.**

Effects on aquatic habitat vary by watercourse as there are different types of habitat present within the Study Area. Indirect fish habitat is that in which fish are not present, but the habitat contributes to downstream direct habitat. Direct fish habitat is habitat in which fish directly occupy. The works at Crossings 3, 7-9, 15 and 20 will affect indirect fish habitat and at 7 and 8 there is also potential direct fish habitat downstream of the crossings. The works at Crossings 5-6, 10, 12-14, 16-18 19, 20, 21 and 23 will affect direct fish habitat. Bridge ‘enclosures’, the area of aquatic habitat that is present under the widened portion of bridges, will affect Crossings 12, 18 and 23 (Bond Street bridge). This type of effect does not have a direct impact on fish habitat other than increased shading and potential loss of riparian vegetation; the actual physical habitat of the channel will not change. The exception to this is at Crossing 12 where there is a bridge pier in the water that will need to be extended to accommodate the bridge widening. At eight crossings (1, 2, 4, 6, 13, 14a, 22 and 23 King Street bridge), no in-water work is proposed and no effects to the aquatic habitat are expected to occur. This has ensured the avoidance of impacts to the aquatic environment at some of the larger watercourses in the Study Area including Highland Creek (Crossing 1), the Rouge River (Crossing 4), and Oshawa Creek (Crossing 23 – King Street Bridge).

Fish and wildlife friendly culvert and bridge design will continue to be considered as part of this project during the detail design phase, where feasible. No new barriers to fish passage will be created from works associated with this project and a fish passage analysis will be conducted during detail design for existing and proposed conditions at all crossings where direct fish habitat is present or potentially present. An analysis of existing and proposed fish passage for jumping and non-jumping fish will be completed at all watercourses that constitute direct (or potential direct) fish habitat. Opportunities to improve fish passage via culvert works will be considered further during the detail design phase, where feasible. DSBRT structure/culvert modifications have been designed to maintain and promote wildlife passage across the landscape. These culvert designs will be revisited during detail design in accordance with TRCA’s crossing guidelines to ensure fish and wildlife passage (TRCA 2015). Where sheet flow occurs in

culverts, the installation of flow deflectors can help deepen flows and capture sediment to form low flow channels that can pass fish. At Crossing 19 (Pringle Creek), there are baffles secured to the concrete bottom of the culvert currently. There is also a concrete "ramp" at the upstream end of the culvert over which water spills as an extremely shallow sheet which forms a barrier during low flow conditions. Eliminating this ramp would be beneficial to restoring fish passage within this watercourse.

General mitigation of effects to the aquatic environment resulting from increased impervious surface area and potential temperature increases are discussed in **Section 4.7**. For mitigation regarding direct effects on the aquatic environment, measures to be taken (to be reviewed during the detail design phase) generally include minimizing the design to keep necessary bridge widenings and culvert extensions as short as possible, employing retaining walls to reduce encroachment into riparian areas and confining work to as small an area as possible.

Consultation with DFO during detail design will be necessary to determine whether harmful alteration, disruption or destruction (HADD) of fish habitat will occur at locations where works are proposed below the high water line (i.e., within the bank, full width of the channel) in fish habitat. Currently, this consultation consists of the preparation and submission of request for review forms and subsequent consultation with DFO biologists. This process is used to determine next steps which could include proceeding with the works under a letter of advice or the application for an authorization under the *Fisheries Act*. Requests for review forms should be submitted to DFO for all crossings where culvert or bridge works are proposed (all crossings except Crossings 1, 2, 4 and 22). A *Fisheries Act* Authorization will be secured during detail design, if required. Fish Collector's permits for salvage will also be obtained during the detail design phase as required.

TABLE 4.2. SUMMARY OF WATERCOURSE CROSSINGS, EXISTING CULVERT/STRUCTURE CONDITIONS, PROPOSED IN-STREAM WORK, IMPACTS/NET ENVIRONMENTAL EFFECTS AND SITE-SPECIFIC MITIGATION

Municipality	Crossing # Watercourse Name	Existing Culvert/Structure Conditions	Proposed Works	Impacts/Net Environmental Effects	Site-Specific Mitigation
City of Toronto	1: Highland Creek	Three span bridge 76.8 m, 29 m long	No in-water work proposed	No impacts within channel	None required
	2: Tributary of Highland Creek	2210 mm diameter pipe arch culvert, 36 m long	No in-water work proposed	No impacts within channel	None required
	3: Centennial Creek	Ditch inlet to 2500 mm diameter circular concrete pipe (trunk sewer inlet), 78 m long	Extend trunk sewer and relocate inlet by 6 m	3 m^2 of warmwater, indirect fish habitat	• Works to be conducted within the warmwater timing window (July 15-March 31) to avoid impacts to the spawning, nursery and migratory periods of local fish populations (applicability and dates to be confirmed with appropriate provincial and federal agencies during detail design); • Work will be done “in-the-dry”; and • Vegetation removals require replacement.
	4: Rouge River	Six span bridge 221 m, 23 m long	No in-water work proposed	No impacts within channel	None required
City of Pickering	5: Petticoat Creek	2450x6150 mm concrete box culvert, 43 m long	Extend by 7.95 m on each end	19.9 m^2 upstream and 15.9 m^2 downstream (35.8 m2) of warmwater, direct fish habitat Potential effects of retaining wall on tributary parallel to north road slope	• Works to be conducted within the warmwater timing window (July 15-March 31) to avoid impacts to the spawning, nursery and migratory periods of local fish populations (applicability and dates to be confirmed with appropriate provincial and federal agencies during detail design); • Work will be done “in-the-dry”; and • Vegetation removals require replacement.
	6: Tributary of Petticoat Creek	2400x2400 mm concrete box culvert, 86 m long	No in-water work proposed	No impact within channel	None required
	7: Amberlea Creek	1820x1820 mm concrete box culvert, 45 m long	Designed by others, not in DSBRT project scope	N/A	N/A
	8: Tributary of Amberlea Creek	1520x2440 mm concrete box culvert, 51 m long	Designed by others, not in DSBRT project scope	N/A	N/A
	9: Tributary of Amberlea Creek	1200x1200 mm concrete box culvert, 58 m long	Designed by others, not in DSBRT project scope	N/A	N/A
	10: Dunbarton Creek	1800x3000 mm concrete box culvert, 57 m long	Extend by 30 m at upstream end and connect to existing CSP culvert under CN Rail	60 m^2 of warmwater, direct fish habitat	• Works to be conducted within the warmwater timing window (July 15-March 31) to avoid impacts to the spawning, nursery and migratory periods of local fish populations (applicability and dates to be confirmed with appropriate provincial and federal agencies during detail design); • Work will be done “in-the-dry”; and • Vegetation removals require replacement.
	11: Pine Creek	2620x6100 mm concrete box culvert, 42 m long	Designed by others, not in DSBRT project scope	N/A	N/A
Town of Ajax	12: West Duffins Creek	Three-span bridge 64 m, 22 m long	Widen by 7.2 m downstream	100.8 m^2 of new ‘enclosure’ of coldwater, direct fish habitat 7.65 m^2 of coldwater direct fish habitat removed for extended bridge pier	• Works to be conducted within the Redside Dace timing window (July 1-September 15) to avoid impacts to the spawning, nursery and migratory periods of local fish populations (applicability and dates to be confirmed with appropriate provincial and federal agencies during detail design). • Work will be done “in-the-dry”. and • Vegetation removals require replacement.
	13: Duffins Creek	3000x12000 mm 2-cell box culvert, 58 m long	No in-water work proposed	No in-water work proposed	None required

Municipality	Crossing # Watercourse Name	Existing Culvert/Structure Conditions	Proposed Works	Impacts/Net Environmental Effects	Site-Specific Mitigation
	14: Carruthers Creek	1900x5500 mm concrete box culvert, 34 m long	Extend by 12 m at upstream end	66 m^2 of warmwater, direct fish habitat	• Works to be conducted within the warmwater timing window (July 15-March 31) to avoid impacts to the spawning, nursery and migratory periods of local fish populations (applicability and dates to be confirmed with appropriate provincial and federal agencies during detail design); • Work will be done "in-the-dry"; and • Vegetation removals require replacement.
	14a: Tributary of Lynde Creek	1280x1860 mm concrete box culvert, unknown length	No in-water work proposed	No impacts within channel	None required
Town of Whitby	15: Tributary of Lynde Creek	1500x1800 mm concrete box culvert, 53 m long	Extend by 10 m at both ends, and 300 m realignment in north ditch	20 m^2 of warmwater, indirect fish habitat (extensions) and 300 m^2 of warmwater, indirect fish habitat from ditch realignment	• Works to be conducted within the warmwater timing window (July 15-March 31) to avoid impacts to the spawning, nursery and migratory periods of local fish populations (applicability and dates to be confirmed with appropriate provincial and federal agencies during detail design); • Work will be done "in-the-dry"; • Vegetation removals require replacement; and • Implement natural channel design into realignment channel to maintain, or enhance natural fluvial processes.
	16: Tributary of Lynde Creek	3500x12800 mm structural arch culvert, 28 m long	Extend by 7.8 m upstream and 5 m downstream	128 m^2 of coolwater direct fish habitat	• Works to be conducted within the coolwater timing window (June 15 – September 15) to avoid impacts to the spawning, nursery and migratory periods of local fish populations (applicability and dates to be confirmed with appropriate provincial and federal agencies during detail design); • Work will be done "in-the-dry"; and • Vegetation removals require replacement.
	17: Tributary of Lynde Creek	2000 mm diameter CSP culvert, 158 m long, storm trunk inlet	Extend by 10 m at upstream end	10 m^2 of warmwater, direct fish habitat	• Works to be conducted within the warmwater timing window (July 15-March 31) to avoid impacts to the spawning, nursery and migratory periods of local fish populations (applicability and dates to be confirmed with appropriate provincial and federal agencies during detail design); • Work will be done "in-the-dry"; and • Vegetation removals require replacement.
	18: Lynde Creek	19.2 m single span bridge, 19 m long	Widen the north side of the bridge by 8.9 m and the south side by 7.4 m	277 m^2 of 'enclosure' of coldwater, direct fish habitat	• Works to be conducted within the coldwater timing window (June 15 - September 15) or Redside Dace timing window if this species is found to occupy this habitat (July 1 – September 15); • Work will be done "in-the-dry"; and • Vegetation removals require replacement.
	19: Pringle Creek	2400x6100 mm concrete box and 2400x9600 2-cell concrete box culvert, 26 m long	Extend by 5.5 m upstream and 9.5 m downstream	62.5 m^2 of coolwater, direct fish habitat	• Works to be conducted within the coldwater (June 15 - September 15) timing window to avoid impacts to the spawning, nursery and migratory periods of local fish populations (applicability and dates to be confirmed with appropriate provincial and federal agencies during detail design); • Work will be done "in-the-dry"; and • Vegetation removals require replacement.
	20: Tributary of Corbett Creek	1800x1250 mm concrete box, 40 m long	Extend by 7.5 m at upstream end	37.5 m^2 of likely warmwater, direct fish habitat	• Works to follow the warmwater timing window (July 15 – September 15) to avoid impacts to the spawning, nursery and migratory periods of local fish populations (applicability and dates to be confirmed with appropriate provincial and federal agencies during detail design); • Work will be done "in-the-dry"; and

Municipality	Crossing # Watercourse Name	Existing Culvert/Structure Conditions	Proposed Works	Impacts/Net Environmental Effects	Site-Specific Mitigation
					• Vegetation removals require replacement.
City of Oshawa	21: Corbett Creek	1900x2500 mm CSPA and 2300 mm diameter CSP culverts, 48 m long	Extend culverts by 12 m at downstream end	24 m^2 of warmwater, direct fish habitat	• Works to be conducted within the warmwater (July 15 - March 31) timing window to avoid impacts to the spawning, nursery and migratory periods of local fish populations (applicability and dates to be confirmed with appropriate provincial and federal agencies during detail design); • Work will be done “in-the-dry”; and • Vegetation removals require replacement.
	22: Goodman Creek	2150x3800 mm concrete box culvert, 58 m long	No in-water work proposed	No impacts within channel	None required
	23: Oshawa Creek (King Street)	3.7x17.6 m arch bridge, 17 m long	Like for like replacement	No permanent impacts to channel	• Works to be conducted within the coldwater timing window (June 15-September 15); • Work will be done “in-the-dry”; and • Vegetation removals require replacement.
	23: Oshawa Creek (Bond Street)	Two span bridge 2.9x16.3 m, 20 m long	Replace with a 17 m single span bridge, 17 m long	6.3 m^2 ‘enclosure’ of coldwater, direct fish habitat	• Works to be conducted within the coldwater timing window (June 15-September 15); • Work will be done “in-the-dry”; and • Vegetation removals require replacement.

4.2.3.2 Construction Impacts and Mitigation

Construction impacts to the aquatic environment (fish and fish habitat) include the temporary disruption of site-specific habitat, changes to water quality and quantity including temporary disruption of flows, increased water temperatures, erosion and sediment inputs to the watercourses, changes to floodplain and riparian vegetation, barriers to fish passage and potential impacts to aquatic SAR.

In addition to the mitigation associated with watercourses/hydrological features presented above, the following mitigation measures will be employed to avoid/minimize impacts to the aquatic environment during construction. Additional site-specific mitigation may be necessary to mitigate impacts to the aquatic environment. The potential need for additional site-specific mitigation will be investigated during detail design through consultation with permitting agencies (e.g., TRCA, CLOCA, DFO, and MECP).

In-Water Works

Where feasible, structures will be constructed outside of the watercourse banks, eliminating the need for in-water works. However, at many of the crossings, in-water work may be necessary. At all locations where in-water work is proposed, cofferdams will be used to isolate the work area from the watercourse to enable work to be done in-the-dry (OPSS 517 Construction Specification for Dewatering). Flow will be maintained through either damming and pumping or fluming. If possible, work will be done during the driest part of the year when the lowest flows are present. This will minimize disturbance to fish habitat at the site and downstream. To further reduce the potential for serious harm, the following environmental protection measures will be implemented: Native species varieties will be considered during detail design over horticultural varieties in particular within/adjacent to natural features/areas.

- Construction will be staged such that both water flow and traffic flow can be maintained;
- All works will be performed in-the-dry by using temporary flow bypass systems and cofferdams to isolate the work areas;
- No in-water work (or work on watercourse banks) will be permitted from April 1 to June 30 to protect spawning warmwater fish, incubating eggs and fry emergence and migratory periods of local fish populations, and from September 16 to June 30 (July 14 where Smallmouth Bass are present) to protect coldwater fish spawning, egg incubation and fry emergence and migratory periods of local fish populations (and September 16 to June 30) to protect Redside Dace). Construction timing window applicability and dates will be confirmed with appropriate provincial and federal agencies during detail design. Dewatering designs will be completed following TRCA's Draft guidelines for dewatering (TRCA 2013) to ensure no negative impacts occur during throughout the working-in-the-dry process;

- Where cofferdams are to be employed, dewatering effluent will be treated prior to discharge to receiving watercourses (OPSS 517);
- Cofferdams will be constructed using pea gravel bags, sheet piling or other appropriate material to isolate the work area, and flow will be maintained at all stations; and,
- Only clean material free of particulate matter will be placed in the watercourse (OPSS 1005 Streambed Material).

Fish isolated by construction activities (if present) will be captured by a qualified fisheries specialist and safely released to the watercourse (OPSS 182 General Specification for Environmental Protection for Construction In and Around Waterbodies and on Waterbody Banks). In addition, any proposed dewatering extraction and discharge must not negatively impact fish habitat and must be completed using TRCA's Technical Guidelines for the Development of Environmental Management Plans for Dewatering (TRCA 2013).

Best Management/Construction Practices

Best management/construction practices will be employed during construction to control erosion and sediment and reduce the potential for spills or other materials/equipment from entering the water and impacting the aquatic environment. Also, best management practices will be implemented to inform, avoid and mitigate impacts throughout the Study Area, including within regulated areas, designated natural areas, federal lands, etc., and to control non-native and invasive plant species that become established, as well as prevent the establishment of new non-native and invasive plant species.

Erosion and Sedimentation Control

Effective erosion and sedimentation control will be achieved throughout the project with careful planning and design, stringent construction supervision, monitoring of the site, and maintenance of control works throughout the operational life, as set out in **TABLE 4.5**.

Maintenance of Riparian Vegetation/Restoration and/or Enhancement of Aquatic Habitat

Maintaining riparian vegetation to the extent possible will help to stabilize the watercourse banks, provide shading/cover for the watercourse, filter contaminants, and improve wildlife habitat and aesthetics. The proponent will be responsible for vegetation management as set out in **TABLE 4.5**.

Stormwater Management

Section 4.2.2.2 discusses some general mitigation measures to manage stormwater which will help avoid/minimize impacts to the aquatic environment. Further details are provided in **Section 4.7**.

4.2.3.3 Operations Impacts and Mitigation

The potential impacts to the aquatic environment (fish and fish habitat) from the operation of the DSBRT are generally limited to water quality alterations due to roadway contaminants, mainly salt application in winter and hot asphalt during summer. Mitigation for effects on water quality are included in **Section 4.7** and in **Section 4.2.2.3** above.

4.2.4 Terrestrial Environment

4.2.4.1 Footprint Impacts and Mitigation

Displacement of/Disturbance to Vegetation and Vegetation Communities

Displacement of/disturbance to vegetation and vegetation communities has been avoided/ minimized to the extent possible. However, some impacts to vegetation/ vegetation communities are unavoidable in order to meet Metrolinx design standards and to accommodate the proposed widening and geometry associated with the DSBRT. The loss of vegetation and vegetation communities has been broken down into impacts within each of the five associated municipalities located within the Study Area. Overall, there will be a loss of 44.61 ha of vegetation communities (including anthropogenically influenced lands such as agricultural, manicured and disturbed land and hedgerows), resulting in impacts to terrestrial and wetland communities with the removal of 0.14 ha of forest communities and 0.92 ha of wetland communities. The majority of the impacts will be to anthropogenically influenced lands with the loss of 32.09 ha and to cultural vegetation communities with the loss of 11.46 ha. All of the vegetation communities identified within the Study Area are considered to be widespread and common in Ontario and secure globally. No vulnerable community type was identified during botanical surveys.

TABLE 4.3 provides a summary of the vegetation removals due to the preferred design alternative/DSBRT footprint, which are broken down into impacts within each of the five municipalities within the Study Area. A more detailed discussion of impacts within each municipality is provided in **Appendix C** (Section 5fi)**.** The natural areas/ELC vegetation communities and the DSBRT grading limits/footprint are presented in **Appendix C** (Figures NER-1a to NER-1i)**.** Impacts to significant natural heritage features (including designated natural areas, plan policy areas and TRCA/CLOCA regulation areas) along with the proposed environmental protection/mitigation measures are presented in **Section 4.2.8**.

TABLE 4.3 SUMMARY OF VEGETATION REMOVALS WITHIN THE DSBRT GRADING LIMITS/FOOTPRINT

Vegetation Impacts within Municipalities	Total Area to be Impacted (Ha)
City of Toronto	***13.82ha***
Cultural Communities (CUM1-1a, CUM1-1a/CUT1a and CUM1-1b/CUT1b, CUT1b and c, CUM1-1a/CUW1a to CUM1-1c/CUW1c, CUM1-1a/M, CUM1-1c/D, CUP1, CUP1-8a, CUP3-2b, and CUW1c)	2.51

Vegetation Impacts within Municipalities	Total Area to be Impacted (Ha)
Forest Communities (FOD5-1b, FOM2a)	0.04
Anthropogenically Influenced Lands (Manicured and Hedgerows)	8.97
City of Pickering	***1 13.82ha***
Cultural Communities (CUM1-1/CUT1 and CUM1-1c/CUT1-1c, CUM1-1a, b, f, and g, CUM1-1e/CUW1e and CUM1-1f/CUW1f, CUM1-1f/M, CUP1-3, CUW1e to j)	2.90
Wetland Communities (MAS2-1/SWT2-2, SWT2-2 and SWD3-4b)	0.25
Anthropogenically Influenced Lands (Manicured, Disturbed and Hedgerows)	10.67
Town of Ajax	***7.30ha***
Cultural Communities (CUM1-1a and h to k, CUM1-1k/M, CUT1b/CUW1b, CUW1k, l and n)	2.54
Wetland Communities (MAS2-c and SWD4)	0.07
Forest Communities (FOD5b)	0.053
Anthropogenically Influenced Lands (Agricultural, Manicured and Disturbed)	4.64
Town of Whitby	***9.39 ha***
Cultural Communities (CUM1-1k to n, CUM1-1m/D and CUM1-1o/D, CUM1-1g/CUW1g, CUW1o, and q to t)	3.32
Wetland Communities (MAS2d and e, MAS2-1d and e, MAM2-2/MAS2, SWD3a and c)	0.58
Forest Communities (FOD5c)	0.05
Anthropogenically Influenced Lands (Agricultural, Manicured, Disturbed and Hedgerows)	5.44
City of Oshawa	***2.58 ha***
Cultural Communities (CUM1-1p, CUT1c, CUW1u to w)	0.19
Wetland Communities (SWD3-4c)	0.02
Anthropogenically Influenced Lands (Manicured and Disturbed)	2.37
Total Vegetation Impacts for the Study Area	***44.61 ha***

Removal of Wetland and Forest Communities, Compensation and Planting Plans

As part of the evaluation of mitigation and compensation associated with vegetation community impacts, a high-level review of respective environmental policy guidelines/documents was undertaken to highlight compliance requirements. These documents include:

- Metrolinx Vegetation Guideline (Metrolinx 2020);
- Guideline for Determining Ecosystem Compensation (TRCA 2018);
- The Living City Policies for Planning and Development in the Watersheds of the Toronto and Region Conservation Authority (TRCA 2014);
- Rouge National Urban Park Management Plan (Parks Canada 2019); and,

- Upper and lower tier municipal tree protection by-laws including:
    - City of Toronto Tree Protection By-laws (Trees on City Streets, City of Toronto Municipal Code Chapter 813, Article II; Private Tree By-law, City of Toronto Municipal Code Chapter 813, Article III; Ravine and Natural Feature Protection By-law, City of Toronto Municipal Code Chapter 658; Parks By-law, City of Toronto Municipal Code Chapter 608, Article VII), City of Pickering Tree Protection By-laws (City of Pickering Tree Protection By-Law 6108/03; City of Pickering Boulevard Maintenance By-law 6831/08), Town of Ajax Tree Protection By-laws (Tree Protection By-Law 137-2006; Boulevard Tree Protection By-Law 138-2006), Town of Whitby Tree Protection By-laws (Town of Whitby By-law: Tree Protection By-Law 4640-00; Town of Whitby Property and Boulevard Maintenance By-law 6937-15), City of Oshawa Tree Protection By-laws (City of Oshawa City Trees By-Law 78-2008; City of Oshawa Boulevard By-law 136-2006), and the Region of Durham Tree Protection By-law (The Regional Municipality of Durham Regional Woodland By-Law 30-2020).

The Metrolinx Vegetation Guideline (Metrolinx 2020) recognizes TRCA's Guideline for Determining Ecosystem Compensation (2018) (herein referred as the TRCA ecosystem compensation protocol) and the approach for replacing natural features lost through development and/or infrastructure where impacts cannot be avoided. Two main approaches outlined in the TRCA ecosystem compensation protocol include replicating ecosystem structure and replicating the land base. However, the Metrolinx Vegetation Guideline notes that '*replicating the land base* [approach that] *involves securing or acquiring land, ...will not be done as part of Metrolinx's approach to vegetation compensation*, thus *no funds will be diverted towards the acquisition of property'* (Sections 3.1.3 and 3.2.3.3, Metrolinx 2020). The Metrolinx Vegetation Guideline recommends a landscape science-based approach for vegetation compensation that reflects the basic principles of the TRCA ecosystem compensation protocol, in addition to following the requirements of applicable by-laws and regulations, with baseline compensation that includes a 1:1 replacement ratio (Metrolinx 2020) (also see **Section 4.4.3** and **Appendix D**). It is acknowledged by TRCA that the full land base requirements as determined by their *'Guideline for a feature lost to infrastructure may not be achievable given that municipalities typically own ROW lands sized only to accommodate the infrastructure itself with little surplus land remaining. In these cases, the land area removed from the natural system from all infrastructure projects can be tracked by TRCA and the municipality and compiled together so that cumulative losses to the land base of the natural system can be quantified'. (TRCA 2018).*

Numerous principles and standards for the above referenced environmental policy documents overlap, and the foremost that overlap are presented below.

- Avoidance of the natural system is the priority but, where this is not possible, impacts will be minimized to the extent possible including impacts associated with access, construction, operations and maintenance;

- Compensation is recommended when avoidance of the natural system is not possible;
- An environmental monitoring and contingency plan will be prepared where infrastructure is permitted within valley or stream corridors, wetlands, woodlands, and/or hazardous lands or sites (to address potential emergencies during construction);
- Compensation through ecological restoration such as the creation or enhancement of habitat will be undertaken, planning of which will be carried out early in the detail design phase to maximize options for restoration to the natural system;
- Compensation will be based on habitat type (ELC) impacted, size or area (ha) of impact, and its function;
- Where the creation of habitat is identified, it will be located outside of the identified natural system from where impacts occur and connected to or contiguous with this system, to the extent possible;
- Compensation of habitat is preferred as close to the original location and within the same watershed, to the extent possible;
- Compensation will serve to improve the size, connectivity, and shape of the local ecosystem and the larger natural heritage system, which will include expanding woodlots, hedgerows, wetlands and meadows to buffer and connect important natural features;
- Compensation may have specific requirements that need to be incorporated in the design and implementation of works (i.e., use by particular species, transplanting plant material (where feasible), invasive species management, promoting biodiversity, maintaining or restoring Carolinian vegetation communities, etc.);
- Replacement of trees at a ratio representative of their ecosystem function and service, as determined by the individual tree approach, where access to contiguous habitat outside of the ROW excludes determining mean basal area for a feature; and,
- Factors to be considered when establishing agreements for compensation include documenting baseline conditions and impacts, specific vegetation objectives or targets for both preferred and incompatible species (i.e., non-native and/or invasive/hazardous species), considerations for location, siting (i.e., topography, soil conditions, vegetation compatibility, compatibility with adjacent land uses, etc.) and timing, detailed planting plans, implementation monitoring and subsequent monitoring of planted material, etc.

Metrolinx/the proponent may consider cash-in-lieu for impacts associated with conservation authority or municipal lands, but funds will be used only for tree compensation as part of vegetation compensation to improve components of the natural heritage system adhering to restoration principles outlined, to the extent possible. Thus, cash-in-lieu for vegetation compensation through ecological restoration would be used for actual tree compensation for the purposes of creating or enhancing the natural heritage system for the benefit of either increasing contiguous habitat, providing buffering capacity, increasing habitat connectivity, etc. As previously noted, Metrolinx's approach to cash-in-lieu does not include monies for securing or acquiring land as part of vegetation compensation (Sections 3.1.3 and 3.2.3.3, Metrolinx 2020). Further investigation of this compensation measure in conjunction with Metrolinx/the proponent and respective regulatory agencies, will be required during detail design. Cash-in-lieu compensation must be submitted prior to permit issuance.

In the case of federally owned lands associated with the Rouge National Urban Park, where efforts to protect the natural system from impacts is not possible, the Rouge National Urban Park Management Plan (Parks Canada 2019) will guide planning and implementation, as required. Specifically, infrastructure proposals requiring land will demonstrate a net ecological gain prior to Parks Canada approvals and the removal of these lands. Parks Canada *will seek to embed design features and operational practices that maintain or restore ecological integrity in external plans, environmental assessments, and operations for infrastructure on non-park lands next to or traversing the park*. In anticipation of future infrastructure improvements, the *Rouge National Urban Park Act permits the transfer of a maximum of 200* [ha] *of park land to a federal or provincial authority, including the* [TRCA], *or to a municipal authority, if the disposal is required for the purposes of the installation or maintenance of public infrastructure, including public utilities or transportation corridors.* The proponent will identify and mitigate any cumulative effects resulting from the DSBRT project during detail design. **Section 4.2.8.1** discusses in more detail the very minor anticipated impacts to the Rouge National Urban Park (loss of 0.06 ha) as a result of the DSBRT preferred design alternative/DSBRT footprint.

Compliance with the above noted principles and standards is required to be applied to final vegetation community impact areas which may be refined during the detail design phase. During detail design, a further review of the environmental policy guidelines/documents, as well as agency consultation (with TRCA, CLOCA, MECP, MNDMNRF, Parks Canada, etc.), will be undertaken to ensure compliance and agreement, while working towards successful project completion.

All works will be undertaken in accordance with the Ontario Regulation 166/06, TRCA's Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses.

Compensation and mitigation measures associated with vegetation impacts, outlined in the following sections, reflects the policies and standards of those environmental policy guidelines/documents listed above. A further, detailed review to ensure compensation and mitigation compliance will be undertaken during detail design.

Vegetation Community Offsets/Compensation

Terrestrial and wetland impacts associated with the DSBRT corridor will result in the removal of 0.14 ha of forest and 0.92 ha of wetland. During the detail design phase, design refinements to further minimize impacts to forest and wetland communities will be undertaken, to the extent possible. At that time, a summary of vegetation removals within each watershed will be provided if required for compensation purposes. Tree protection hoarding plans must also be submitted and approved prior to any permit issuance. The removal of wetland and forest communities will be offset/compensated through restoration, through habitat creation and/or the enhancement of nearby vegetation communities, to the extent possible. Disturbed lands that are suitable for restoration post-construction, will be restored. Where suitable habitat to restore wetland is less than calculated removals, the restoration of forest habitat in lieu of wetland, will be considered in discussion with agency staff. Where lands are identified for forest and wetland offsetting, no fill placement will be undertaken and plantings will be installed into natural, good quality soils. If, during construction, additional forest or wetland habitat is impacted, additional offsetting will be undertaken. During detail design, and in compliance with relevant environmental policy (as noted above) discussion with municipal and agency staff (including TRCA, CLOCA, MECP, MNDMNRF and Parks Canada, as required) will be undertaken to identify suitable sites for offsetting to compensate for habitat loss as part of implementing the project.

Restoration of suitable forest and/or wetland habitat will be undertaken at a compensation ratio to be determined through further discussion with regulatory agencies (e.g., TRCA, CLOCA, MECP, MNDMNRF, Parks Canada, etc.), as part of implementing this project. Compensation will be undertaken following applicable Tree By-laws and Ecological Restoration with replacement at a 1:1 ratio on an individual tree basis (Metrolinx 2020), and will be in accordance with applicable environmental policies and the standards of respective agencies and municipalities. A preliminary calculation has been undertaken, the results of which are presented in **4.4.3** and **Appendix D**. Site suitability of lands where habitat restoration and/or enhancement could be undertaken, typically within or adjacent to the ROW, will consider the following:

- site conditions for specific habitat function (e.g., suitability for wetland creation/restoration where variable or prolonged flooding conditions are possible for wetland species, etc.);
- habitat for species protected under the Ontario ESA 2007, if confirmed that the DSBRT corridor will impact existing SAR habitat and where mitigation or a permit is required;
- ensuring that compensation occurs as close to the location of vegetation removals as possible and typically within the same watershed/sub-watershed;
- ensuring that compensation is prioritized on lands adjacent to existing forest to increase contiguous habitat;

- ensuring that restoration/enhancement is undertaken outside of existing natural features;
- ensuring provision of buffering capacity to protect existing vegetation communities;
- increasing species diversity;
- supporting/increasing habitat connectivity; and,
- improving habitat conditions to facilitate the movement of wildlife.

The City of Toronto requires replacement ratios by tree category as follows as per the City of Toronto By-laws:

- Private tree located on the Project Site: 3:1;
- Private tree located on property adjacent to the Project Site or on the boundary of the Project Site and adjacent property: 3:1;
- Park tree: 3:1;
- RNFP tree: healthy tree >10 cm: 3:1; healthy tree <10 cm: 1:1; poor condition tree: 1:1; tree injury: 1:1; hedge removal: 1 tree per 5 m of hedge removed; and,
- City tree: 3:1.

The City of Oshawa has noted that if compensation planting is completed on-site, it must be completed in consultation with both CLOCA and City of Oshawa Parks staff. The City of Oshawa noted that, if compensation planting is completed off-site, there can be no net loss of planting. Planting plans must be developed in consultation with both CLOCA and City of Oshawa Parks staff.

Compensation will be in accordance with applicable environmental policies and the standards of respective agencies and municipalities. A high-level summary of potential compensation options is provided below. However, during detail design, as noted above, environmental policies/guidelines will be reviewed in detail and agency consultation will continue to ensure compliance and agreement regarding compensation for habitat loss.

- Discussions with respective municipal and regulatory staff will be undertaken to determine if compensation for the DSBRT corridor can be tracked as part of cumulative losses with other infrastructure projects. In this regard, compensation may be explored through existing municipally owned lands and existing ecological restoration programs;
- Compensating for land loss of habitat on a 1:1 ratio within the same ecosystem, to the extent possible, while adhering to the baseline compensation of individual trees at a 1:1 ratio. Offsetting habitat loss will be on lands in close proximity to

removals and where feasible to extend contiguous habitat within natural heritage systems to maintain/extend connectivity. Calculating compensation must also take into account vegetation type using the Ecological Land Classification system; and

- Where compensation is undertaken, reporting components will include a description of impacted ecosystems, a description of any proposed compensation locations, a proposed work plan, detail design drawings, a construction phasing plan, monitoring plan, etc.

When suitable restoration sites cannot be identified, the option to provide cash-in-lieu will be discussed and will adhere to criteria set out in the respective environmental policy guideline documents listed above, as well as municipal by-laws. As noted above, cash-in-lieu for vegetation compensation through ecological restoration will only be used for actual tree compensation for the purposes of creating or enhancing the natural heritage system for the benefit of either increasing contiguous habitat, providing buffering capacity, increasing habitat connectivity, etc. Cash-in-lieu compensation must be submitted prior to permit issuance.

Impacts to wetland communities within the Study Area will be to small portions of meadow marsh, shallow marsh, thicket swamp and deciduous swamp habitat. These wetlands are typically located along several watercourses that bisect the Study Area or along low-lying areas adjacent to roads. These wetland vegetation communities provide valuable ecological functions such as flood mitigation, and habitat for more sensitive wildlife and plant species. It is expected that post-construction, new wetland areas will be created as a result of changes in drainage related to the construction of the DSBRT corridor, and this can, in part, mitigate for removals of similar wetland types. Additionally, edge management, which would include high-density plantings of robust, native wetland plant species, will be considered (see discussion below). Such plantings can mitigate impacts related to invasive species establishment/encroachment further into wetlands and can increase local diversity. Other mitigation measures include the removal of dumped garbage, and the treatment of invasive species such as common reed.

Impacts to forest communities within the Study Area (deciduous and mixed forest) will be to very small portions along existing forest edges, which are already in a disturbed state. However, forest edge management will be implemented to enhance edges, and to try to mitigate the establishment of invasive species along disturbed edges (see discussion below). It is recommended that restoration plantings not be undertaken in fill, but in areas with suitable soil conditions for sustained vegetation growth and health. Where these conditions cannot be met, soil amendments primarily incorporating/mixing suitable soils into the top 0.3 to 1.0 m of fill will be considered.

Where restoration is undertaken as part of compensation, the contractor will be required to provide a warranty on planted materials to ensure that the newly planted material survives and fulfils the intended function. A two-year warranty applies to planted

materials when part of a restoration plan for the City of Toronto. The spread of aggressive or non-native plant species will be appropriately managed.

Forest Edge Management

The removal of forest vegetation along existing forest edges or the removal of a portion of a forested feature that results in the exposure of a new forest edge will have several negative impacts along forest borders and potentially within the forest interior. Some of the direct and indirect impacts as a result of newly exposed edges include:

- exposure of the retained vegetation to the effects of increased light, wind, and sun which results in decreased soil moisture;
- exposure to salt spray;
- reduced establishment of shade tolerant plant species and an overall reduction in plant species richness and abundance;
- increased invasion/spread of aggressive non-native plant species;
- loss of native seedbank;
- decreased presence of interior habitat;
- exposure of “edge” trees to windthrow;
- changes in wildlife diversity and abundances;
- destabilization of landforms composed of unconsolidated material and/or soil compaction; and,
- changes to hydrology.

Forest edge management in accordance with the TRCA Forest Edge Management Plan Guidelines (2004) is recommended at impacted forest communities, including deciduous and mixed forests and deciduous and thicket swamps across the Study Area. Where new edges are exposed, forest management techniques will be implemented to mitigate the associated impacts to forest communities. As part of the forest edge management, mitigation measures will include, but not be limited to the following:

- Planting of appropriate native trees, shrubs and ground flora, which will be undertaken as soon as possible following vegetation removals. Plantings along the disturbed forest edges will provide a protective buffer to newly exposed forest edges which have become exposed to a greater potential for aggressive and invasive species infiltration further into the forest interior, alteration due to a greater incident of light penetrating further into the forest with potential for decreased soil moisture and increased windthrow. Plant species used within the buffer will be somewhat similar to those in the adjacent habitat and be non-invasive in nature;

- Woody stock will be planted at high densities along new edges to increase buffering capacity over time;
- Grading within areas where edges will be newly created will be designed to meet existing grades a minimum of 3 m away from the tree drip-line, to the extent possible;
- Compaction of soils on lands immediately adjacent to the newly exposed forest edge will be minimized to the extent possible. Construction activities can result in cut roots, and soil compaction due to re-grading and fill placement. Cut tree roots can reduce a tree's capacity to uptake and transfer water and nutrients, and soil compaction can result in a decrease in air spaces within the soil, which can reduce the infiltration capacity of the soil, limit soil oxygen and limit root penetration. Decompaction efforts and methodology will be site specific. Where decompaction is required, it will extend to a minimum depth of approximately 25 cm;
- Drainage patterns adjacent to newly created edges will be maintained to avoid changes in soil moisture, to the extent possible. This is especially important around wetland areas and forest communities with substrates that maintain increased moisture capacity;
- Suitable tree protection fencing will be installed and regularly maintained along any newly exposed forest edges;
- The spread/invasion of aggressive plant species must be immediately mitigated. The inclusion of filter fabric along all tree protection fencing to enhance protection from the spread of invasive, aggressive plant species, will be undertaken; and,
- The contractor will be required to provide a warranty on planted material to ensure that the newly planted material survives and fulfils the intended function. The spread of aggressive or non-native plant species will be appropriately managed.

Prior to construction during detail design, forest edge management will be considered for those communities where forest edge management is recommended.

Invasive Species Management

Efforts to control non-native and invasive plant species that become established, as well as prevent the establishment of new non-native and invasive plant species will follow the guidelines laid out in the report, and include items such as:

- Consideration of relevant regulations where feasible including the federal *Plant Protection Act* and *Seeds Act* and the provincial *Invasive Species Act* and *Weed Control Act;*
- Managing dense patches of common buckthorn, garlic mustard, Canada thistle, and Russian or Autumn olive;

- Consideration, where feasible, of the existing species composition, nature of the invasive species, potential impacts of spread, type of control available;
- Consider, where feasible, indirect and direct impacts and incorporate best management practices;
- Invasive species treatment may include several treatment applications over time;
- Herbicide treatments will be applied at the optimal time and be used in conjunction with cutting or mowing to also mitigate spread by seed;
- Minimize the exposure of bare soil and, plant with a non-invasive annual cover crop for an interim period, while preferred species become established; and
- Prohibit the use of non-native and invasive ornamental plants for landscaping.

Planting Plans

A detailed landscape planting plan (including landscape composition planting layout drawings) will be developed during the detail design phase prior to construction and once areas identified for restoration have been determined in consultation with the respective agencies and municipalities. Restoration plans and replanting plans (along with erosion control fencing plans) must be submitted prior to permit issuance. The planting of forest and wetland habitat must be undertaken with the appropriate native and non-invasive and locally appropriate plant species that will be presented on site-specific plans to be developed by an experienced landscape architect/ecologist. Local municipal arborists should be consulted regarding the planting plan to ensure the planting list consists of climate change resilient species. At a minimum, planting plans will show the following:

- Detailed maps of the planting locations along with the respective allocations;
- Description of the best management practices that are to be followed in the planting and tending of these sites for a minimum of five years following the initial planting stage;
- Limiting and controlling aggressive species;
- Select species suitable to expected conditions post-construction;
- Require appropriate warranties on planted materials; and
- Demonstrate a natural approach to compliment the character of the DSBRT, which is appropriate to the surrounding landscape.

General Environmental Protection/Mitigation Measures

The additional environmental protection/mitigation measures outlined below will be reviewed during detail design to minimize and mitigate footprint-related impacts associated with the construction of the DSBRT corridor. Measures included below are a

result of best industry practices and are based on a review of relevant policy guidelines/documents. During detail design, additional mitigation measures may be identified through a further review of policies and/or agency discussion.

- Efforts to minimize encroachment, displacement of, and disturbance to vegetation/vegetation communities will be undertaken, to the extent possible. Avoidance of wetlands and forest will be prioritized to the extent possible;
- Current Best Management Practices (BMPs) will be incorporated to inform, avoid and mitigate impacts throughout the Study Area, including within regulated areas, designated natural areas, federal lands, etc.;
- Maintain existing topography to the extent possible to minimize grade changes to adjacent natural areas;
- The placement of fill will not be permitted within hazardous lands, watercourses, wetlands and other areas to mitigate interference with the hydrological function of a wetland, or in areas where compensation planting may be undertaken to mitigate interference with the growth of planted tree and shrub stock;
- Impacts to natural habitat associated with the Rouge National Urban Park will demonstrate a net ecological gain. Discussion with Parks Canada staff prior to construction will be undertaken as necessary to discuss vegetation impacts of park lands and for approval. During detail design, further review of the Rouge National Urban Park Management Plan (2019) will be undertaken to ensure compliance with key strategies;
- If required, incorporate SAR planning into planting areas, to the extent possible;
- Monitoring of compensation planting areas will include contingencies to mitigate for plant mortality, species incompatibility with site conditions, invasive species presence, etc.;
- Plant removal and maintenance will comply with the requirements of the MBCA. Thus, disturbance, clearing or disruption (i.e., maintenance, etc.) of vegetation where birds may be nesting will be completed outside of the migratory bird nesting timing window of April 1 to August 31;
- Where mowing of vegetation is required, pollinator habitat will be considered, where feasible, by avoiding late summer mowing in areas with suitable pollinator plant species that may also negatively impact pollinator larvae on host plants, such as milkweed;
- Implement appropriate erosion and sediment controls and best management practices to mitigate construction impacts including the installation of a cover crop, erosion control blanket, etc.;

- Minimize encroachment into areas where vegetation is to be retained by installing suitable protective fencing;
- Flush cut tree stumps and minimize grubbing, to the extent possible;
- Explore opportunities to pre-stress shrubs and certain tree species along forest edges, by cutting to encourage suckering and minimize negative impacts to newly exposed edges, until such a time when these areas are stabilized with permanent plantings and preferred seed mixes post-construction;
- The application of a nurse crop with a preferred seed mix is recommended. Fast growing nurse crops provide temporary cover while the preferred seed mix becomes established, helping to suppress weeds. Suitable nurse crop species include Virginia wild rye (*Elymus virginicus*), Canada wild rye (*Elymus canadensis*), common oat (*Avena sativa*) and buckwheat (*Fagopyrum esculetnum*). Due to its potential to interfere with the establishment of preferred species, annual rye (*Lolium multiflorum*) is not recommended for use; and,
- Preferred seed mixes for restoration projects are outlined in the Metrolinx Vegetation Guideline (2020) with species' selection including native species in compliance with multiple conservation authority jurisdictions. These seed mixes were designed to be used in a variety of soil and moisture conditions. Plant species will also be native to the City of Toronto and Durham Region. Seed mixes will be applied at the specified rate of 22-25 kg/ha or adjusted as necessary to suit application method and site conditions.

4.2.4.2 Construction Impacts and Mitigation

The temporary displacement of and/or disturbance to vegetation and vegetation communities will occur as a result of the construction of the DSBRT corridor associated with grading, the construction work around bridges, and the extension/replacement of culverts, etc. In addition, the inadvertent spread of non-native invasive plants could take place during construction.

Vegetation impacts from construction may be associated with equipment operating in areas identified for protection. Therefore, areas designated for protection will be clearly shown on all construction plans and marked in the field using tree protection barriers in accordance with the Erosion and Sediment Control Guide for Urban Construction (TRCA 2019a) and OPSS 801 – Construction Specification for the Protection of Trees. The City of Toronto (Urban Forestry) Tree Protection Policy and Specifications for Construction Near Trees will also be followed. Tree protection hoarding plans must be submitted and approved prior to permit issuance. Efforts will be taken during construction to minimize impacts to existing forest and wetland vegetation communities located within the Study Area. Wherever possible, regionally rare species will be avoided. Where these plant species cannot be avoided, they will be salvaged through transplanting into nearby vegetation communities with suitable habitat characteristics that will afford ongoing protection, where feasible (see **Section 4.2.7.2** for more details

on rare plant species). Mitigation and monitoring measures to take place during construction will be further developed during the detail design phase.

Siltation of natural vegetation arising from soil erosion of exposed soils can arise if appropriate sediment control is not undertaken. An Erosion and Sedimentation Control Plan will be in place prior to the start of construction (see **Section 4.2.3.2** and **Section 4.3.3.2**) to address this issue.

Non-native invasive plants can establish in natural areas during construction displacing native plant species over time. The inadvertent spread of aggressive or non-native plant species will be appropriately managed. Efforts to control non-native species that have become established, as well as to prevent the establishment of new non-native plants, is important to maintain the health and diversity of natural ecological systems.

Riparian Habitat and Valleyland Management

The DSBRT corridor will cross numerous watercourses, and at these crossings, consideration will be given to providing an access management plan to avoid/minimize encroachment, to the extent possible. Also, vegetation along the banks of watercourses will be retained to the extent possible. Where such vegetation is identified for retention, filter fabric will be installed to delineate sections of vegetation to be retained to mitigate encroachment.

Riparian habitat will be retained at a minimum of 3 m to 5 m from the bank edge of any watercourse impacted during construction. This measure is expected to ensure bank stability, mitigate erosion, and mitigate negative impacts to aquatic habitat. Suitable tree protection fencing, and erosion control fencing will be installed and regularly maintained. Restoration/enhancement of riparian habitat will be undertaken during construction immediately following the completion of work in riparian zones. Suitable deep rooting graminoid, herbaceous and shrub species, with a variety of trees where suitable, will be installed to prevent streambank erosion and improve riparian conditions. Plant species selected will be native and/or non-invasive. Where feasible, disturbance to riparian areas will be avoided within 30 m of the watercourse, in particular within sensitive features or where sensitive aquatic species are present.

Where valleylands are impacted, the zone of construction impacts will be limited, and staging areas will be well outside of forested valleys. Suitable tree protection fencing and erosion control fencing will be installed and regularly maintained. Tree protection hoarding plans must be submitted and approved prior to permit issuance. Restoration of newly impacted edges will be undertaken, and methods for the enhancement of these areas will be carried out as outlined in **Section 4.2.4.1** (under forest edge management). Plant species selected will be native and/or non-invasive.

The contractor will be required to provide a warranty on planted materials to ensure that the newly planted material survives and fulfils the intended function. A two-year warranty applies to planted materials when part of a restoration plan for the City of Toronto. The spread of aggressive or non-native plant species will be appropriately managed.

General Environmental Protection/Mitigation Measures

During detail design, efforts will be made to minimize encroachment to vegetation communities/natural areas associated with access and staging during construction (as well as associated with operations and maintenance) to the extent possible. Avoidance of wetlands and forest will be prioritized to the extent possible. At a minimum, the following general construction best management practices and environmental protection/mitigation measures will be implemented during construction to minimize and mitigate construction-related impacts associated with the construction of the DSBRT corridor. Measures included below are a result of best industry practices and are based on a review of relevant policy guidelines/documents. During detail design, additional mitigation measures may be identified through a further review of policies/guidelines and/or agency discussion. Consideration will be given to erosion and sediment control measures outlined in the Erosion and Sediment Control Guide for Urban Construction (TRCA 2019a) and Silt Smart-Erosion and Sediment Control Effectiveness Monitoring and Rapid Response Protocol for Large Urban Development Sites (Credit Valley Conservation, MNDMNRF, MOE, DFO 2012). These include but will not be limited to the following:

- the inclusion of filter fabric along all tree protection fencing and edge management fencing to enhance protection from the spread of invasive, aggressive plant species;
- implement methods for the short-term stabilization of soils, including but not limited to, coir fibre or a suitable alternative, as required;
- utilize vegetation cover to protect any exposed surfaces and inhibit the establishment of invasive species in accordance with construction specific standards (i.e., OPSS 804 Construction Specification for Seed and Cover);
- topsoil from stockpiles will be in accordance with construction specific standards (i.e., OPSS 802 Construction Specification for Topsoil);
- old field seed mix and mulching or erosion control blanket, in accordance with construction specific standards, will be placed in areas of soil disturbance to provide adequate slope protection and long-term slope stabilization;
- tree protection will be in accordance with construction specifications (i.e., OPSS 801 Construction Specification for the Protection of Trees and the City of Toronto (Urban Forestry) Tree Protection Policy and Specifications for Construction Near Trees) to minimize impacts and ensure no construction activity will occur within the tree protection zone. **Section 4.4.4** (and **Appendix D)** outline in detail the environmental protection and mitigation measures proposed to protect trees identified to be retained;
- riparian and valleyland management of impacted edges will be undertaken, as required as per TRCA's Forest Edge Management Plan Guidelines (2004);

- ensure efforts are made to prevent the spread of invasive plant species during construction both on and off site. Sanitation of construction equipment will be undertaken in accordance with the Clean Equipment Protocol (2013) and at a minimum will include sanitation of construction vehicles and equipment prior to leaving and moving to the next site. A cleaning station will be set up, so vehicles and equipment can be inspected and cleaned regularly;
- An environmental monitoring and contingency plan in accordance with TRCA/CLOCA Standards may be required to address potential emergencies during construction where valley or stream corridors, wetlands, woodlands and/or hazardous lands are impacted;
- Any construction activities should mitigate damage to recent wetland restoration work undertaken in the valleylands north of Crossing 14 (Carruthers Creek) by the Town of Ajax, Region of Durham and TRCA, and manage the presence of invasive species; and,
- The valleylands south of Carruthers Creek (Crossing 14) have been identified as a priority restoration area in the Carruthers Creek Watershed Plan (Durham Region and TRCA 2020) (and will soon be transferred to public ownership). Post-construction restoration should be focused on this site and impacts should be minimized through appropriate controls.

4.2.4.3 Operations Impacts and Mitigation

Impacts to vegetation and vegetation communities are transient and primarily relate to footprint and construction impacts. It is expected that post-construction, new wetland areas will be created as a result of changes in drainage related to the construction of the DSBRT corridor, and that this, in part, mitigates for removals of similar wetland types. Where vegetation offsetting is determined and restoration of forest and/or wetland is additionally undertaken, maintenance associated with any prescribed restoration monitoring and maintenance of manicured areas during the operation and maintenance phase, including removal of dumped garbage, will be on-going.

Efforts to control non-native and invasive plant species that have become established, as well as prevent the establishment of new non-native and invasive plant species, at a minimum must be implemented (see **Section 4.2.4.1** and **Section 4.2.4.2).**

De-icing salts can have negative impacts on plants growing adjacent to the road ROW, with typical exposure within 10 m to 30 m from the pavement edge. Plant exposure is through root uptake or when seeds germinate during the next growing season. Tree and shrub above ground plant parts are also exposed to aerial salt deposition when de-icing salts are applied to roads, affecting both forest and landscape species. Salt stress in plants results in abnormalities by damaging root, leaf and shoot tissue. Salt stress results in reductions in water uptake and loss of photosynthetic capacity that reduce plant growth.

To mitigate the effects of salt spray, reduce its use in lieu of an alternate, less harmful substance and ensure planting must be undertaken with salt tolerant species that can withstand salt exposure where planting is undertaken close to the roadside, while planting less tolerant species further away from the roadside. Recommended salt tolerant tree and shrub species, both native and horticultural species, include but are not limited to:

- honey locust (*Gleditsia triacanthos*);
- Kentucky coffee-tree (*Gymnocladus dioicus*);
- Colorado spruce (*Picea pungens*);
- Austrian pine (*Picea nigra*);
- red oak (*Quercus rubra*);
- bur oak (*Quercus macrocarpa*);
- Japanese tree lilac (*Syringa reticulata*);
- paper birch (*Populus papyrifera*);
- white cedar (*Thuja occidentalis*);
- Red osier dogwood (*Cornus sericea*);
- common juniper (*Juniperus communis*);
- Staghorn sumac (*Rhus typhina*);
- shrubby cinquefoil (*Potentilla fruticosa*); and,
- elderberry (*Sambucus canadensis*).

Native species varieties will be considered during detail design over horticultural varieties in particular within/adjacent to natural features/areas. Several of the native species noted above would also serve to provide screening where planted in higher densities to aid in edge management (see **Section 4.2.4.1**), where newly exposed edges require protection.

4.2.5 Wildlife

4.2.5.1 Footprint Impacts and Mitigation

Displacement of/Disturbance to Wildlife and Wildlife Habitat

A discussion of the displacement of/disturbance to wildlife/wildlife habitat as a result of the preferred design alternative/DSBRT footprint is provided for each municipality below.

City of Toronto

Limited negative effects are anticipated within the City of Toronto as wildlife habitats identified within the Study Area consist almost entirely of previously modified/disturbed wildlife habitat with low habitat diversity and limited habitat potential. Efforts should be made to minimize impacts to habitats affected by the DSBRT corridor in the vicinity of the watercourses, the Highland Creek Swamp Life Science ANSI and the Highland Forest, Morningside Park Forest and Highland Creek West ESA (City of Toronto)/Morningside Park Forest ESA (TRCA). No extension of the road platform is proposed in the vicinity of the Rouge River/Little Rouge Creek valleyland which will maintain opportunity for wildlife movement through this feature.

City of Pickering

Limited negative effects are anticipated within the City of Pickering as wildlife habitats identified within the Study Area consist almost entirely of previously modified/disturbed wildlife habitat with low habitat diversity and limited habitat potential. Efforts should be made to minimize impacts to habitats affected by the DSBRT corridor in the vicinity of the watercourses and the Petticoat Creek Forest ESA. No extension of the road platform is proposed in the vicinity of the Rouge River/Little Rouge Creek valleyland (located at the westerly edge of the City of Pickering) which will maintain opportunity for wildlife movement through this feature.

Town of Ajax

Limited negative effects are anticipated within the Town of Ajax as wildlife habitats identified within the Study Area consist almost entirely of previously modified/disturbed wildlife habitat with low habitat diversity and limited habitat potential. Efforts should be made to minimize impacts to habitats affected by the DSBRT corridor in the valleylands/ natural areas associated with the watercourses and to maintain opportunity for wildlife movement in these areas.

Town of Whitby

Limited negative effects are anticipated within the Town of Whitby as wildlife habitats identified within the Study Area consist almost entirely of previously modified/disturbed wildlife habitat with low habitat diversity and limited habitat potential. Efforts should be made to minimize impacts to habitats affected by the DSBRT corridor associated with the Tributaries of Lynde Creek, Pringle Creek, and the Tributary of Corbett Creek and the Lynde Creek Coastal Wetland Complex PSW, as well as to impacts within the associated NHS in order to maintain opportunity for wildlife movement through these features.

City of Oshawa

Limited negative effects are anticipated in the City of Oshawa as wildlife habitats identified within the Study Area consist almost entirely of previously modified/disturbed wildlife habitat with low habitat diversity and limited habitat potential. Efforts should be made to minimize impacts to habitats affected by the DSBRT corridor associated with Corbett Creek, Goodman Creek and Oshawa Creek valleylands and the low sensitivity ESA, Corbett Creek Valley ESA, and Oshawa Goodman Creek valleylands and the associated NHS, to maintain opportunity for wildlife movement through these features.

Barrier Effects on Wildlife Passage

No new barriers to wildlife passage are expected to occur as a result of the DSBRT corridor. All major corridors associated with valleylands will be maintained to facilitate wildlife passage. DSBRT structure/culvert modifications have been designed to maintain and promote wildlife passage across the landscape.

The bridge structures/larger culverts at several watercourse/valley crossings within the Study Area provide the only significant wildlife passage corridors as nearly the entire DSBRT corridor is highly urbanized, disturbed and fragmented from surrounding natural areas (if present at all), and much of the lands do not generally accommodate wildlife passage. Lands in the vicinity of these structures/culverts comprise some of the highest quality natural heritage features within the vicinity of the Study Area and provide important north south movement corridors for wildlife within, or in the immediate vicinity of, the Study Area. The highly disturbed environment mentioned above also provides some function to funnel wildlife species towards these corridors by forcing them to move laterally until they reach a suitable crossing area. It should be noted that the structure characteristics associated with several of these crossings either prohibit or significantly reduce the ability of wildlife to safely cross through the structure. Carruthers Creek (Crossing #14) is identified as a priority ecological connectivity improvement area in the Carruthers Creek Watershed Plan (TRCA 2021) as it is currently a barrier to terrestrial and aquatic animal movement/migration. Any improvements to the function of this crossing at conveying wildlife should be considered (e.g., increased openness ratio, terrestrial crossing opportunity, etc.).

Openness ratio (OR) is a calculation which is used to determine the tunnel effect created by a structure and thus the likelihood wildlife species would utilize that structure. Generally, a greater OR value is expected to increase the likelihood of wildlife utilization of a given structure or culvert. To maximize the OR, structures should be designed to have a larger opening and the shortest length possible, since wildlife species are more likely to enter a culvert if they can see light at the other end.

An assessment of the OR at 16 watercourse crossings (9 watercourses) that offer the highest quality wildlife habitat/connectivity potential and are part of the construction of the DSBRT corridor was undertaken. Work being completed at each of these 11 crossings consists largely of lengthening of existing culverts/structures.

Overall, the OR for the culverts/structures reviewed will largely result in a slight to modest decrease in OR value; however, the suitability of the culverts/structures to safely convey the four wildlife groupings (large mammals, mid-sized mammals, small mammals and herpetofauna) will remain largely unchanged. Most notably, the lengthening of the arch structure at Corbett Creek will result in the loss of suitability for mid-sized mammals and herpetofauna. The Oshawa Creek (Bond Street) crossing works will result in a modest increase in OR for all animal groups. OR values at the Oshawa Creek (King Street) crossing will remain unchanged. OR calculations at two crossings (West Duffins Creek and Lynde Creek) could not be calculated as complete structure dimensions are not available at this time of the report development. However, both structures are relatively large bridges and are expected to facilitate safe movement for all wildlife groups.

Wildlife/Vehicle Conflicts

Wildlife/vehicle conflicts along/in the vicinity of the DSBRT corridor are poorly understood. However, frequent use of natural habitat corridors (primarily associated

with watercourse crossings) and existing crossing structures was noted during field investigations. Because these corridors will be maintained under the DSBRT project through construction or maintenance of appropriately sized structures, no additional conflicts are expected to occur, and the structures will allow for the continued use of these wildlife corridors for all species of wildlife.

Wildlife Passage Recommendations for Enhanced Functionality

Where feasible, implement the following wildlife passage considerations where existing crossing structures are significantly modified to accommodate DSBRT corridor, to enhance the functionality of crossing structures:

- Planting at Wildlife Crossing Structures – Salvage, to the extent possible, all existing natural vegetation surrounding all crossing locations;
- Internal Cover at Wildlife Crossing Structures - Assess light penetration into the crossing structures during detail design to determine if adequate vegetation growth and establishment as cover will occur. Use other natural forms of cover to create shelter and moist microclimates for wildlife;
- Substrate Materials within Wildlife Crossing Structures – Use natural substrates to encourage wildlife to utilize crossing structures. Ensure ground cover is continuous with the substrates found outside and adjacent to the structural entrances thereby encouraging animals to pass through the structure; and,
- Wildlife Barrier/Funnel Fencing – Construct wildlife barrier/funnel fencing at several crossing structures, specifically those which contain larger natural heritage systems, and which will experience bridge or culvert extensions/widening, to improve their effectiveness at safely moving wildlife across the landscape. Undertake further analysis at a site-specific level during detail design prior to construction to determine fencing requirements and to further explore fencing type required (e.g., small animal fencing vs. large animal fencing). Construct wildlife barrier/funnel fencing to tie-into crossing structures (identified above) and extend to the edge of natural areas associated with crossings (or to the extent feasible).

4.2.5.2 Construction Impacts and Mitigation

Construction activities associated with the implementation of the DSBRT corridor have the potential to result in temporary construction impacts to wildlife and wildlife habitat including:

- displacement of/disturbance to wildlife and wildlife habitat during construction;
- barrier effects on wildlife passage during construction;
- wildlife/vehicle conflicts during construction;
- potential impacts to migratory birds during construction; and,

- displacement of rare, threatened or endangered wildlife (discussed in **Section 4.2.7)**.

The majority of species residing in habitats within or directly adjacent to the DSBRT ROW are generally tolerant of anthropogenic disturbances. However, efforts will be made to ensure that impacts to areas containing more sensitive wildlife habitat (e.g., natural areas/valleylands and designated natural areas) are minimized during construction to the extent possible and to maintain opportunity for wildlife movement through the natural areas/valleylands.

Minimize construction duration and disturbance in the vicinity of existing culverts and bridges to the extent possible to reduce the potential for increase in road mortality caused by wildlife avoidance of these structures.

Wildlife salvage must occur prior to clearing and grubbing activities associated with construction where feasible, particularly in wetland habitats, to preserve vulnerable wildlife species (e.g., herpetofauna). All applicable Wildlife Collector's permits will be obtained prior to any salvage activities.

A number of bird species listed under the MBCA are located within the Study Area. The MBCA prohibits the killing, capturing, injuring, taking or disturbing of migratory birds (including eggs) or the damaging, destroying, removing or disturbing of nests. While migratory insectivorous and non-game birds are protected year-round, migratory game birds are only protected from March 10 to September 1. Environment Canada provides Nesting Periods when migratory birds are most likely to be nesting, within a respective geographic zone. The Study Area falls within Environment Canada's Nesting Zone C2 (Nesting Period: end of March – end of August). To comply with the requirements of the MBCA, disturbance, clearing or disruption of vegetation where birds may be nesting must be completed outside the migratory bird nesting timing window of April 1 to August 31. In the event that these activities must be undertaken from April 1 to August 31, a pre-clearing nest survey will be conducted by a qualified avian biologist to identify and locate active nests of species covered by the MBCA.

4.2.5.3 Operations Impacts and Mitigation

Operations/maintenance activities associated with the implementation of the DSBRT corridor have the potential to result in operations impacts to wildlife and wildlife habitat including:

- barrier effects on wildlife passage; and,
- potential disturbance to wildlife from noise, light and visual intrusion.

No new barriers to wildlife passage are expected to occur as a result of the operation of the DSBRT corridor. All major corridors associated with natural areas/valleylands will be maintained and where structure works (e.g., widening, etc.) will occur, crossing structures will mimic (or exceed suitability for wildlife crossing where appropriate) the existing crossings to facilitate wildlife passage.

Noise, light and visual intrusion may alter wildlife activities and patterns. In the DSBRT project setting, wildlife has generally become acclimatized to the noise, light and visual conditions associated with the operation of the roadways within the Study Area, and only those fauna that are tolerant of human activities tend to persist. Given that wildlife found within the Study Area are generally acclimatized to the presence of road infrastructure, disturbance to wildlife from any increase in noise, light and visual intrusion potentially caused by the operation of the DSBRT corridor is not expected to have any significant adverse effects.

Potential disturbance caused by light pollution from the proposed improvements to the transportation network can be mitigated by using reflectors to focus light beams onto the DSBRT and away from natural heritage features adjacent to the DSBRT corridor.

4.2.6 Significant Wildlife Habitat

During LGL's 2019 field survey, no seasonal concentration areas were found within or in proximity to the Study Area. No rare vegetation communities or specialized habitats for wildlife were found within the Study Area; nor were any habitats for rare (provincially ranked S1 to S3 species) or special concern species found. As a result, there will be no impacts to Significant Wildlife Habitat as per the Provincial Policy Statement.

While no Significant Wildlife Habitat was documented as per the Provincial Policy Statement, many portions of the Study Area (all creeks and associated valley and riparian areas) are expected to provide important local and regional animal movement corridors. Wildlife movement and corridor function must be maintained by establishing crossing structure design criteria and prescribing a number of mitigation measures which will ensure continued opportunity for wildlife to safely move across the local landscape. These design criteria and mitigation measures are described in **Section 4.2.5.1 and Section 4.2.5.2.**

4.2.7 Species at Risk and Plant Species of Concern/Regionally Rare Plant Species

4.2.7.1 Footprint Impacts and Mitigation

Implementation of the DSBRT corridor has the potential to result in the disturbance to/displacement of rare, threatened or endangered aquatic, plant and wildlife SAR and SAR habitat, as well as plant species of concern/regionally rare plant species. Impacts to vegetation/vegetation communities, wildlife/wildlife habitat and significant natural heritage features will be minimized to the extent possible to minimize impacts to SAR/SAR habitat and removals of plant species of concern/regionally rare plant species.

A total of 16 SAR (as well as endangered bat species) have been recorded in the vicinity of the Study Area by secondary source data and external agencies. These 16 species include three aquatic SAR, one plant SAR, and 12 wildlife SAR (as well as endangered bat species). However, only two of these SAR were identified within the vicinity of the Study Area during LGL's field investigations including Barn Swallow

(regulated as 'Threatened' under the Ontario ESA) and Butternut (regulated as 'Endangered' by both the Ontario ESA and Canada SARA). One additional plant SAR (Kentucky coffee-tree – regulated as 'Threatened' under the Ontario ESA and Canada SARA) was identified during the arborist investigation. The 17 aquatic, plant and wildlife SAR recorded within the vicinity of the Study Area (and the endangered bat species) are further discussed below. Plant species of concern/regionally rare plant species are also discussed further below.

Further correspondence will take place with external agencies (i.e., MECP, DFO, Environment and Climate Change Canada and Parks Canada) during the detail design phase prior to construction, as required, to discuss the SAR (and SAR habitat) that have been identified or have the potential to be located in the vicinity of the Study Area (in particular Redside Dace, American Eel, Butternut, Bobolink, Barn Swallow, Bank Swallow, Eastern Meadowlark and SAR bat species), any potential impacts of the proposed work on these federally/provincially designated species and their habitat, and appropriate protection/mitigation/monitoring/compensation measures. A determination of whether a proposed development will contravene subsection 10(1) of the Ontario ESA 2007 and/or the Canada SARA 2002 is required prior to the undertaking. The requirements for permitting under the Ontario ESA (Ontario Regulation 242/08, etc.) and Canada SARA will be reviewed and confirmed with MECP, DFO, Environment and Climate Change Canada and Parks Canada as necessary to determine whether mitigation or overall benefit are required. Prior to construction, further targeted field investigations must be undertaken as required for SAR during the appropriate season using specified specific standardized protocols. Surveying for these species must be conducted to establish their presence or absence, and, thus, the appropriate steps for protection and permitting.

Plant SAR and SAR Habitat, and Plant Species of Concern/Regionally Rare Plant Species

Two plant SAR that are regulated under the Ontario ESA and the Canada SARA were identified during LGL's botanical and arborist field investigations within the vicinity of the Study Area including Kentucky coffee-tree and Butternut. Impacts to these two plants SAR were assessed and are described below. No other plant SAR were identified during LGL's field investigations.

Kentucky Coffee-Tree

A total of 125 Kentucky coffee-trees were identified as planted streetscape/amenity feature trees within the Study Area during the arborist survey. A total of 81 of the 125 Kentucky coffee-trees located within the Study Area will be removed as a result of the DSBRT corridor (see **Appendix D** for locations). Kentucky coffee-tree is regulated as 'Threatened' under the Ontario ESA and the Canada SARA (Schedule 1). The Ministry of the Environment, Conservation and Parks (MECP) has advised that streetscape Kentucky coffee-trees are likely cultivars and, as such, do not require Ontario ESA authorizations (MECP, 2019). None of the Kentucky coffee-trees identified are located

on federal lands and, therefore, permitting under the Canada SARA will not be required. As a result, no further action is required under the Ontario ESA or Canada SARA.

Butternut

A total of four Butternut trees were identified within the Study Area; three within the vicinity of Morningside Park in the City of Toronto, identified during the arborist survey (see **Appendix D** for locations), and one additional Butternut tree (located outside of the ROW) north of Dundas Street and just east of the Highway 412 on-ramp located in the Town of Whitby, as observed from within the ROW during the botanical investigations. Its location is close to the edge of a cultural meadow and cattail shallow marsh. Butternut is regulated as 'Endangered' under the Ontario ESA and the Canada SARA (Schedule 1). Based on the current grading limits/DSBRT footprint, no direct impacts to these four Butternuts are anticipated. However, works will occur within the 50 m habitat protection zone of all four Butternuts. Prior to construction during detail design, a detailed Butternut survey must be undertaken within 50 m of the proposed limits of disturbance during the appropriate window (i.e., leaf on) to determine if any additional Butternut trees are present and thus appropriate steps for protection, mitigation or permitting under the Ontario ESA. Also, at that time, a Butternut Health Assessment must be undertaken for each of the four Butternuts identified as well as any additional butternut trees identified. This assessment will be conducted by a MNDMNRF designated Butternut Health Assessor. Since the grading limits lie within the 50 m habitat project zone (of the four identified Butternuts), consultation with MECP will take place during the detail design phase to determine if mitigation or permitting under the Ontario ESA is required.

Where Butternut trees are identified to be retained, fencing will be used to delineate where encroachment must not occur. During detail design, if SAR planting is identified as a requirement and planting in suitable areas adjacent to the ROW or in compensation areas is acceptable, planting, tending, monitoring and reporting of SAR planting will be adhered to as per criteria/conditions under the Ontario ESA 2007.

None of the four Butternuts identified are located on federal land (i.e., Rouge National Urban Park) and, therefore, the Canada SARA does not apply and consultation with federal agencies/permitting under the Canada SARA will not be required.

Plant Species of Concern and Regionally Rare Plant Species

Seventeen plant species identified as rare in Toronto and/or Durham or as TRCA species of concern (L1 to L3), were observed within several vegetation communities across with the Study Area (see **Appendix C, Table 8**). Many of these plants were identified on lands outside of the grading limits/DSBRT footprint. All of these plant species have populations that are provincially secure.

Where warranted (i.e., trees < 3 cm dbh, etc.), during detail design, efforts will be made to locate/identify plant species of concern/regionally rare plants that will be impacted by the DSBRT corridor. Where removal of plant species of concern/regionally rare plant species cannot be avoided, these plant species will be salvaged through transplanting

into nearby vegetation communities (prior to construction or the previous growing season) with suitable habitat characteristics that will afford ongoing protection, where feasible. A transplantation/relocation plan will be prepared during detail design as required for appropriate species.

Aquatic SAR and SAR Habitat

Three potential aquatic SAR are found within the Study Area: Eastern Pondmussel, Redside Dace and American Eel.

A portion of the Study Area (around the Rouge River - Crossing 4) contains potential habitat for Eastern Pondmussel. Eastern Pondmussel is listed as 'Special Concern' both provincially and federally and is not protected under either the Ontario ESA 2007 or Canada SARA. Works at the Rouge River, downstream of which Eastern Pondmussel had been reported on DFO Aquatic Species at Risk mapping, will be limited to the roadside/bridge deck. Therefore, there will be no effects on this species or its habitat.

Redside Dace, a provincially and federally 'Endangered' species, has been reported as present (occupied) in West Duffins Creek (Crossing 12) and Duffins Creek (Crossing 13) is considered to be contributing habitat for this species. In addition, Lynde Creek (Crossing 18) is possible occupied habitat, although at this time its status as direct Redside Dace habitat is not known. Carruthers Creek (Crossing 14) is historic habitat for this species and does not have protected status as a result. The bridge widening at Crossing 12 and, potentially, the works at Crossing 18 have the potential to impact this 'Endangered' species and its habitat. No works at Crossing 13 are proposed. Consultation with MECP and DFO during detail design will be necessary to determine permitting requirements for works proposed at Crossing 12. In addition, it is recommended that discussions also occur with MECP and DFO regarding the status of Redside Dace habitat within Lynde Creek at Crossing 18 at detail design. American Eel is listed as 'Endangered' provincially under the Ontario ESA and 'Threatened' federally by COSEWIC. It has been reported to occur in Oshawa Creek (Crossing 23 – Bond Street and King Street Crossings) within close proximity to the Study Area and to possibly occur at Crossings 4 (Rouge River), 12 (West Duffins Creek), 13 (Duffins Creek), 14 (Carruthers Creek), 16 (Tributary of Lynde Creek), and 18 (Lynde Creek). This species has broad habitat requirements rather than specialized critical habitats that are often associated with other species. Provincially, this species receives protection under the Ontario ESA 2007. Although American Eel is listed federally as 'Threatened' by COSEWIC, it has 'No Status' under the federal Canada SARA and therefore is not regulated federally. Recent experience with this species indicates that it will not require permitting under the Ontario ESA 2007 due to its general habitat requirements and transient behaviour. However, its presence in Oshawa Creek will automatically trigger a review by DFO under the *Fisheries Act* for any works occurring within the high-water mark of Oshawa Creek and for the other crossings mentioned above. Consultation with MECP during detail design will be necessary to address the potential need for permitting requirements under the Ontario ESA.

Wildlife SAR and SAR Habitat

A total of 12 wildlife SAR, including one herpetofauna and 11 birds (as well as endangered bat species) have been recorded within the vicinity of the Study Area based on secondary source data. As noted above, only one wildlife SAR (Barn Swallow) was confirmed at one location within the Study Area during LGL's 2019 field investigations. Based on the habitat where the Barn Swallow was observed, it is considered possibly breeding within the Study Area.

A brief review of each species' status (listed below), the results of field surveys carried out, and the potential impacts to the SAR and their populations as a result of the DSBRT facility is provided in **Appendix C** (Section 5gi).

- Golden Eagle;
- Chimney Swift;
- Common Nighthawk;
- Bobolink;
- Peregrine Falcon;
- Bald Eagle;
- Barn Swallow;
- Least Bittern;
- Bank Swallow;
- Eastern Meadowlark;
- Red-necked Phalarope; and
- Snapping Turtle.

Bats

The assessment of bat habitat undertaken by LGL Limited also identified 48 candidate snag habitat trees within the Study Area. Details of species and tree attributes are included in **Appendix C**, Table 10 and locations of snags are included in **Appendix C** (Figures NER-1a to NER-1i). During detail design, the requirement for follow up targeted field surveys for bats (including acoustic surveys) and potential permitting for SAR bats under the Ontario ESA will be assessed for these species.

4.2.7.2 Construction Impacts and Mitigation

Construction of the DSBRT corridor has the potential to result in the disturbance to/displacement of rare, threatened or endangered aquatic, plant and wildlife SAR and

SAR habitat, and plant species of concern/regionally rare plant species. Seventeen aquatic, plant and wildlife SAR have been recorded in the vicinity of the Study Area (as well as endangered bat species) although only three of these SAR were identified within the vicinity of the Study Area during LGL's botanist/arborist field investigations including Barn Swallow, Butternut and Kentucky coffee-tree. Seventeen plant species of concern/ regionally rare plant species were also observed within several vegetation communities across the Study Area.

Section 4.2.7.1 provides more details on impacts to SAR/SAR habitat and plant species of concern/regionally rare plant species, as well as commitments for future work during the detail design phase. Impacts to SAR/SAR habitat as well as to plant species of concern/ regionally rare plant species during construction will be minimized to the extent possible.

For Redside Dace, the Redside Dace/coldwater timing window (July 1-September 15) will need to be adhered to. Other site-specific mitigation may be necessary and will be determined through agency consultation during detail design. In addition, if federally listed aquatic SAR (i.e., Redside Dace) are present within a watercourse, and dewatering will occur during construction, a Canada SARA permit may be necessary for the rescue of potentially stranded fish. This will be determined during detail design.

Due to the general habitat requirements of American Eel and the nature of the works proposed at the two crossings of Oshawa Creek (Crossings 23 – Bond Street and King Street), no additional site-specific mitigation will likely be required for this species, unless otherwise specified by MECP during detail design consultations.

4.2.7.3 Operations Impacts and Mitigation

The operation and maintenance activities of the DSBRT corridor should not result in any impacts to SAR/SAR habitat or plant species of concern/regionally rare plant species.

4.2.8 Significant Natural Heritage Features

4.2.8.1 Footprint Impacts and Mitigation

The DSBRT corridor is planned to travel adjacent to/or near to significant natural heritage features (including designated natural areas, plan policy areas and regulation areas) and will result in some impacts to natural areas within these features/areas. **Appendix C** (Figures 2 and NER-2) present the location of these features/areas as well as the grading limits/DSBRT footprint.

One of four PSWs located within the vicinity of the Study Area will be impacted. The Lynde Creek Coastal Wetland Complex PSW is located within the Town of Whitby and is partly within the Study Area generally south of Dundas Street. Impacts to this PSW are expected only south of Dundas Street. Five of 13 unevaluated wetlands identified within the vicinity of the Study Area will be impacted, two within the Town of Ajax and three within the Town of Whitby, all within CLOCA's jurisdiction. One of three ANSIs located within the vicinity of the Study Area will be impacted. A very small portion of the Highland Creek Swamp Life Science ANSI in the City of Toronto will be impacted due to

the DSBRT. Of the ESAs located within the vicinity of the Study Area, impacts to two named ESAs will occur. These include two ESAs within Toronto and Pickering which are typically within TRCA's jurisdiction; Within CLOCA's jurisdiction, impacts to CLOCA's NHS will occur within the DSBRT study area from west of Lake Ridge Road in Ajax through to the east end of the study area through Whitby and Oshawa.

Regulated areas across TRCA and CLOCA jurisdictions will also be impacted where these hazard lands lie within the grading limits/DSBRT footprint, typically associated with watercourse crossings.

Greenbelt Plan Areas ('Protected Countryside' Designation and 'Urban River Valleys' Designation) will be impacted where these lands lie within the grading limits/DSBRT footprint. Carolinian Core Natural Areas and Carolinian Existing and Potential Areas are also located within proximity of the Study Area and will be impacted. In addition, a very small portion of the Rouge National Urban Park will be impacted (0.06 ha) by grading in the City of Pickering, where the park is adjacent to Altona Road east of the Rouge River.

The loss of area within each of the affected significant natural heritage features (designated natural areas, plan policy areas and regulation areas) has been separated by municipality and TRCA/CLOCA jurisdiction and is summarized in **TABLE 4.4**, and discussed further below (with details for impacts to each municipality outlined in detail in (**Appendix C**, Section 5ji). Overall, impacts will affect both terrestrial and wetland communities (see **Section 4.2.4.1**).

TABLE 4.4. IMPACTS TO DESIGNATED NATURAL AREAS, PLAN POLICY AREAS, AND REGULATION AREAS

Designated Natural Area / Plan Policy Area / Regulation Area	Municipality/Jurisdiction	Total Area to be Impacted (ha)*
Designated Natural Areas		
Highland Creek Swamp Life Science ANSI	Toronto	0.005
Highland Forest/Morningside Park Forest and Highland Creek West ESA (City of Toronto) and Morningside Park Forest ESA (TRCA) (these ESAs overlap and are considered one ESA for the purposes of this report)	Toronto/TRCA	0.10
Petticoat Creek Forest ESA	Pickering/TRCA	0.44
Unevaluated Wetlands (6)	Ajax and Whitby/CLOCA	0.005
Lynde Creek Coastal Wetland Complex PSW	Whitby	0.16
CLOCA's Natural Heritage System	Ajax/CLOCA	0.05
	Whitby/CLOCA	4.57
	Oshawa/CLOCA	1.22
Designated Natural Areas Total		**6.80**
Regulation Area		
TRCA Regulation Area (natural areas)	Toronto, Pickering, Ajax	8.13
CLOCA Regulation Area (natural areas)	Ajax, Whitby, Oshawa	5.04
Regulation Area Total (natural areas)		**13.17**

Designated Natural Area / Plan Policy Area / Regulation Area	Municipality/Jurisdiction	Total Area to be Impacted (ha)*
Plan Policy Areas		
Greenbelt Plan		
Protected Countryside	Ajax and Whitby	5.12
Urban River Valley	Ajax, Whitby, Oshawa	2.25
Sub-total		**7.37**
Rouge National Urban Park		
Rouge National Urban Park	Toronto	0.04
Rouge National Urban Park	Pickering	0.04
Sub-total		**0.08**
Carolinian Canada		
Carolinian Existing and Potential Areas	Toronto	0.832
Carolinian Core Natural Areas	Toronto	0.92
Sub-total		**1.75**
Plan Policy Areas Total		**9.20**

**Totals from respective areas are not always cumulative where natural areas, plan and regulation areas correspond.*

Plan Policy Areas and Regulation Areas

Across the Study Area, impacts within TRCA's and CLOCA's regulation limits have been identified. Impacts are typically along watercourse crossings that bisect the Study Area with a total of 13.17 ha of natural areas to be impacted, including 5.54 ha of manicured and disturbed areas. **Appendix C** (Figure NER-2) presents TRCA's and CLOCA's regulation limits as well as the grading limits/DSBRT footprint.

Within TRCA's regulation limit (Toronto, Pickering and Ajax), natural areas impacted include Dry-Fresh Sugar Maple Deciduous Forest (FOD5b and FOD5-1b), Fresh-Moist Willow Lowland Deciduous Forest (FOD7-3) and Dry-Fresh White Pine-Maple-Oak Mixed Forest (FOM2a) totalling 0.09 ha, Manitoba Maple Mineral Deciduous Swamp (SWD3-4b) and Willow Mineral Thicket Swamp (SWT2-2) totalling 0.024 ha, Mineral Cultural Woodland and Plantation (0.78 ha), and as well as 3.14 ha of Mineral Cultural Meadow, Cultural Meadow/Cultural Thicket, Cultural Thicket/Cultural Woodland, manicured and disturbed areas. The total impacts to natural areas within TRCA's regulation limits is 8.13 ha.

Within CLOCA's regulation limit (Ajax, Whitby and Oshawa), natural areas impacted include Dry-Fresh Sugar Maple Deciduous Forest (FOD5c) totalling 0.05 ha, Cattail Mineral Shallow Marsh (MAS2-1d), Mineral Deciduous Swamp (SWD4), Manitoba Maple Mineral Deciduous Swamp (SWD3-4c), Reed-Canary Grass Mineral Meadow Marsh/Mineral Shallow Marsh (MAM2-2/MAS2), Cattail Mineral Shallow Marsh (MAS2-1d and e), Mineral Shallow Marsh (MAS2d and e), and Maple Mineral Deciduous Swamp (SWD3a and c) totalling 0.66 ha, Mineral Cultural Woodland and Plantation (0.23 ha), as well as 2.75 ha of Mineral Cultural Meadow and Thicket, disturbed areas, hedgerows and agricultural lands. The total impacts to natural areas within CLOCA's regulation limits that also includes manicured areas is 5.04 ha.

Within the Greenbelt Plan Area, 7.37 ha of cultural, forest, wetland and manicured areas will be impacted in Ajax, Whitby and Oshawa. Impacts of 5.12 ha are within the 'Protected Countryside' designation in Ajax and Whitby where these lands bisect the Study Area within the vicinity of Lake Ridge Road and Highway 412. Impacts to the 'Protected Countryside' designation under the Greenbelt Plan (2017) located in the vicinity of the Rouge River/Little Rouge Creek have been avoided as work will not extend past the existing roadway footprint in this area. Impacts of 2.25 ha are within the 'Urban River Valley' designation in Ajax, Whitby and Oshawa associated with four watercourses across the Study Area located within the Greenbelt Plan Area including West Duffins Creek (Crossing 12 in Ajax), Carruthers Creek (Crossing 14 in Ajax), Lynde Creek (Crossing 18 in Whitby) and Oshawa Creek (Crossing 23 in Oshawa).

Impacts to the majority of the lands within the Rouge National Urban Park have been avoided as work will not extend past the existing roadway footprint through most of this area. However, an area of 0.04 ha of habitat will be impacted within the City of Toronto that includes impacts to a Mineral Cultural Meadow/Mineral Cultural Woodland (CUM1-1c/CUW1c). Also, an area of 0.04 ha of habitat will be impacted within the City of Pickering (east of the Rouge River crossing) that includes impacts to a Mineral Cultural Woodland (CUW1e) north of Kingston Road (due to the grading limits/DSBRT footprint in this area.

Impacts within the Carolinian Core Natural Areas (loss of 0.92 ha) and the Carolinian Existing and Potential Areas (loss of 0.83 ha) are associated with the impacts to vegetation communities within the Highland Creek Swamp Life Science ANSI and the Highland Forest/Morningside Park Forest and Highland Creek West ESA (City of Toronto)/Morningside Park Forest ESA (TRCA) in the City of Toronto. Impacts to the Carolinian Core Natural Area associated with the Rouge River/Little Rouge Creek and the numerous designated natural areas located in the Rouge River/Little Rouge Creek valleylands have been avoided as work will not extend past the existing roadway footprint in this area.

Avoidance and protection of vegetation communities located within designated natural areas, plan policy areas and regulation areas are important to mitigate impacts to the extent possible. Where impacts cannot be avoided, the environmental protection/mitigation measures presented throughout this report (in particular throughout **Section 4.2.4**) including vegetation community offsets/compensation for habitat loss, forest and wetland edge management, riparian habitat and valleyland management, invasive species management and planting plans will also serve to mitigate impacts. Mitigation within impacted Carolinian Conservation Areas must include increasing biodiversity of Carolinian species and habitat where suitable. This is especially important where such species are rare or occasional within the impacted area, to be determined during detail design. Impacts within Carolinian Core, Existing and Potential Areas, and within the Rouge National Urban Park, must be mitigated/compensated as outlined in **Section 4.2.4**, to be further defined during detail design.

Overall, the environmental protection/mitigation measures outlined in this report (in particular for Terrestrial Environment (**Section 4.2.4**), Wildlife (**Section 4.2.5**) and SAR

(**Section 4.2.7**)) will help maintain/enhance impacted designated natural areas, natural areas within TRCA's and CLOCA's regulation limits, and plan policy areas associated with the Greenbelt Plan Areas, Rouge National Urban Park Management Plan Areas and Carolinian Canada Natural Core Areas/Existing and Potential Areas. These measures will also help to support connections between Natural Heritage Systems and the local, regional and broader natural heritage systems of southern Ontario.

Consideration and conformity with respective environmental policy guidelines/ documents and standards are outlined in **Section 4.2.4.1**, and include the Metrolinx Vegetation Guideline (Metrolinx 2020), Guideline for Determining Ecosystem Compensation (TRCA 2018), Forest Edge Management Plan Guidelines (TRCA 2004b), The Living City Policies for Planning and Development in the Watersheds of the Toronto and Region Conservation Authority (TRCA 2014), the Rouge National Park Urban Management Plan (Parks Canada 2019) and upper and lower tier municipal tree protection by-laws (listed under **Section 4.2.4.1**). These guidelines/policies/plans will be followed to protect ecological form and function and provide compensation/mitigation to significant natural heritage features, to the extent possible. Where the grading limits/DSBRT footprint correlates with key natural heritage or hydrological features and Natural Heritage Systems across the City of Toronto, Durham Region and respective municipalities within the Region, impacts associated with infrastructure must conform with municipal policy to the extent possible where impacts cannot be avoided. Retention and enhancement of such features must be undertaken where feasible, and relevant municipal environmental policy and by-laws will be adhered to, to the extent possible, to be further defined during detail design.

Any design refinements necessary will be completed during the detail design phase prior to construction to delineate the designated natural areas, plan policy areas, and regulations areas, and the construction areas within them, as well as to address the guidelines/policies/plans noted above as well as the Greenbelt Plan (2017). During detail design, consultation will continue with municipal and agency staff (including TRCA, CLOCA, MECP, MNDMNRF, Parks Canada, etc.,) as required to ensure compensation and mitigation compliance and agreement for habitat loss within the forest/wetland communities/significant natural heritage features and to identify any additional required mitigation measures to ensure impacts to these areas are minimized to the extent possible. Staging and stockpile areas should be identified on the design drawings during the detail design. Where possible, staging and stockpile areas will be located outside of the floodplain and vegetated areas, and ideally outside of TRCA's regulated areas.

4.2.8.2 Construction Impacts and Mitigation

The temporary displacement of and/or disturbance to vegetation and vegetation communities associated with significant natural heritage features (designated natural areas, plan policy areas and regulation areas) will occur as a result of the construction of the DSBRT corridor associated with grading, the construction work around bridges, and the extension/replacement of culverts, etc.

Vegetation impacts from construction in these areas may be associated with equipment operating in areas identified for protection. Therefore, designated natural areas, plan policy areas and regulation areas designated for protection will be clearly shown on all construction plans and marked in the field using tree protection barriers in accordance with the Erosion and Sediment Control Guide for Urban Construction (TRCA 2019a) and OPSS 801 – Construction Specification for the Protection of Trees. The City of Toronto (Urban Forestry) Tree Protection Policy and Specifications for Construction Near Trees should also be followed. Efforts will be taken during construction to minimize impacts to the existing forest and wetland vegetation communities within these sensitive areas. **Section 4.2.4** provides more details on impacts to the vegetation and vegetation communities/natural areas as well as commitments for future work during the detail design phase. Impacts to significant natural heritage features will be minimized to the extent possible.

Vegetation clearing, mitigation and compensation within and/or adjacent to environmentally sensitive areas must consider/comply with mitigation protocols already established, to the extent possible. Consultation with external agencies (including TRCA, CLOCA, MECP, MNDMNRF, Parks Canada) and municipal staff will be required during detail design to ensure compliance with the applicable environmental policy, guidelines and plans regarding acceptable mitigation/compensation protocols.

4.2.8.3 Operations Impacts and Mitigation

The operation and maintenance activities of the DSBRT corridor will not affect the designated natural areas, plan policy areas and regulation areas located in the vicinity of the Study Area.

4.2.9 Summary of Potential Impacts, Mitigation Measures and Monitoring

The potential impacts, mitigation measures and monitoring are summarized in **TABLE 4.5**.

TABLE 4.5. SUMMARY OF POTENTIAL IMPACTS, MITIGATION MEASURES AND MONITORING: NATURAL ENVIRONMENT

Environmental Component	Potential Impacts (Design/Construction/Operation)	Mitigation Measures	Monitoring
During Detail Design			
Watercourses and Hydrological Features	Volumes of runoff and local peak flows will increase as a result of the introduction of new impervious areas. Potential for water quality impacts in the form of increased erosion and contaminant (e.g., oils, road salt) input.	Conduct a detailed assessment of storm and surface drainage and watercourses to inform the detail design See **Section 4.7** for the proposed drainage/stormwater management measures. Update the preliminary Drainage/Stormwater Management Plan in consultation with regulatory agencies (including TRCA/CLOCA) to manage storm and surface drainage/runoff and build upon the drainage/stormwater management mitigation measures/practices. Where feasible, the plan for the management of stormwater will adhere to the TRCA's The Living City Policies (TRCA 2014), at least within the TRCA's jurisdiction. Low impact development (LID) measures will be incorporated to the extent possible where stormwater management is required along the DSBRT to achieve stormwater management as per TRCA and CLOCA stormwater management criteria. Runoff generated by the new DSBRT lanes will be collected and treated using approved stormwater management practices employing a treatment-train approach including source, conveyance and end-of-pipe measures, where feasible (see **Section 4.7**). Stormwater management mitigation design will consider the environmental setting into which the drainage system will be placed. Salt vulnerable areas will be identified and the potential for salt impacted drainage in these areas must be assessed. Initiate TRCA's Voluntary Project Review (VPR) process. Submit design drawings, following TRCA submission requirements. Design project components within TRCA's regulated area in accordance with TRCA's guidelines. Prepare and submit an interim site protection plan to TRCA if proposed works are phased over multiple construction seasons.	N/A
	Work/impacts are proposed at 20 of the 24 watercourse crossings (including culvert extensions, structure widenings, and structure replacements). No in-water work is proposed at five watercourse crossings including Highland Creek (Crossing 1), Tributary of Highland Creek (Crossing 2), Rouge River (Crossing 4), Goodman Creek (Crossing 22), and Oshawa Creek – King Street Bridge). Overall drainage volume will increase at all crossings due to the increased impervious surface area associated with the widened DSBRT corridor and associated runoff directed to the receiving watercourses and hydrologic features.	Impacts to watercourses have been minimized to the extent possible by design refinements. General mitigation of effects to watercourses and hydrologic features related to drainage and stormwater management are discussed in **Section 4.7**. Mitigation that will be applied to effects caused by construction and operations are presented in **4.2.2.2** and **4.2.2.3** (and under Construction and Operation Impacts below) and in **Section 4.2.3** (related to aquatic environment).	N/A
	Impacts to navigable waters under the CNWA.	All works on unscheduled waterways that were not opted-out are to be treated as 'legacy' works and must therefore be considered the same as any work on a scheduled waterway. An application must always be submitted for works proposed at these waterways and approval must be received prior to undertaking any activities. As a result, prior to the commencement of any work and during the detail design phase, for all proposed works on the waterways within the Study Area, the proponent will be required to either submit a voluntary application and receive an Approval document or undertake the owner-led Public Resolution Process with no Transport Canada involvement. The proponent will make a determination during detail design regarding how to proceed and consultation with Transport Canada will take place as required. CNWA provisions will also be reviewed during the detail design phase and the proponent will be required to adhere to the current legislation and obtain/submit any required permits/approvals under the CNWA prior to construction, if required.	N/A
Aquatic Environment	The footprint of the DSBRT corridor (and associated culvert/structure modifications) will result in a number of permanent changes to the aquatic environment at	Impacts to the aquatic environment (fish and fish habitat) have been minimized to the extent possible by design refinements. **Table 4.2** presents the proposed works, impacts/net	Environmental Monitoring and Contingency Plan to include monitoring during

Environmental Component	Potential Impacts (Design/Construction/Operation)	Mitigation Measures	Monitoring
	20 watercourse crossings within the study limits (see **Table 4.2**), all of which constitute fish habitat (directly or indirectly). Effects to aquatic habitat from the DSBRT corridor will mainly involve the alteration of habitat through enclosure within/under culverts/ bridges, almost exclusively due to extensions of existing culverts and bridge widenings/replacements. There may also be affects due to channel realignments (Crossing 15), the construction of retaining walls (Crossing 5) and extensions of in-water bridge piers (Crossing 12). The area of aquatic habitat that may potentially be altered through the proposed works and further details on impacts are presented in **Table 4.2**. At five crossings (1, 2, 4, 22 and 23 - King Street bridge), no in-water work is proposed and no effects to the aquatic habitat are expected to occur.	environmental effects of those works on the aquatic environment and site-specific mitigation at each watercourse separated by municipality. Fish and wildlife friendly culvert and bridge design will continue to be considered as part of this project during the detail design phase, where feasible. No new barriers to fish passage will be created from works associated with this project. Consider fish and wildlife friendly culvert and bridge design as part of the Project. Opportunities to improve fish passage via culvert works will be considered further during the detail design phase, where feasible. DSBRT structure/culvert modifications have been designed to maintain and promote wildlife passage across the landscape. Where sheet flow occurs in culverts, the installation of flow deflectors can help deepen flows and capture sediment to form low flow channels that can pass fish. At Crossing 19 (Pringle Creek), there are baffles secured to the concrete bottom of the culvert currently. There is also a concrete "ramp" at the upstream end of the culvert over which water spills as an extremely shallow sheet which forms a barrier during low flow conditions. Eliminating this ramp would be beneficial to restoring fish passage within this watercourse. For mitigation regarding direct effects on the aquatic environment, measures to be taken (to be reviewed during the detail design phase), generally include minimizing the design to keep necessary bridge widenings and culvert extensions as short as possible, employing retaining walls to reduce encroachment into riparian areas and confining work to as small an area as possible. Consultation with DFO during detail design will be necessary to determine whether a HADD of fish habitat will occur at locations where works are proposed below the high water line (i.e., within the bank, full width of the channel) in fish habitat, and to confirm the process at that time to determine next steps. Requests for review forms should be submitted to DFO for all crossings where culvert or bridge works are proposed (all crossings except Crossings 1, 2, and 22). A *Fisheries Act* Authorization will be secured during detail design, if required. Secure any required Fish Collector's permits for salvage during the detail design phase as required.	construction and post-construction activities specific to watercourses and aquatic habitat.
Terrestrial Environment	Displacement of/disturbance to vegetation and vegetation communities including a loss of 44.61 ha of vegetation communities (see **TABLE 4.3** for details). Majority of impacts to anthropogenically influenced lands with the loss of 32.09 ha and to cultural vegetation communities with the loss of 11.46 ha.	Displacement of/disturbance to vegetation and vegetation communities has been avoided/minimized to the extent possible. However, some impacts to vegetation/vegetation communities are unavoidable in order to meet Metrolinx design standards and to accommodate the proposed widening and geometry associated with the DSBRT. Commence consultation with CLOCA and TRCA early in detail design to develop the vegetation compensation strategy in parallel with design refinements to minimize impacts. Delineate natural heritage feature limits and ELC vegetation communities at a detail design level to inform impacts both temporary and permanent and development of restoration and compensation strategies. No impacts to vulnerable community types. All of the vegetation communities identified within the Study Area are considered to be widespread and common in Ontario and secure globally.	N/A
	Removal of 0.92 ha of wetland communities (small portions of meadow marsh, shallow marsh, thicket swamp and deciduous swamp habitat) and 0.14 ha of forest edge communities (deciduous and mixed forest). Potential impacts to federally owned land associated with the Rouge National Urban Park. Negative impacts along forest borders and potentially within the forest interior associated with the removal of forest vegetation along existing forest edges or the removal of a portion of a forested feature that results	<u>Mitigation/Compensation Associated with Vegetation Community Impacts – Environmental Policy Guideline/Documents</u> Further review during detail design of the noted environmental policy guidelines/documents, as well as agency consultation (with TRCA, CLOCA, MECP, MNDMNRF, Parks Canada, etc.), will be undertaken to ensure compensation, mitigation compliance and agreement in association with vegetation impacts. The following principles/standards outlined in the environmental policy documents will be adhered to: • Where avoidance of the natural system is not possible, impacts will be minimized to the extent possible including impacts associated with access, construction, operations and maintenance; • Compensation is recommended when avoidance of the natural system is not possible;	Preparation of an Environmental Monitoring and Contingency Plan during detail design where infrastructure is permitted within valley or stream corridors, wetlands, woodlands, and/or hazardous lands or sites (also to address potential emergencies during construction). Ensure adherence to compensation agreements/requirements (to be secured during detail design) including implementation monitoring and subsequent monitoring of planted material/compensation

Environmental Component	Potential Impacts (Design/Construction/Operation)	Mitigation Measures	Monitoring
	in the exposure of a new forest edge. Direct and indirect impacts as a result of newly exposed edges include: • exposure of the retained vegetation to the effects of increased light, wind, and sun which results in decreased soil moisture; • exposure to salt spray; • reduced establishment of shade tolerant plant species and an overall reduction in plant species richness and abundance; • increased invasion/spread of aggressive non-native plant species; • loss of native seedbank; • decreased presence of interior habitat; • exposure of “edge” trees to windthrow; • changes in wildlife diversity and abundances; • destabilization of landforms composed of unconsolidated material and/or soil compaction; and • changes to hydrology.	• Compensation through ecological restoration such as the creation or enhancement of habitat will be undertaken, planning of which will be carried out early in the detail design phase to maximize options for restoration to the natural system; • Compensation will be based on habitat type (ELC) impacted, size or area (ha) of impact, and its function; • Where the creation of habitat is identified, it will be located outside of the identified natural system from where impacts occur and connected to or contiguous with this system, to the extent possible. Undertake compensation through ecological restoration such as the creation or enhancement of habitat, and habitat and carry out the planning early to maximize options for restoration to the natural system. Compensation for communities other than forest and wetland communities (i.e., CUW, CUT and CUM) will be considered/discussed during the detail design phase; • Compensation of habitat is preferred as close to the original location and within the same watershed, to the extent possible. Compensation will be implemented coincident with the timing of natural heritage removals on a subwatershed scale (i.e., Creek by Creek) to ensure no net loss of ecological value over the period of project implementation where possible; • Compensation will serve to improve the size, connectivity, and shape of the local ecosystem and the larger natural heritage system, which will include expanding woodlots, hedgerows, wetlands and meadows to buffer and connect important natural features; • Compensation may have specific requirements that need to be incorporated in the design and implementation of works (i.e., use by particular species, transplanting plant material (where feasible), invasive species management, promoting biodiversity, maintaining or restoring Carolinian vegetation communities, etc.); • Replacement of trees at a ratio representative of their ecosystem function and service, as determined by the individual tree approach, where access to contiguous habitat outside of the ROW excludes determining mean basal area for a feature; and • Factors to be considered when establishing agreements for compensation include documenting baseline conditions and impacts, specific vegetation objectives or targets for both preferred and incompatible species (i.e., non-native and/or invasive/hazardous species), considerations for location, siting (i.e., topography, soil conditions, vegetation compatibility, compatibility with adjacent land uses, etc.) and timing, detailed planting plans, implementation monitoring and subsequent monitoring of planted material, etc. When all other compensation efforts are not feasible, cash-in-lieu compensation measure for impacts associated with conservation authority or municipal lands will be considered by Metrolinx/the proponent and respective regulatory agencies. Funds will be used only for tree compensation as part of vegetation compensation to improve components of the natural heritage system, adhering to restoration principles outlined, to the extent possible. Cash-in-lieu compensation must be submitted prior to permit issuance. Metrolinx, as a Crown agency of the Province of Ontario, is generally not subject to the legal requirements of the *Conservation Authorities Act* and the conservation authorities permitting processes. However, Metrolinx/the proponent will work closely with conservation authorities to achieve conformance to their respective requirements (including TRCA’s Living City Policies). During the detail design phase, engagement with TRCA and CLOCA will continue including consultation/negotiation processes and submitting design information, where appropriate, without formally entering into the permitting process. Impacts to federally owned lands associated with the Rouge National Urban Park are not anticipated. If during detail designs impacts are identified that are not avoidable, the Rouge National Urban Park Management Plan (Parks Canada 2019) will guide planning and implementation, as required. Consultation with Parks Canada to continue during detail design and cumulative effects will be identified and mitigated.	planting areas (including transplanting plant material (where feasible), invasive species management, promoting biodiversity, maintaining/restoring Carolinian vegetation communities). Monitoring of compensation planting areas will include contingencies to mitigate for plant mortality, species incompatibility with site conditions, invasive species presence, etc. Adaptive management will be considered during monitoring.

Environmental Component	Potential Impacts (Design/Construction/Operation)	Mitigation Measures	Monitoring
		Apply compliance with all above noted principles/standards to the final vegetation community impact areas which may be refined during the detail design phase. All works will be undertaken in accordance with the Ontario Regulation 166/06, TRCA's Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses. <u>Vegetation Community Offsets/Compensation</u> Undertake design refinements during detail design to further minimize impacts to forest and wetland communities to the extent possible. Ensure tree protection hoarding plans are submitted and approved prior to permit issuance. Provide a summary of vegetation removals within each watershed if required for compensation purposes. Offset/compensate for the removal of wetland and forest communities through restoration, through habitat creation and/or the enhancement of nearby vegetation communities, to the extent possible. Disturbed lands that are suitable for restoration post-construction will be restored. Where suitable habitat to restore wetland is less than calculated removals, the restoration of forest habitat in lieu of wetland, will be considered in discussion with agency staff. Where lands are identified for forest and wetland offsetting, no fill placement will be undertaken and plantings will be installed into natural, good quality soils. If, during construction, additional forest or wetland habitat is impacted, additional offsetting will be undertaken. Discussion with municipal and agency staff (including TRCA, CLOCA, MECP, MNDMNRF and Parks Canada, as required) will be undertaken during detail design, and in compliance with relevant environmental policy (as noted above), to identify suitable sites for offsetting to compensate for habitat loss as part of implementing the project. Restoration of suitable forest and/or wetland habitat will be undertaken at a compensation ratio to be determined through further discussion with regulatory agencies (e.g., TRCA, CLOCA, MECP, MNDMNRF, Parks Canada, etc.), as part of implementing this project. Compensation will be undertaken following applicable Tree By-laws and Ecological Restoration with replacement at a 1:1 ratio on an individual tree basis (Metrolinx 2020), and will be in accordance with applicable environmental policies and the standards of respective agencies and municipalities (see **Section 4.4.3** and **Appendix D** for preliminary calculations). Site suitability of lands where habitat restoration and/or enhancement could be undertaken, typically within or adjacent to the ROW, will consider the following: • site conditions for specific habitat function; • habitat for species protected under the Ontario ESA 2007, if confirmed that the DSBRT corridor will impact existing SAR habitat and where mitigation or a permit is required; • ensuring that compensation occurs as close to the location of vegetation removals as possible and typically within the same watershed/sub-watershed; • ensuring that compensation is prioritized on lands adjacent to existing forest to increase contiguous habitat; • ensuring that restoration/enhancement is undertaken outside of existing natural features; • ensuring provision of buffering capacity to protect existing vegetation communities; • increasing species diversity; • supporting/increasing habitat connectivity; and, • improving habitat conditions to facilitate the movement of wildlife.	

Environmental Component	Potential Impacts (Design/Construction/Operation)	Mitigation Measures	Monitoring
		The City of Toronto requires replacement ratios by tree category as follows as per the City of Toronto By-laws: • Private tree located on the Project Site: 3:1; • Private tree located on property adjacent to the Project Site or on the boundary of the Project Site and adjacent property: 3:1; • Park tree: 3:1; • RNFP tree: healthy tree >10 cm: 3:1; healthy tree <10 cm: 1:1; poor condition tree: 1:1; tree injury: 1:1; hedge removal: 1 tree per 5 m of hedge removed; and, • City tree: 3:1. Review environmental policies/guidelines and continue agency consultation during detail design (as noted above) to ensure compliance and agreement regarding compensation for habitat loss. • Discussions with respective municipal and regulatory staff will be undertaken to determine if compensation for the DSBRT corridor can be tracked as part of cumulative losses with other infrastructure projects. In this regard, compensation may be explored through existing municipally owned lands and existing ecological restoration programs; • Compensating for land loss of habitat on a 1:1 ratio within the same ecosystem, to the extent possible, while adhering to the baseline compensation of individual trees at a 1:1 ratio. Offsetting habitat loss must be on lands in close proximity to removals and where feasible to extend contiguous habitat within natural heritage systems to maintain/extend connectivity. Calculating compensation should also take into account vegetation type using the Ecological Land Classification system; and • Where compensation is undertaken, reporting components will include a description of impacted ecosystems, a description of any proposed compensation locations, a proposed work plan, detail design drawings, a construction phasing plan, monitoring plan, etc. Discuss the option to provide cash-in-lieu when suitable restoration sites cannot be identified and ensure adherence to criteria set out in the respective environmental policy guideline documents as well as municipal by-laws. Cash-in-lieu compensation must be submitted prior to permit issuance. <u>Wetland Community Impacts</u> Post-construction, new wetland areas will be created as a result of changes in drainage related to the construction of the DSBRT corridor which will help mitigate for removals of similar wetland types. Consider implementation of edge management including high-density plantings of robust, native wetland plant species (see discussion below) to mitigate impacts related to invasive species establishment/encroachment further into wetlands, and to increase local diversity. Ensure the removal of dumped garbage and the treatment of invasive species such as common reed. <u>Forest Edge Management</u> Consider/implement forest edge management (where forest edge management is recommended) in accordance with the TRCA Forest Edge Management Plan Guidelines (2004) at impacted forest communities during detail design. Implement forest management techniques where new edges are exposed to enhance edges and mitigate the associated impacts to forest communities. Mitigation measures will include, but are not limited to, the following:	

Environmental Component	Potential Impacts (Design/Construction/Operation)	Mitigation Measures	Monitoring
		• Undertake planting of appropriate native trees, shrubs and ground flora as soon as possible following vegetation removals. Plant species used within the buffer will be somewhat similar to those in the adjacent habitat and be non-invasive in nature; • Plant woody stock at high densities along new edges to increase buffering capacity over time; • Design grading within areas where edges will be newly created to meet existing grades a minimum of 3 m away from the tree drip-line, to the extent possible; • Minimize compaction of soils on lands immediately adjacent to the newly exposed forest edge to the extent possible. Decompaction efforts and methodology will be site specific. Where decompaction is required, it will extend to a minimum depth of approximately 25 cm; • Maintain drainage patterns adjacent to newly created edges to avoid changes in soil moisture, to the extent possible (especially around wetland areas and forest communities with substrates that maintain increased moisture capacity); • Install suitable tree protection fencing and regularly maintain fencing along any newly exposed forest edges; • Immediately mitigate the spread/invasion of aggressive plant species. Include filter fabric along all tree protection fencing to enhance protection from the spread of invasive, aggressive plant species; • Ensure the contractor provides a warranty on planted material to ensure that the newly planted material survives and fulfils the intended function; and • Ensure restoration plantings are not undertaken in fill but in areas with suitable soil conditions for sustained vegetation growth and health. Where these conditions cannot be met, soil amendments primarily incorporating/mixing suitable soils into the top 0.3 to 1.0 m of fill will be considered. <u>Planting Plans</u> Develop a detailed landscape planting plan (including landscape composition planting layout drawings) during detail design prior to construction and once areas identified for restoration have been determined in consultation with the respective agencies. Submit restoration plans and replanting plans (along with erosion control fencing plans) prior to permit issuance. Undertake the planting of forest and wetland habitat with the appropriate native and non-invasive and locally appropriate plant species that will be presented on site-specific plans to be developed by an experienced landscape architect/ecologist. <u>General Environmental Protection/Mitigation Measures</u> Review the additional environmental protection/mitigation measures outlined below during detail design to minimize and mitigate footprint-related impacts associated with the construction of the DSBRT corridor and identify any additional mitigation measures through a further review of policies and/or agency discussion during detail design. • Efforts to minimize encroachment, displacement of, and disturbance to vegetation/vegetation communities will be undertaken, to the extent possible. Avoidance of wetlands and forest will be prioritized to the extent possible; • Incorporate current BMPs to inform, avoid and mitigate impacts throughout the Study Area, including within regulated areas, designated natural areas, federal lands, etc.; • Maintain existing topography to the extent possible to minimize grade changes to adjacent natural areas; • Prohibit the placement of fill within hazardous lands, watercourses, wetlands and other areas to mitigate interference with the hydrological function of a wetland, or in areas where	

Environmental Component	Potential Impacts (Design/Construction/Operation)	Mitigation Measures	Monitoring
		compensation planting may be undertaken to mitigate interference with the growth of planted tree and shrub stock; • Ensure impacts to natural habitat associated with the Rouge National Urban Park demonstrates a net ecological gain. Undertake discussion with Parks Canada staff prior to construction as necessary to discuss vegetation impacts of park lands and for approval. During detail design, further review of the Rouge National Urban Park Management Plan (2019) will be undertaken to ensure compliance with key strategies; • If required, incorporate SAR planning into planting areas, to the extent possible; • Plant removal and maintenance will comply with the requirements of the MBCA. Thus, disturbance, clearing or disruption (i.e., maintenance, etc.) of vegetation where birds may be nesting will be completed outside of the migratory bird nesting timing window of April 1 to August 31; • Where mowing of vegetation is required, pollinator habitat will be considered, where feasible, by avoiding late summer mowing in areas with suitable pollinator plant species that may also negatively impact pollinator larvae on host plants, such as milkweed; • Implement appropriate erosion and sediment controls and best management practices to mitigate construction impacts including the installation of a cover crop, erosion control blanket, etc.; • Minimize encroachment into areas where vegetation is to be retained by installing suitable protective fencing; • Flush cut tree stumps and minimize grubbing, to the extent possible; • Explore opportunities to pre-stress shrubs and certain tree species along forest edges, by cutting to encourage suckering and minimize negative impacts to newly exposed edges, until such a time when these areas are stabilized with permanent plantings and preferred seed mixes post-construction; • The application of a nurse crop with a preferred seed mix is recommended. Suitable nurse crop species include Virginia wild rye, Canada wild rye, common oat, and buckwheat. Due to its potential to interfere with the establishment of preferred species, annual rye is not recommended for use; and • Preferred seed mixes for restoration projects are outlined in the Metrolinx Vegetation Guideline (2020) with species' selection including native species in compliance with multiple conservation authority jurisdictions. Plant species will also be native to the City of Toronto and Durham Region. Seed mixes will be applied at the specified rate of 22-25 kg/ha or adjusted as necessary to suit application method and site conditions.	
	Potential for establishment of non-native and invasive plant species.	Implement mitigation measures to help control non-native and invasive plant species that become established, as well as prevent the establishment of new non-native and invasive plant species. Measures will include, at a minimum, the following: • Consideration of relevant regulations where feasible including the federal *Plant Protection Act* and *Seeds Act* and the provincial *Invasive Species Act* and *Weed Control Act* with restrictions on spreading four species including black dog-strangling vine, dog-strangling vine, Japanese knotweed, European common reed. Emerging or established populations observed will be effectively treated especially in areas identified for compensation or mitigation; • Managing dense patches of common buckthorn, garlic mustard, Canada thistle, and Russian or Autumn olive; • Overall and where feasible, consideration for the management of invasive species will include the existing species composition, the nature of the invasive species, potential impacts of spread, type of control including the use and type of herbicide, etc.;	Monitoring of compensation planting areas will include contingencies to mitigate for invasive species presence/management.

Environmental Component	Potential Impacts (Design/Construction/Operation)	Mitigation Measures	Monitoring
		• Application of treatment/mitigation methods will vary depending on site conditions and will consider indirect and direct impacts and incorporate up to date best management practices; • Invasive species treatment may include several treatment applications over time; • Herbicide treatments will be applied at the optimal time by licensed, experienced personnel. Herbicide treatment will be used in conjunction with cutting or mowing to also mitigate spread by seed. Invasive species management is particularly important where habitat creation and/or enhancement is undertaken to support restoration trajectories/objectives; • Minimize the exposure of bare soil and, where bare soil persists, these areas will be planted with a non-invasive annual cover crop for an interim period, while preferred species become established; and • Prohibit the use of non-native and invasive ornamental plants for landscaping (e.g., Norway maple, purple loosestrife, Japanese knotweed, Japanese honeysuckle, etc.).	
Wildlife	Displacement of/disturbance to wildlife/wildlife habitat. Limited negative effects are anticipated as wildlife habitats identified within the Study Area consist almost entirely of previously modified/ disturbed wildlife habitat with low habitat diversity and limited habitat potential.	Minimize impacts to the habitats affected by the DSBRT corridor in the vicinity of the watercourses/valleylands/ natural areas and to designated natural areas to maintain opportunity for wildlife movement through these features. No extension of the road platform is proposed in the vicinity of the Rouge River/Little Rouge Creek valleyland which will maintain opportunity for wildlife movement through this feature.	N/A
	Barrier effects on wildlife passage. The Openness Ratio (OR) assessment completed at the 11 watercourse crossings (9 watercourses) that offer the highest quality wildlife habitat/connectivity potential determined that the OR for the culverts/structures reviewed will largely result in a slight to modest decrease in OR value; however, the suitability of the culverts/structures to safely convey the four wildlife groupings (large mammals, mid-sized mammals, small mammals and herpetofauna) will remain largely unchanged.	No new barriers to wildlife passage are expected to occur as a result of the DSBRT corridor. All major corridors associated with valleylands will be maintained to facilitate wildlife passage. DSBRT structure/culvert modifications have been designed to maintain and promote wildlife passage across the landscape. Consider fish and wildlife friendly culvert and bridge design as part of the Project. Wildlife passage corridors are provided via the bridge structures/larger culverts at several watercourse/valley crossings within the Study Area. Re-calculate the OR for each of the culverts/structures during detail design (once proposed culvert/structure sizes are confirmed) to determine whether target animal groups can use the culverts/structures for passage. Where feasible, the culvert/structure size must reflect an approximate OR to facilitate animal movement. Conduct an assessment of light penetration into the crossing structures will be conducted to determine if adequate vegetation growth and establishment as cover will occur. Where feasible, consider enhancement of crossing sites (see below) where crossing structure sizing is constrained by existing sizing, or other technical limitations,	N/A
	Wildlife/vehicle conflicts.	No additional conflicts are expected to occur (as natural habitat corridors/crossing structures will be maintained), and the structures will allow for the continued use of these wildlife corridors for all species of wildlife.	N/A
	Impacts to wildlife passage.	Implement wildlife passage recommendations where feasible where existing crossing structures are significantly modified, to enhance the functionality of crossing structures. Planting at wildlife crossing structures: salvage all existing natural vegetation surrounding all crossing locations to the extent possible. Where vegetation has been removed or is found to be absent, in the immediate vicinity of crossings, plant low stature vegetation (e.g., grasses and small shrubs) where feasible. Space shrubs apart from one another by approximately 3-5 m, as to not cause a visual obstruction of the wildlife crossing structure. Internal Cover at Wildlife Crossing Structures: conduct an assessment of light penetration into the crossing structures during detail design to determine if adequate vegetation growth and establishment as cover will occur – as reptiles, amphibians and small mammals prefer low stature vegetation or other forms of shelter within crossing structures. Use other natural forms of cover such as stumps, logs (preferably hollowed), and rock piles to provide shelter and moist	N/A

Environmental Component	Potential Impacts (Design/Construction/Operation)	Mitigation Measures	Monitoring
		microclimates for wildlife. Place a mix of stumps, logs and rock piles within each of the identified crossing structures. Ensure cover objects are present at intervals of approximately every 10 m, within enclosed areas. Construct rock piles out of rip-rap or other similar sized material, but these will be no larger than 0.5 m height x 1 m wide, to avoid impediment of wildlife movement through the structure. Orient logs placed within the crossing structure lengthwise within the structure wall so as to not impede wildlife movement. Substrate Materials within Wildlife Crossing Structures: use natural substrates to encourage wildlife to utilize crossing structures. Ensure ground cover is continuous with the substrates found outside and adjacent to the structural entrances thereby encouraging animals to pass through the structure. Ensure substrates covering the ground within and surrounding the crossing structures contain a mix of soil and small granular materials, matching what is found on lands surrounding the crossing structures (locally excavated soils is recommended). Wildlife Barrier/Funnel Fencing: construct wildlife barrier/funnel fencing at the crossing of Petticoat Creek, West Duffins Creek, Duffins Creek, Carruthers Creek (within Ajax), Lynde Creek, Pringle Creek, Tributary of Corbett Creek (within Whitby), Corbett Creek, and Oshawa Creek (within Oshawa) to improve their effectiveness at safely moving wildlife across the landscape. Undertake further analysis at a site-specific level during detail design prior to construction to determine fencing requirements and to further explore fencing type required (e.g. small animal fencing vs. large animal fencing). Construct wildlife barrier/funnel fencing to tie-into crossing structures (identified above) and extend to the edge of natural areas associated with crossings (or to the extent feasible).	
Species at Risk and Plant Species of Concern/Regionally Rare Plant Species	Potential disturbance to/ displacement of rare, threatened or endangered aquatic, plant and wildlife SAR and SAR habitat, and plant species of concern/regionally rare plant species. Plant SAR: a total of 81 of the 125 Kentucky coffee-trees will require removal. No direct impacts are anticipated to the four Butternut trees located within the Study Area. However, works will occur within the 50 m habitat protection zone of all four Butternuts.	Minimize impacts to vegetation/vegetation communities, wildlife/wildlife habitat and significant natural heritage features to the extent possible to minimize impacts to SAR/SAR habitat and removals of plant species of concern/regionally rare plant species. Further correspondence will take place with MECP, DFO, Environment and Climate Change Canada and Parks Canada during the detail design phase prior to construction, as required, to discuss the SAR (and SAR habitat) that have been identified or have the potential to be located in the vicinity of the Study Area (in particular Redside Dace, American Eel, Butternut, Bobolink, Barn Swallow, Bank Swallow, Eastern Meadowlark and SAR bat species), any potential impacts of the proposed work on these federally/provincially designated species and their habitat, and appropriate protection/mitigation/monitoring/compensation measures. A determination of whether a proposed development will contravene subsection 10(1) of the Ontario ESA 2007 and/or the Canada SARA 2002 is required prior to the undertaking. Review/confirm the requirements for permitting under the Ontario ESA (Ontario Regulation 242/08, etc.) and Canada SARA with MECP, DFO, Environment and Climate Change Canada and Parks Canada as necessary to determine whether mitigation or overall benefit are required. Undertake further targeted field investigations prior to construction as required for SAR during the appropriate season using specified specific standardized protocols (to establish their presence or absence, and, thus, the appropriate steps for protection and permitting). <u>Plant SAR and Plant SAR Habitat</u> Kentucky Coffee-Tree (regulated as 'Threatened' under the Ontario ESA and the Canada SARA (Schedule 1)): MECP has advised that streetscape Kentucky coffee-trees are likely cultivars and do not require Ontario ESA authorizations (MECP, 2019). None of the Kentucky coffee-trees identified are located on federal lands and, therefore, permitting under the Canada SARA will not be required. As a result, no further action is required under the Ontario ESA or Canada SARA for Kentucky Coffee-Tree. Butternut (regulated as 'Endangered' under the Ontario ESA and the Canada SARA (Schedule 1)): since works will occur within the 50 m habitat protection zone of the four Butternuts located within the Study Area, a detailed Butternut survey must undertaken prior to construction during detail design within 50 m of the proposed limits of disturbance during the appropriate window (i.e., leaf on) to determine if any additional Butternut trees are present and thus appropriate	Monitoring for SAR to take place as required (based on any Ontario ESA/Canada SARA permit requirements/agreements).

Environmental Component	Potential Impacts (Design/Construction/Operation)	Mitigation Measures	Monitoring
		steps for protection, mitigation or permitting under the Ontario ESA. A Butternut Health Assessment must also be undertaken for each of the four Butternuts identified as well as any additional Butternut trees identified by an MNDMNRF designated Butternut Health Assessor. Since the grading limits lie within the 50 m habitat project zone (of the four identified Butternuts), consultation with MECP will take place during the detail design phase to determine if mitigation or permitting under the Ontario ESA is required. Where Butternut trees are identified to be retained, fencing will be used to delineate where encroachment must not occur. During detail design, if SAR planting is identified as a requirement and planting in suitable areas adjacent to the ROW or in compensation areas is acceptable, planting, tending, monitoring and reporting of SAR planting will be adhered to as per criteria/conditions under the Ontario ESA 2007. None of the four Butternuts identified are located on federal land (i.e., Rouge National Urban Park) and, therefore, the Canada SARA does not apply and consultation with federal agencies/permitting under the Canada SARA will not be required. <u>Plant Species of Concern and Regionally Rare Plant Species</u> Where warranted (i.e., trees < 3 cm dbh, etc.), during detail design, efforts will be made to locate/identify plant species of concern/regionally rare plants that will be impacted by the DSBRT corridor. Where removal of these plant species cannot be avoided, these plant species will be salvaged through transplanting into nearby vegetation communities with suitable habitat characteristics that will afford ongoing protection, where feasible.	
	Aquatic SAR: no impacts anticipated to Eastern Pondmussel/Eastern Pondmussel habitat (at Rouge River Crossing 4). Potential impacts to Redside Dace/Redside Dace habitat at Carruther's Creek (Crossing 14) as a result of the culvert extension at this location. Potential impacts to American Eel/American Eel habitat at Oshawa Creek (Crossing 23 – Bond Street and King Street crossings) as a result of the bridge replacements at these locations.	<u>Aquatic SAR and Aquatic SAR Habitat</u> Redside Dace (regulated as 'Endangered' under the Ontario ESA and the Canada SARA) at Crossings 12, 14 and 18) : Consultation with MECP and DFO during detail design will be necessary to determine the permitting requirements that will need to be addressed under the Ontario ESA at that time. American Eel at Oshawa Creek, Crossing 23 (regulated as 'Endangered' under the Ontario ESA and 'Threatened' federally by COSEWIC), also possibly at Crossings 4, 12, 13, 14, 16, and 18: Although American Eel is listed federally as 'Threatened' by COSEWIC, it has 'No Status' under the federal Canada SARA and therefore is not regulated federally. Recent experience with this species indicates that it will not require permitting under the Ontario ESA 2007 due to its general habitat requirements and transient behaviour. However, its presence in Oshawa Creek will automatically trigger a review by DFO under the *Fisheries Act* for any works occurring within the high water mark of the Oshawa Creek and for the other crossings mentioned above. Consultation with MECP during detail design will be necessary to address the potential need for permitting requirements under the Ontario ESA.	
	Wildlife SAR: potential impacts to Bobolink, Barn Swallow, Bank Swallow, Eastern Meadowlark and SAR bat species and their habitat. No impacts anticipated (and no requirement for follow up targeted field surveys or permitting under the Ontario ESA/Canada SARA) for the following wildlife species and their habitat: Golden Eagle, Chimney Swift, Common Nighthawk, Peregrine Falcon, Bald Eagle, Least Bittern, Red-necked Phalarope, and Snapping Turtle.	<u>Wildlife SAR and Wildlife SAR Habitat</u> Bobolink (regulated as 'Threatened' under the Ontario ESA and Canada SARA): During detail design, the requirement for follow up targeted field surveys (undertaken during the appropriate season using MNDMNRF/MECP protocols) and potential permitting under the Ontario ESA and Canada SARA will be assessed for this species. Barn Swallow (regulated as 'Threatened' under the Ontario ESA, not a regulated species under the Canada SARA): During detail design, the requirement for follow up targeted field surveys (undertaken during the appropriate season using MNDMNRF/MECP protocols) and potential permitting under the Ontario ESA will be assessed for this species. No requirement for permitting under the Canada SARA is anticipated as this species is not regulated under this act. Bank Swallow (regulated as 'Threatened' under the Ontario ESA, not regulated under the Canada SARA): During detail design, the requirement for follow up targeted field surveys (undertaken during the appropriate season using MNDMNRF/MECP protocols) and potential permitting under the Ontario ESA will be assessed for this species. No requirement for permitting under the Canada SARA is anticipated as this species is not regulated under this act. Eastern Meadowlark (regulated 'Threatened' under the Ontario ESA and Canada SARA): During detail design, the requirement for follow up targeted field surveys (undertaken during the	

Environmental Component	Potential Impacts (Design/Construction/Operation)	Mitigation Measures	Monitoring
		appropriate season using MNDMNRF/MECP protocols) and potential permitting under the Ontario ESA and Canada SARA will be assessed for this species. Endangered Bats: During detail design, the requirement for follow up targeted field surveys for bats (including acoustic surveys) and potential permitting for SAR bats under the Ontario ESA will be assessed for these species.	
Significant Natural Heritage Features	Impacts to 6.80 ha of designated natural areas including: TRCA: Toronto – Highland Creek Swamp Life Science ANSI, Highland Forest/ Morningside Park Forest and Highland Creek West ESA and Morningside Park Forest ESA. Pickering – Petticoat Creek Forest ESA, Unevaluated Wetland associated with Crossing 15. Ajax – Tributary of Lynde Creek. Whitby – Lynde Creek Coastal Wetland Complex PSW. CLOCA: Natural Heritage System (Ajax/Whitby/Oshawa). Impacts to 8.13 ha of natural areas within TRCA's Regulation Area (natural areas) and5.04 ha of natural areas within CLOCA's Regulation Area. Impacts to cultural, forest, wetland and manicured areas within the Greenbelt Plan Area (5.12 ha of 'Protected Countryside' Designation in Ajax and Whitby, and 2.25 ha of 'Urban River Valleys' Designation associated with four watercourses including West Duffins Creek (Crossing 12 in Ajax), Carruthers Creek (Crossing 14 in Ajax), Lynde Creek (Crossing 18 in Whitby) and Oshawa Creek (Crossing 23 in Oshawa)). Impacts to Carolinian Core Natural Areas (loss of 0.83 ha) and Carolinian Existing and Potential Areas (loss of 0.92 ha) associated with the impacts to vegetation communities within the Highland Creek Swamp Life Science ANSI and the Highland Forest/ Morningside Park Forest and Highland Creek West ESA (City of Toronto)/ Morningside Park Forest ESA (TRCA) in the City of Toronto. Impacts to a very small portion of the Rouge National Urban Park (0.08 ha) in the City of Toronto and Pickering, where the park is adjacent to Altona Road east of the Rouge River. Impacts to the Rouge River/Little Rouge Creek and the numerous designated natural areas located in the Rouge River/Little Rouge Creek valleylands have been avoided as work will not extend past the existing roadway footprint in this area.	Avoid/protect vegetation communities located within designated natural areas, plan policy areas and regulation areas to mitigate impacts to the extent possible. Where impacts cannot be avoided, implement the environmental protection/mitigation measures presented throughout this report (in particular throughout **Section 4.2.4**) including vegetation community offsets/compensation for habitat loss, forest and wetland edge management, riparian habitat and valleyland management, invasive species management and planting plans. Mitigation within impacted Carolinian Conservation Areas must include increasing biodiversity of Carolinian species and habitat where suitable, in particular where such species are rare or occasional within the impacted area (to be determined during detail design). Mitigate/compensate for impacts within Carolinian Core, Existing and Potential Areas, and within the Rouge National Urban Park as outlined in **Section 4.2.4** (to be further defined during detail design). Implement the environmental protection/mitigation measures outlined in this report (in particular for Terrestrial Environment (**Section 4.2.4**), Wildlife (**Section 4.2.5**) and SAR (**Section 4.2.7**)) to help maintain/enhance impacted designated natural areas, natural areas within TRCA's and CLOCA's regulation limits, and plan policy areas associated with the Greenbelt Plan Areas, Rouge National Urban Park Management Plan Areas and Carolinian Canada Natural Core Areas/Existing and Potential Areas, and to support connections between Natural Heritage Systems and the local, regional and broader natural heritage systems of southern Ontario. Consider/conform with environmental policy guidelines/documents/plans outlined in **Section 4.2.4.1** to protect ecological form and function and provide compensation/mitigation to significant natural heritage features, to the extent possible. Where the grading limits/DSBRT footprint correlates with key natural heritage or hydrological features and Natural Heritage Systems across the City of Toronto, Durham Region and respective municipalities within the Region, impacts associated with infrastructure must conform with municipal policy to the extent possible where impacts cannot be avoided. Undertake retention and enhancement of these features where feasible, and adhere to relevant municipal environmental policy and by-laws, to the extent possible (to be further defined during detail design). Complete any design refinements necessary during the detail design phase prior to construction to delineate the designated natural areas, plan policy areas, and regulations areas, and the construction areas within them, and to address the appropriate guidelines/policies/plans noted above as well as the Greenbelt Plan (2017). Review for any changes per outcome of the Province's consultation on growing the size of the Greenbelt (see ERO 019-3136 on the Environmental Registry), which may result in the addition, expansion and further protection of Urban River Valleys. Consult further during detail design with municipal and agency staff (including TRCA, CLOCA, MECP, MNDMNRF, Parks Canada, etc.,) as required to ensure compensation and mitigation compliance and agreement for habitat loss within the forest/wetland communities/significant natural heritage features and to identify any additional required mitigation measures to ensure impacts to these areas are minimized to the extent possible.	Preparation of an Environmental Monitoring and Contingency Plan during detail design where infrastructure is permitted within valley or stream corridors, wetlands, woodlands, and/or hazardous lands or sites (to address potential emergencies during construction). Ensure adherence to compensation agreements/requirements (to be secured during detail design) including implementation monitoring and subsequent monitoring of planted material/ compensation planting areas (including transplanting plant material (where feasible), invasive species management, promoting biodiversity, maintaining/restoring Carolinian vegetation communities). Monitoring of compensation planting areas will include contingencies to mitigate for plant mortality, species incompatibility with site conditions, invasive species presence, etc.
During Construction			

Environmental Component	Potential Impacts (Design/Construction/Operation)	Mitigation Measures	Monitoring
Watercourses and Hydrological Features	Impacts to watercourses and hydrologic features due to the exposure of soils (erosion and sedimentation) from grading and vegetation removals, drainage improvements, culvert/structure modifications, excavations, stockpiling, vehicle refueling and maintenance and other construction-related activities.	An Erosion and Sedimentation Control Plan (including an erosion monitoring and sediment report program) will be developed during detail design prior to construction including measures to monitor and maintain erosion and sedimentation control during construction to ensure their effectiveness. See **Section 4.2.2.2** for the proposed erosion and sedimentation control measures and the guidelines to be followed to ensure effective erosion and sedimentation control during construction.	Site monitoring during construction as per the Erosion and Sedimentation Control Plan.
	Potential for impacts to water quality from spills or other materials/equipment entering the water during construction.	The following additional general environmental protection measures will be employed to reduce the potential effects on watercourses/hydrologic features during construction: • Work areas will be delineated with construction fencing to minimize the area of disturbance; • Appropriate sediment control structures will be installed prior to and maintained during construction to prevent entry of sediments into the watercourses; • Surface water that comes in contact with exposed soils will be treated using stormwater detention ponds, basins, traps and bags; • Where cofferdams are to be employed, unwatering effluent will be treated prior to discharge to receiving watercourses; • Cofferdams will be constructed using pea gravel bags or equivalent to isolate the work area and maintain flow; and, • Disturbed riparian areas will be vegetated and/or covered with an erosion control blanket as quickly as possible to stabilize the banks and minimize the potential for erosion and sedimentation. See **Section 4.2.2.1** and **Section 4.2.2.2** for general mitigation measures regarding spills. Best management practices must be implemented during construction to reduce the potential for spills or other materials/equipment from entering the water. The following measures will be employed: • All equipment maintenance and refuelling will be controlled to prevent any discharge of petroleum products. Vehicular maintenance and refuelling will be conducted at least 30 m distance from any surface drainage features to prevent the entry of petroleum, oil or lubricants (POL) to the watercourses; • Storage, stockpiling and staging areas will be delineated prior to construction and inspected during construction; • Construction material, excess material, construction debris, and empty containers will be stored at least 30 m distance from any surface drainage features to prevent their entry into the watercourses; and, • All spills that could potentially cause damage to the environment will be reported to the Spills Action Centre of the MECP. In the event of a spill, containment and clean-up will be completed quickly and effectively. A “Spill Response Plan” and the appropriate contingency materials to absorb or contain a spill will be on the site at all times; no construction machinery or vehicles will cross any watercourse at any time during construction.	N/A
	Impacts to downstream habitats, existing water temperatures, and impacts to water quality/quantity.	A preliminary drainage and stormwater management plan has been prepared to ensure construction and post-construction conditions maintain flow to downstream habitats, maintain existing water temperatures and ensure water quality and quantity is not impaired. The drainage and stormwater management plan will be updated as necessary during detail design in consultation with regulatory agencies (including TRCA/CLOCA). See **Sections 4.7** for the proposed drainage/stormwater management measures. Where feasible, the plan for the management of stormwater will adhere to the TRCA’s The Living City Policies (TRCA 2014), at least within the TRCA’s jurisdiction. Low impact development (LID) measures will be incorporated to the extent possible where stormwater management is required along the DSBRT to achieve stormwater management as per TRCA and CLOCA stormwater management criteria.	N/A

Environmental Component	Potential Impacts (Design/Construction/Operation)	Mitigation Measures	Monitoring
		Some of the general mitigation measures will include: • A stormwater management facility will be designed to detain a minimum of a 2-hour 25 mm storm event for 24 hours to address water quantity and erosion concerns. Where agencies demonstrate a need, other detention times or additional quantity sizing requirements will be considered during the detail design phase in consultation with stakeholders. • When designing best management practices, consideration will be given to measures for reducing environmental impacts to surface and groundwater, including those related to temperature and salt, where feasible. • Bridge run-off will be discharged to stormwater management facilities where feasible (preferably a pond or swale) prior to discharge to watercourses where this can be achieved and will not cause unacceptable environmental, highway design, safety or operational problems. • Where feasible, opportunities for providing ease of containment of accidental spills will be provided during the design of stormwater management facilities. • Low impact development (LIDs) measures will be incorporated to the extent possible where stormwater management is required along the DSBRT corridor.	
Aquatic Environment	Construction impacts to the aquatic environment (fish and fish habitat) include the temporary disruption of site-specific habitat, changes to water quality and quantity including temporary disruption of flows, increased water temperatures, erosion and sediment inputs to the watercourses, changes to floodplain and riparian vegetation, barriers to fish passage and potential impacts to aquatic SAR.	See **Section 4.2.7** for mitigation measures for impacts to aquatic SAR. See **Section 4.2.3.1** (and under Footprint Impacts above) for additional mitigation measures and the assessment of footprint impacts to the aquatic environment. Additional site-specific mitigation may be necessary to mitigate impacts to the aquatic environment during construction. The potential need for additional site-specific mitigation will be investigated during detail design through consultation with permitting agencies (e.g., TRCA, CLOCA, DFO, and MECP).	N/A
	Impacts to the aquatic environment due to in-water work.	Where feasible, structures will be constructed outside of the watercourse banks, eliminating the need for in-water works. At all locations where in-water work is proposed, cofferdams (pea gravel bags, sheet piles, etc.) will be used to isolate the work area from the watercourse to enable work to be done in-the-dry (OPSS 517 Construction Specification for Dewatering). Flow will be maintained through either damming and pumping or fluming. If possible, work will be done during the driest part of the year when the lowest flows are present. This will minimize disturbance to fish habitat at the site and downstream. To further reduce the potential for serious harm, the following environmental protection measures will be implemented: • Construction will be staged such that both water flow and traffic flow can be maintained. • All works will be performed in-the-dry by using temporary flow bypass systems and cofferdams to isolate the work areas. • No in-water work (or work on watercourse banks) will be permitted from April 1 to June 30 (July 14 where Smallmouth Bass are present) to protect spawning warmwater fish, incubating eggs and fry emergence and migratory periods of local fish populations, and from September 16 to June 30 (July 14 where Smallmouth Bass are present) to protect coldwater fish spawning, egg incubation and fry emergence and migratory periods of local fish populations (and to protect Redside Dace). • Where cofferdams are to be employed, dewatering effluent will be treated prior to discharge to receiving watercourses (OPSS 517). • Cofferdams will be constructed using pea gravel bags, sheet piling or other appropriate material to isolate the work area, and flow will be maintained at all stations. • Only clean material free of particulate matter will be placed in the watercourse (OPSS 1005 Streambed Material).	N/A

Environmental Component	Potential Impacts (Design/Construction/Operation)	Mitigation Measures	Monitoring
		• Fish isolated by construction activities (if present) will be captured by a qualified fisheries specialist and safely released to the watercourse (OPSS 182 General Specification for Environmental Protection for Construction In and Around Waterbodies and on Waterbody Banks).	
	The potential for spills or other materials/equipment from entering the water and impacting the aquatic environment.	**Section 4.2.2.2** discusses the best management/construction practices to be employed during construction to avoid/prevent spills or other materials/equipment from entering the water.	
	Impacts to the aquatic environment due to the exposure of soils (erosion and sedimentation).	Effective erosion and sedimentation control will be achieved throughout the project with careful planning and design, stringent construction supervision, monitoring of the site, and maintenance of control works throughout the operational life. An Erosion and Sedimentation Control Plan (including an erosion monitoring and sediment report program) will be developed during detail design prior to construction including measures to monitor and maintain erosion and sedimentation control during construction to ensure their effectiveness. See **Section 4.2.2.2** and **Section 4.3.3.2** for the proposed erosion and sedimentation control measures and the guidelines to be followed to ensure effective erosion and sedimentation control during construction. Standard erosion and sedimentation control measures will be followed during construction in accordance with OPSS 805 (Construction Specification for Temporary Erosion and Sediment Control Measures) to minimize construction-related impacts on surface water quality and fish habitat. See **Section 4.3.3.2**. for the detailed discussion about the proposed erosion and sedimentation control measures and the guidelines to be followed to ensure effective erosion and sedimentation control during construction. The following additional OPSSs (in addition to OPSS 805) related to erosion and sedimentation control are also recommended (to be installed pre-construction, maintained during construction, and removed post-construction following soil re-stabilization) to ensure that the erosion and sedimentation control measures are implemented including: • General Specification for Environmental Protection for Construction In and Around Waterbodies and on Waterbody Banks (OPSS 182) to cover the environmental protection requirements and mitigation measures that apply to construction involving work in and around waterbodies and on waterbody banks. • Construction Specification for Seed and Cover (OPSS 803) to stabilize disturbed areas. • Construction Specification for Topsoil (OPSS 802) and Sodding (OPSS 803) to address the requirements for stockpiling, placing and supplying topsoil and to cover the requirements for sodding. • General Specification for the Management of Excess Materials (OPSS 180) to ensure material generated during maintenance of sediment control measures will be taken off-site for disposal.	Site monitoring during construction as per the Erosion and Sedimentation Control Plan.
	Impacts to riparian vegetation/aquatic habitat.	Maintain riparian vegetation to the extent possible to help stabilize the watercourse banks, provide shading/cover for the watercourse, filter contaminants, and improve wildlife habitat and aesthetics. The proponent will be responsible for vegetation management. The following environmental protection/mitigation measures are recommended: • Prior to construction, trees/shrubs to be retained will be clearly identified in the field by the installation of tree/shrub protection barrier in accordance with OPSS 801 (Construction Specification for the Protection of Trees). • Trees/shrubs identified to remain, which become damaged by construction activities, will be repaired or replaced.	N/A

Environmental Component	Potential Impacts (Design/Construction/Operation)	Mitigation Measures	Monitoring
		• In areas where riparian vegetation removal is necessary to accommodate construction, measures to protect the local fish communities will include the following: no clearing of mature trees providing a bank stabilization function; no felling of trees into the watercourse; minimize the amount of debris produced from entering the watercourse; and, only clearing the vegetation required to complete the necessary works. Restoration and/or enhancement of aquatic habitat will be completed at the end of construction works at all watercourses. At a minimum, the following will be implemented as restoration/enhancement during the detail design phase of the project for all crossings where works (in-water or riparian) are proposed: • Banks and riparian areas will be planted with native grasses and shrubs to provide increased shading and allochthonous inputs to the watercourse. • Where restoration and enhancement will not suffice to offset/mitigate impacts, compensation will be employed. • Compensation plans, if necessary, will be completed during detail design in consultation with regulatory agencies.	
	Impacts to downstream habitats.	**See Section 4.2.2.2** for some general mitigation measures to manage stormwater which will help avoid/minimize impacts to the aquatic environment. Further details are provided in **Sections 4.7**.	N/A
Terrestrial Environment	Temporary displacement of and/or disturbance to vegetation and vegetation communities as a result of the construction of the DSBRT corridor.	Minimize encroachment/impacts to vegetation communities/natural areas associated with access and staging during construction to the extent possible. Prioritize avoidance of wetlands and forest to the extent possible. Implement the following general construction best management practices and environmental protection/mitigation measures during construction (and review/identify any additional measures during detail design through a further review of policies/guidelines and/or agency discussion): • consider erosion and sediment control measures outlined in the Erosion and Sediment Control Guide for Urban Construction (TRCA 2019a) and Silt Smart-Erosion and Sediment Control Effectiveness Monitoring and Rapid Response Protocol for Large Urban Development Sites (Credit Valley Conservation, MNDMNRF, MOE, DFO 2012); • include filter fabric along all tree protection fencing and edge management fencing to enhance protection from the spread of invasive, aggressive plant species; • implement methods for the short-term stabilization of soils, including but not limited to, coir fibre or a suitable alternative, as required; • utilize vegetation cover to protect any exposed surfaces and inhibit the establishment of invasive species in accordance with construction specific standards (i.e., OPSS 804 Construction Specification for Seed and Cover); • ensure topsoil from stockpiles is in accordance with construction specific standards (i.e., OPSS 802 Construction Specification for Topsoil); • place old field seed mix and mulching or erosion control blanket, in accordance with construction specific standards, in areas of soil disturbance to provide adequate slope protection and long-term slope stabilization; • ensure tree protection is in accordance with construction specifications (i.e., OPSS 801 Construction Specification for the Protection of Trees and the City of Toronto (Urban Forestry) Tree Protection Policy and Specifications for Construction Near Trees) to minimize impacts and ensure no construction activity will occur within the tree protection zone; • ensure tree protection hoarding plans are submitted and approved prior to permit issuance;	Monitoring measures to take place during transplanting of plant species to be developed during detail design, where feasible. Site monitoring during construction as per the Erosion and Sedimentation Control Plan. Preparation of an environmental monitoring and contingency plan, in accordance with TRCA/CLOCA Standards, as required to address potential emergencies during construction where valley or stream corridors, wetlands, woodlands and/or hazardous lands are impacted.

Environmental Component	Potential Impacts (Design/Construction/Operation)	Mitigation Measures	Monitoring
		• undertake riparian and valleyland management of impacted edges as required as per TRCA's Forest Edge Management Plan Guidelines (2004) (see below); and, • ensure efforts are made to prevent the spread of invasive plant species during construction both on and off site (see below). Sanitation of construction equipment will be undertaken in accordance with the Clean Equipment Protocol (2013) and at a minimum will include sanitation of construction vehicles and equipment prior to leaving and moving to the next site. A cleaning station will be set up, so vehicles and equipment can be inspected and cleaned regularly. Areas designated for protection must be clearly shown on all construction plans and marked in the field using tree protection barriers in accordance with the Erosion and Sediment Control Guide for Urban Construction (TRCA 2019a) and OPSS 801 – Construction Specification for the Protection of Trees. The City of Toronto (Urban Forestry) Tree Protection Policy and Specifications for Construction Near Trees will also be followed. Avoid regionally rare species wherever possible. Where these plant species cannot be avoided, salvage through transplanting into nearby vegetation communities with suitable habitat characteristics that will afford ongoing protection, where feasible (see **Section 4.2.7** for more details on rare plant species). Mitigation and monitoring measures to take place during construction will be further developed during the detail design phase.	
	Potential for siltation of natural vegetation arising from soil erosion of exposed soils.	Ensure an Erosion and Sedimentation Control Plan is in place prior to the start of construction (see **Section 4.2.2.2 and Section 4.3.3.2).**	Site monitoring during construction as per the Erosion and Sedimentation Control Plan.
	Potential for inadvertent spread of non-native invasive plants into natural areas during construction displacing native plant species over time.	Manage the inadvertent spread of aggressive or non-native plant species appropriately. Control non-native species that have become established to prevent the establishment of new non-native plants.	Monitoring of compensation planting areas will include contingencies to mitigate for invasive species presence/management.
	Potential for encroachment at watercourse crossings/valleylands and into riparian habitat.	Consider providing an access management plan to avoid/minimize encroachment at watercourse crossings, where feasible. Retain riparian habitat to the extent possible and at a minimum of 3 m to 5 m from the bank edge of any watercourse impacted during construction to ensure bank stability, mitigate erosion, and mitigate negative impacts to aquatic habitat. Install suitable tree protection fencing and erosion control fencing and ensure regular maintenance (e.g., filter fabric installed to delineate sections of vegetation to be retained to mitigate encroachment). Undertake restoration/enhancement of riparian habitat during construction immediately following the completion of work in riparian zones. Install suitable deep rooting graminoid, herbaceous and shrub species, with a variety of trees where suitable to prevent streambank erosion and improve riparian conditions and ensure plant species selected are native and/or non-invasive. For valleylands that are impacted, limit the zone of construction impacts and locate staging areas well outside of forested valleys. Install suitable tree protection fencing and erosion control fencing and ensure regular maintenance. Tree protection hoarding plans must be submitted and approved prior to permit issuance. Undertake restoration of newly impacted edges and carry out methods for the enhancement of these areas as outlined in **Section 4.2.4.1** (under forest edge management). Ensure plant species selected are native and/or non-invasive. Ensure the contractor provides a warranty on planted materials to ensure that the newly planted material survives and fulfils the intended function. A two-year warranty applies to planted materials when part of a restoration plan for the City of Toronto. Manage the spread of aggressive or non-native plant species appropriately.	N/A
Wildlife	Displacement of/disturbance to wildlife/wildlife habitat during construction.	Ensure that impacts to areas containing more sensitive wildlife habitat (e.g., natural areas/valleylands and designated natural areas) are minimized during construction to the extent	N/A

Environmental Component	Potential Impacts (Design/Construction/Operation)	Mitigation Measures	Monitoring
		possible and to maintain opportunity for wildlife movement through the natural areas/valleylands.	
	Barrier effects on wildlife passage during construction.	Minimize construction duration and disturbance in the vicinity of existing culverts and bridges to the extent possible to reduce the potential for increase in road mortality caused by wildlife avoidance of these structures.	N/A
	Wildlife/vehicle conflicts during construction.	Ensure wildlife salvage occurs prior to clearing and grubbing activities associated with construction where feasible, particularly in wetland habitats, to preserve vulnerable wildlife species (e.g., herpetofauna). Obtain all applicable Wildlife Collector's permits prior to any salvage activities.	N/A
	Potential impacts to migratory birds during construction.	A number of bird species recorded within the Study Area are afforded protection under the MBCA. Bird species protected under the MBCA were documented across a variety of habitat types within the Study Area. To comply with the requirements of the MBCA, ensure disturbance, clearing or disruption of vegetation where birds may be nesting is completed outside the migratory bird nesting timing window of April 1 to August 31. In the event that these activities must be undertaken from April 1 to August 31, a pre-clearing nest survey must be conducted by a qualified avian biologist to identify and locate active nests of species covered by the MBCA.	N/A
Species at Risk and Plant Species of Concern/Regionally Rare Plant Species	Potential disturbance to/ displacement of rare, threatened or endangered aquatic, plant and wildlife SAR and SAR habitat, and plant species of concern/regionally rare plant species during construction.	See **Section 4.2.7.2** for mitigation measures/commitments to future work during the detail design phase for SAR/SAR habitat and plant species of concern/regionally rare plant species. Impacts during construction will be minimized to the extent possible. Redside Dace: if it is determined during detail design that this species is present within Carruthers Creek (Crossing 14), the Redside Dace/coldwater timing window (July 1-September 15) must be adhered to rather than the warmwater window dictated by the reported thermal regime of the watercourse. Other required site-specific mitigation will be determined through agency consultation during detail design. In addition, if federally-listed aquatic SAR (i.e., Redside Dace) are present within a watercourse (to be determined during detail design), and dewatering will occur during construction, a Canada SARA permit may be necessary for the rescue of potentially stranded fish. American Eel: no additional site-specific mitigation will likely be required for this species, unless otherwise specified by MECP during detail design consultations.	Monitoring for SAR to take place as required during construction (based on any Ontario ESA/Canada SARA permit requirements/agreements).
Significant Natural Heritage Features	Temporary displacement of and/or disturbance to vegetation and vegetation communities associated with significant natural heritage features (designated natural areas, plan policy areas and regulation areas) as a result of construction of the DSBRT corridor. Potential for impacts to vegetation from construction in significant natural areas associated with equipment operating in areas identified for protection.	Clearly show designated natural areas, plan policy areas and regulation areas designated for protection on all construction plans and mark these areas in the field using tree protection barriers in accordance with the Erosion and Sediment Control Guide for Urban Construction (TRCA 2019a), OPSS 801 – Construction Specification for the Protection of Trees, and the City of Toronto (Urban Forestry) Tree Protection Policy and Specifications for Construction Near Trees. Minimize impacts during construction to the existing forest and wetland vegetation communities within these more sensitive significant natural heritage features to the extent possible. See **Section 4.2.4** for mitigation measures/commitments to future work for vegetation and vegetation communities/natural areas during the detail design phase. Comply with mitigation protocols already established for vegetation clearing, mitigation and compensation within and/or adjacent to environmentally sensitive areas, to the extent possible. Consult with external agencies (including TRCA, CLOCA, MECP, MNDMNRF, Parks Canada) and municipal staff during detail design to ensure compliance with the applicable environmental policy, guidelines and plans regarding acceptable mitigation/compensation protocols.	Preparation of an environmental monitoring and contingency plan, in accordance with TRCA/CLOCA Standards, as required to address potential emergencies during construction where valley or stream corridors, wetlands, woodlands and/or hazardous lands are impacted.
During Operation			
Watercourses and Hydrological Features	Water quality alterations due to roadway contaminants, mainly salt application in winter.	Mitigation for effects on water quality during operation of the DSBRT are included **Section 4.7**.	N/A

Environmental Component	Potential Impacts (Design/Construction/Operation)	Mitigation Measures	Monitoring
		For road salt, mitigation will follow Environment Canada's *Code of Practice for the Environmental Management of Road Salts* (2004) as well as the *Five-year Review of Progress: Code of Practice for the Environmental Management of Road Salts* (2012).	
Aquatic Environment	Potential impacts to the aquatic environment (fish and fish habitat) from the operation of the DSBRT are generally limited to water quality alterations due to roadway contaminants, mainly salt application in winter and hot asphalt during summer.	Mitigation for effects on water quality are included in **Section 4.7** and in **Section 4.2.2.3**.	N/A
Terrestrial Environment	Impacts to vegetation/vegetation communities as a result of the operation of the DSBRT.	New wetland areas will be created post construction as a result of changes in drainage related to the construction of the DSBRT corridor and this, in part, mitigates for removals of similar wetland types.	Where vegetation offsetting is determined and restoration of forest and/or wetland is additionally undertaken, maintenance associated with any prescribed restoration monitoring and maintenance of manicured areas during the operation and maintenance phase, including removal of dumped garbage, will be on-going.
	Potential for non-native and invasive species to become established during the operations phase.	Implement efforts to control non-native and invasive plant species that have become established, as well as prevent the establishment of new non-native and invasive plant species (see **Section 4.2.4.1** and **Section 4.2.4.2).**	Monitoring of compensation planting areas will include contingencies to mitigate for invasive species presence/management.
	Impacts of de-icing salts on plants growing adjacent to the road ROW (with typical exposure within 10 m to 30 m from the pavement edge).	Reduce the use of salt spray in lieu of an alternate, less harmful substance and ensure planting is undertaken with salt tolerant species that can withstand salt exposure where planting is undertaken close to the roadside, while planting less tolerant species further away from the roadside. Use native, salt tolerant species to provide screening where planted in high densities to aid in edge management, where newly exposed edges require protection.	N/A
Wildlife	Barrier effects on wildlife passage during operations/maintenance activities.	No new barriers to wildlife passage are expected to occur as a result of the operation of the DSBRT corridor. All major corridors associated with natural areas/valleylands will be maintained and where structure works will occur, crossing structures will mimic (or exceed suitability for wildlife crossing where appropriate) the existing crossings to facilitate wildlife passage.	N/A
	Potential disturbance to wildlife (activities and patterns) from noise, light and visual intrusion.	Disturbance to wildlife from any increase in noise, light and visual intrusion potentially caused by the operation of the DSBRT corridor is not expected to have any significant adverse effects as wildlife found within the Study Area are generally acclimatized to the presence of road infrastructure. Use reflectors to focus light beams onto the DSBRT and away from natural heritage features adjacent to the DSBRT corridor (to mitigate for the potential disturbance caused by light pollution from the proposed improvements to the transportation network). Mitigation for the potential of bird collisions with bus shelters constructed of glass will be further developed during detail design. The design will comply with Canadian Standards Association A460:19 Bird Friendly Building Design and Toronto Green Standard for Bird Control.	N/A
Species at Risk and Plant Species of Concern/Regionally Rare Plant Species	N/A	N/A	N/A
Significant Natural Heritage Features	N/A	N/A	N/A

4.3 Landforms/Physiography, Soils, Geology and Groundwater

4.3.1 Methodology

Although impacts to landforms/physiography, soils, geology and groundwater resources within the DSBRT study corridor have been avoided/minimized to the extent possible (since the BRT lanes and platforms/stops are generally in the median and curbside), some impacts are unavoidable in order to meet Metrolinx design standards and to accommodate the proposed widening and geometry associated with the DSBRT.

The environmental effects/impacts of the undertaking and the proposed environmental protection/mitigation measures are described separately for each discipline under the following three categories and, as much as possible:

- Footprint Impacts – long-term/permanent impacts on the existing features/resources located within the Study Area that will potentially be disturbed or displaced through the introduction of the DSBRT corridor;
- Construction Impacts – potential short-term/temporary disruption effects on the existing features/resources resulting from the actual construction of the DSBRT corridor; and,
- Operations Impacts – potential long-term disruption effects on the existing features/resources resulting from the operation/maintenance of the DSBRT corridor.

4.3.2 Landforms and Physiography

4.3.2.1 Footprint Impacts and Mitigation

The entire Study Area is located within the South Slope and the Iroquois Plain physiographic regions. Impacts to these landform features within the Study Area were assessed and determined to be fairly insignificant considering that the DSBRT corridor will be constructed within an area that has been previously disturbed by the original construction of Ellesmere Road, Kingston Road, Dundas Street and King Street/Bond Street (and other crossroads) within the Study Area, and by past and current land use practices, settlement and development that have already significantly impacted the landform features/physiography in the Study Area. For example, construction activities (such as road construction and watercourse alterations (including piping) to accommodate current infrastructure), have already resulted in impacts to the soils, groundwater, watercourses, terrestrial, riparian, and aquatic habitat, and significant natural heritage features within the Study Area.

Within the South Slope and Iroquois Plain physiographic regions, there is potential for impacts to the hydrologic cycle of the watersheds located within the Study Area (see **Section 4.2.2** for the impact assessment and mitigation measures outlined for

watercourses and hydrological features). In addition, soils of the South Slope are relatively impermeable so any precipitation that falls within this region quickly runs off to the local watercourses (TRCA 1999). **Section 4.2.3.2** and **Section 4.3.3.2** provide the impact assessment and mitigation measures proposed for soils (and the erosion/sedimentation control plan) within the Study Area.

Additionally, within the Iroquois Plain physiographic region, the beach deposits are a significant source of groundwater. The Iroquois beach deposits locally represent a shallow aquifer system along the southcentral part of the watershed that still serves as a potable drinking water source for the surrounding smaller communities (CLOCA 2004). The deposits provide groundwater discharge to streams in areas where stream valleys cut through the deposits into the underlying till. These deposits are thin with very high-water tables and can be easily contaminated, which in turn can result in impacts to the streams and aquatic life (CLOCA 2004). **Section 4.3.4** provides the impact assessment and mitigation measures proposed for groundwater.

4.3.2.2 Construction Impacts and Mitigation

Construction-related impacts to the landform/physiographic features within the Study Area are expected to be minimal considering that settlement/development have already significantly impacted/altered the landform features and physiology in the Study Area.

4.3.2.3 Operations Impacts and Mitigation

The operation and maintenance activities of the DSBRT corridor will not affect the landforms and physiographic features in the vicinity of the Study Area.

4.3.3 Bedrock Geology, Quaternary Geology and Soils

4.3.3.1 Footprint Impacts and Mitigation

Bedrock and Quaternary Geology

The bedrock within the Study Area consists of shale, limestone, dolostone and siltstone of the Georgian Bay Formation from the Upper Ordovician period (Ontario Geological Survey 1991). The quaternary geology consists of modern and older river deposits associated with the major watercourses, glacial lake deposits associated with Lake Iroquois and the Peel Ponds, and glacial ice deposits associated with the Laurentide Ice Sheet during the Wisconsinan glaciation (Sharpe 1980). A description of the impacts to each geological deposit is presented below for each municipality.

City of Toronto

Within the City of Toronto, the DSBRT corridor will impact 20.40 ha of glacial deposits of Newmarket/Northern/Bowmanville Till with low-medium permeability, 8.74 ha of glacial lake deposits with high permeability, and 3.46 ha of river deposits with variable permeability. A total area of 32.60 ha of geological deposits within the City of Toronto will be impacted.

City of Pickering

Within the City of Pickering, the DSBRT corridor will impact 10.82 ha of glacial deposits of Newmarket/Northern/Bowmanville Till with low-medium permeability, 26.51 ha of glacial lake deposits with low permeability, and 0.49 ha of river deposits with variable permeability. A total area of 37.82 ha of geological deposits within the City of Pickering will be impacted.

Town of Ajax

Within the Town of Ajax, the DSBRT corridor will impact 11.12 ha of glacial deposits of Newmarket/Northern/Bowmanville Till with low-medium permeability, 17.07 ha of glacial lake deposits with low permeability, and 1.75 ha of river deposits with variable permeability. A total area of 28.92 ha of geological deposits within the Town of Ajax will be impacted.

Town of Whitby

Within the Town of Whitby, the DSBRT corridor will impact 14.19 ha of glacial deposits of Newmarket/Northern/Bowmanville Till with low-medium permeability, 12.50 ha of glacial lake deposits with low permeability, 1.75 ha of river deposits with variable permeability, and 1.45 ha of organic deposits with high permeability. A total area of 29.89 ha of geological deposits within the Town of Whitby will be impacted.

City of Oshawa

Within the City of Oshawa, the DSBRT corridor will impact 5.79 ha of glacial deposits of Newmarket/Northern/Bowmanville Till with low-medium permeability, 3.93 ha of glacial lake deposits with high permeability, 1.53 ha of glacial lake deposits with low permeability, and 0.49 ha of river deposits with variable permeability. A total area of 11.74 ha of geological deposits within the City of Oshawa will be impacted.

The loss of these geological deposits as a result of the DSBRT corridor is unavoidable and required to meet Metrolinx design standards and to accommodate the proposed widening and geometry associated with the DSBRT.

Excess and Contaminated Soils

The long-term impacts on the existing soils within the Study Area that will be displaced or lost through the introduction of the DSBRT corridor are categorized as footprint impacts. The impacts to the terrain located within the Study Area have been minimized to the extent possible as the DSBRT infrastructure will be located where the existing municipal roads and existing settlement area have already altered the terrain.

However, a large volume of soil will be displaced by excavation activities. Excess soil may be generated that cannot be reused along the DSBRT corridor. The excess soil may be stained, odorous, containing debris or found to be contaminated. The excess soil will require management as waste. Final soil profiles will be defined during the detail design phase prior to construction activities. Regulatory requirements in place at the

time of construction and excess materials management guidelines and specifications (i.e., O. Reg. 406/19 – On-Site and Excess Soil Management, OPSS 180 – General Specification for the Management of Excess Materials, Management of Excess Soil – A Guide for Best Management Practices (MECP 2014), the Excess Soil Management Policy Framework (MECP 2016), and TRCA/CLOCA guidelines) will be used to develop an Excess Materials Management Plan during detail design to manage excess/contaminated soils.

The Excess Soil Management Policy Framework (MECP 2016) states that excess soil management and disposal have implications for greenhouse gas emissions. The transportation of excess soil around the province emits greenhouse gases which contributes to climate change. Local reuse of excess soil is therefore encouraged and can reduce emissions by reducing the distance excess soil is transported for reuse or disposal.

The disposal of excess soil within the 'Greenbelt Area' will be avoided and managed in accordance with the 'Protected Countryside' policies in the Greenbelt Plan (MMAH 2017), and 'A Culture of Conservation' policies contained in the Growth Plan (MMAH 2019). Disposal will comply with Section 3.4.2 of the Greenbelt Plan and Section 4.2.9 of the Growth Plan.

The On-Site and Excess Soil Management Regulation (O. Reg. 406/19) under the *Environmental Protection Act* also requires that any fill placed in environmentally sensitive areas meets Table 1 standards. Any soil placed on cropland or pasture must meet the definition of topsoil as per the *Municipal Act.*

4.3.3.2 Construction Impacts and Mitigation

Construction impacts on the existing soils within the Study Area include short-term or temporary disturbance to soils during construction activities. The soils within the Study Area range from being well-drained to moderately drained to imperfectly or poorly drained. The clay and loam soils located along the Study Area are more susceptible to erosion and will be impacted during construction activities. Consequently, soil disturbance associated grading, drainage improvements, culvert/structure modifications, etc., may result in erosion of, and sedimentation to, sensitive receiving watercourses. For this reason, an Erosion and Sedimentation Control Plan (including an erosion monitoring and sediment report program) will be developed during detail design prior to construction including measures to monitor and maintain erosion and sedimentation control during construction to ensure their effectiveness.

Standard erosion and sedimentation control measures will be followed during construction in accordance with OPSS 805 (Construction Specification for Temporary Erosion and Sediment Control Measures) to minimize construction-related impacts on surface water quality and fish habitat. Site-specific erosion and sedimentation control measures to be implemented prior to construction, maintained during construction and removed after construction (once soils have stabilized) will be identified prior to construction following a number of different guidelines including TRCA's Erosion and Sediment Control Guide for Urban Construction (2019a) and Silt Smart - Erosion and

Sediment Control Effectiveness Monitoring and Rapid Response Protocol for Large Urban Development Sites (Credit Valley Conservation, MNDMNRF, MOE, DFO 2012).

Erosion and sedimentation control measures are set out in **TABLE 4.5**:

These environmental protection measures will greatly reduce the potential for soil erosion and impairment of surface water quality and fish habitat.

As noted above under **Section 4.3.3.1**, during construction, a large volume of soil will be displaced by excavation activities. This may generate excess soils that cannot be reused as part of the construction of the DSBRT corridor. Therefore, there is potential for disturbance to/disposal of contaminated waste and/or soils during construction. **Section 4.3.3.1** outlines the mitigation measures that will be in place to manage excess/contaminated soil. In addition, surface water will be managed at the construction site to prevent contact with exposed soil and/or surface water that comes in contact with exposed soils will be treated using stormwater detention ponds, basins, traps and bags.

4.3.3.3 Operations Impacts and Mitigation

Bedrock geology, quaternary geology and soils will not be disturbed by the operation and maintenance activities of the DSBRT corridor.

4.3.4 Groundwater Resources

4.3.4.1 Footprint Impacts and Mitigation

Water Wells

There are over 500 water wells in the Study Area that may be permanently affected by the DSBRT footprint, and more specifically by construction dewatering that may be required. Additional mapping of water wells in these specific areas and desktop review would be required to develop a short list of wells that could be affected by the DSBRT project, followed by mail surveys and/or field verification visits to mitigate potential impacts to these shortlisted wells. There is a potential that some older private water wells are still being used despite being in an area that is serviced by municipal distribution systems that are supplied from Lake Ontario.

Municipal Water Supply

Groundwater is not used by municipalities in or near the study area and, therefore, the DSBRT project would not threaten such municipal drinking water supplies. However, the study area does include EBAs that transect it from north to south along water courses associated with potential threats to source water. Specifically, the EBAs include potential threats due to petroleum products spills from a pipeline or bulk petroleum plant north of the study area, and also from major sanitary sewer trunk main breaks into water courses near the shore of Lake Ontario, that could result in a threat to water treatment plant intakes in Lake Ontario. Of these EBAs, those associated with sanitary sewage releases to water courses are potentially relevant to the DSBRT project, if construction activities were to cause a major break in a trunk sewer main where it crosses a water

course. The applicable source water protection policy for such an occurrence applies to the MECP SAC, specifically the prompt notification if such an event to the water treatment plant operators upon reporting to the SAC.

Aquifers

Aquifers identified in the Study Area include the Scarborough Aquifer in the west section, west of the Rouge Valley, and numerous shallow HVAs throughout. The HVAs may have shallow wells that are in use and may be susceptible to impacts by the DSBRT project due to potential construction dewatering. See **Section 4.3.4.2** below for mitigation associated with construction dewatering.

Surface Water Bodies

Several watercourses cross the Study Area flowing north to south towards Lake Ontario. Duffins Creek was identified as having significant base flow from groundwater. Any of the Study Area watercourses could potentially be impacted by discharge during construction dewatering of groundwater and such impacts are typically mitigated by conditions of PTTWs or Environmental Activity and Sector Registration (EASR) approvals and a required Water Taking and Discharge Plan. See **Section 4.3.4.2** below for more details.

4.3.4.2 Construction Impacts and Mitigation

Construction and associated dewatering activities may be required at 13 locations within the DSBRT footprint, specifically at Petticoat Creek culvert (C-01), Dunbarton Creek culvert (C-02), CN Rail bridge – York Subdivision (B-04), Duffins Creek bridge (B-05), Miller's Creek culvert (C-04), Carruthers Creek culvert (C-05), Lynde Creek culvert (C-06), Lynde Creek bridge (B-07), Pringle Creek culvert (C-07), CP Rail bridge – Belleville Subdivision (B-08), Oshawa Creek bridge – King Street (B-09) and Oshawa Creek bridge – Bond Street (B-10). In addition, dewatering maybe required to replace a section of watermain west of the Pine Creek culvert (C-03). The Pine Creek culvert may also be extended, which may require construction dewatering. In addition, dewatering may be required to replace a section of watermain west of the Pine Creek culvert (C-03). The Pine Creek culvert may also be extended, which may require construction dewatering.

MECP requires a PTTW or an EASR for groundwater takings exceeding 50,000 liters per day (L/day). For construction, a PTTW is required for dewatering extraction rates that exceed 400,000 L/day. An EASR is required for a rate between 50,000 and 400,000 L/day. Groundwater control or unwatering must be designed and implemented by a specialist contractor and be drawn down to a depth of at least 1 m below the excavation base level, or as necessary, to ensure stable conditions during excavation. Surface water shall be directed away from the excavation areas to prevent ponding of water. A category 3 PTTW is required by the MECP for water takings in excess of 400,000 L/day. The Contractor will be responsible for obtaining any required discharge approvals and documentations.

In addition, as noted above, several surface watercourses flow across the Study Area from north to south towards Lake Ontario, and numerous shallow HVAs are present that may still be in use despite being in a highly urbanized area with a municipal potable water distribution system that does not rely on groundwater. In addition, 500 water wells (94 of which were identified within the construction footprint) are located in the Study Area. These surface watercourses, shallow HVAs and water wells may be affected by the construction of the DSBRT project. Specifically, construction dewatering may interfere with the quantity and quality of groundwater in nearby water wells and the discharge could impact the shallow HVAs and surface watercourses. Any required MECP approvals will have elements, that when implemented, will mitigate interference and impacts from construction dewatering (e.g., such as best practices, prescriptive regulation, monitoring and reporting). Mitigation of interference and/or impacts is typically addressed by EASRs/PTTWs. Any dewatering calculations can be completed during detail design and PTTWs and/or EASRs obtained ahead of construction. The MECP requires at least three months to review a Category 3 PTTW application. The dewatering volumes, zones of influences, discharge plans, and impact assessment will be completed during the detail design phase. A Water Taking and Discharge Plan will be developed during the detail design phase to document potential impacts and mitigation associated with construction dewatering activities.

4.3.4.3 Operations Impacts and Mitigation

Post-construction of the DSBRT, surface water drainage of melted snow during the de-icing season may result in road salt related impacts to soil, groundwater and surface water. This surface water drainage must be managed/controlled through the standard drainage engineering/municipal storm sewer system design to mitigate impacts to surface water.

Water wells in shallow HVAs that are currently in use within the Study Area for potable purposes must also be considered in order to avoid impacts to groundwater at these locations post-construction. This requires a better understanding of water wells that are in use within the Study Area proximal to the proposed dewatering locations.

4.3.5 Summary of Potential Impacts, Mitigation Measures and Monitoring

The potential impacts, mitigation measures and monitoring are summarized in **TABLE 4.6**.

TABLE 4.6. SUMMARY OF POTENTIAL IMPACTS, MITIGATION MEASURES AND MONITORING: LANDFORMS/PHYSIOGRAPHY, SOILS, GEOLOGY AND GROUNDWATER

Environmental Component	Potential Impacts (Design/Construction/Operation)	Mitigation Measures	Monitoring
During Detail Design			
Landforms/Physiography	Impacts to the South Slope and Iroquois Plain physiographic regions were determined to be fairly insignificant considering that the DSBRT corridor will be constructed within an area that has been previously disturbed by the original construction of roadways within the Study Area, and by past and current land use practices, settlement and development that have already significantly impacted the landform features/physiography in the Study Area.	N/A	N/A
	Potential for impacts to the hydrologic cycle of the watersheds within the physiographic regions located within the Study Area.	See **Section 4.2.2** for the mitigation measures outlined for watercourses and hydrological features.	N/A
	Impacts to soils, and erosion and sedimentation within the physiographic regions.	See **Section 4.2.3.2 and Section 4.3.3.2** for the mitigation measures proposed for soils (and the erosion/ sedimentation control plan).	Site monitoring during construction as per the Erosion and Sedimentation Control Plan.
	Impacts to the groundwater/aquifer system including contamination of high-water tables.	See **Section 4.3.4** for the mitigation measures proposed for groundwater.	N/A
Bedrock Geology, Quaternary Geology and Soils	Impacts to geological deposits (glacial deposits, glacial lake deposits, river deposits and some organic deposits) within the Study Area including 32.60 ha within the City of Toronto, 37.82 ha within the City of Pickering, 28.92 ha within the Town of Ajax, 29.89 ha within the Town of Whitby, and 11.74 ha in the City of Oshawa.	The loss of these geological deposits as a result of the DSBRT corridor is unavoidable and required to meet Metrolinx design standards and to accommodate the proposed widening and geometry associated with the DSBRT.	N/A
	Impacts to (displacement/ loss of) existing soils within the Study Area due to excavation activities. Generation of excess soils (which may be stained, odorous, containing debris or found to be contaminated) that cannot be reused along the DSBRT corridor and will require management as waste. Potential for excess soil management and disposal (including transportation) to have implications for greenhouse gas emissions. Disposal of excess soils within the 'Greenbelt Area'. Placement of fill in environmentally sensitive areas. Soil conditions and soil/earth slope stability within the Study Area varies locally.	Impacts to the terrain located within the Study Area have been minimized to the extent possible as the DSBRT infrastructure will be located where the existing municipal roads and existing settlement area have already altered the terrain. Define final soil profiles during the detail design phase prior to construction activities. Meet regulatory requirements in place at the time of detail design and excess materials management guidelines and specifications (i.e., O.Reg. 406/19 – On-Site and Excess Soil Management, OPSS 180 – General Specification for the Management of Excess Materials, Management of Excess Soil – A Guide for Best Management Practices (MECP 2014), the Excess Soil Management Policy Framework (MECP 2016), and TRCA/CLOCA guidelines) to develop an Excess Materials Management Plan during detail design to manage excess/contaminated soils. Encourage the local reuse of excess soil which can reduce emissions by reducing the distance excess soil is transported for reuse or disposal. Avoid the disposal of excess soil within the 'Greenbelt Area' and manage in accordance with the 'Protected Countryside' policies in the Greenbelt Plan (MMAH 2017), and 'A Culture of Conservation' policies contained in the Growth Plan (MMAH	N/A

Environmental Component	Potential Impacts (Design/Construction/Operation)	Mitigation Measures	Monitoring
		2019). Adhere to Section 3.4.2 of the Greenbelt Plan and Section 4.2.9 of the Growth Plan as follows: • Municipalities must develop excess soil reuse strategies as part of planning for growth and development; AND • Municipal planning policies and relevant development proposals must incorporate best practices for the management of excess soil generated and fill received during development or site alteration, including *infrastructure* development, to ensure that: ○ any excess soil is reused on-site or locally to the maximum extent possible and, where feasible, excess soil reuse planning is undertaken concurrently with development planning and design; ○ appropriate sites for excess soil storage and processing are permitted close to areas where proposed development is concentrated or areas of potential soil reuse; and, ○ fill quality received and fill placement at a site will not cause an adverse effect with regard to the current or proposed use of the property or the natural environment, and is compatible with adjacent land uses. Ensure that any fill placed in environmentally sensitive areas meets Table 1 standards as per the On-Site and Excess Soil Management Regulation (O. Reg. 406/19) under the *Environmental Protection Act*. Any soil placed on cropland or pasture must meet the definition of topsoil as per the *Municipal Act.* It is recommended that site-specific investigations (including boreholes/test pits and visual inspection – in combination with further geotechnical investigations) be undertaken during the detail design phase in the vicinity of areas of soil disturbance as necessary to obtain soils characteristics data.	
Groundwater	Water well interference	Additional inspection/verification of the individual water well records (and a desktop review) will be required to verify the list of wells and a map of their locations. Any further evaluations would likely require mail surveys/field verification activities in order to ensure impacts to these water wells are mitigated.	N/A
During Construction			
Landforms/Physiography	N/A	N/A	N/A
Bedrock Geology, Quaternary Geology and Soils	Short-term or temporary disturbance to existing soils within the Study Area during construction activities which may result in erosion of, and sedimentation to, sensitive receiving watercourses.	Develop an Erosion and Sedimentation Control Plan (including an erosion monitoring and sediment report program) during detail design prior to construction including measures to monitor and maintain erosion and sedimentation control during construction to ensure their effectiveness. Follow standard erosion and sedimentation control measures during construction in accordance with OPSS 805 (Construction Specification for Temporary Erosion and Sediment Control Measures) to minimize construction-related impacts on surface water quality and fish habitat. Identify site-specific erosion and sedimentation control measures to be implemented prior to construction, maintained during construction and removed after construction (once soils have stabilized) prior to construction following a number of different guidelines including TRCA's Erosion and Sediment Control Guide for Urban Construction (2019a) and Silt Smart - Erosion and Sediment Control Effectiveness Monitoring and Rapid Response Protocol for Large Urban Development Sites (Credit Valley Conservation, MNDMNRF, MOE, DFO 2012).	Site monitoring during construction as per the Erosion and Sedimentation Control Plan.

Environmental Component	Potential Impacts (Design/Construction/Operation)	Mitigation Measures	Monitoring
		Erosion and sedimentation control measures will include the following to greatly reduce the potential for soil erosion and impairment of surface water quality and fish habitat: • placing flow checks at regular intervals in ditches down-gradient from areas of soil disturbance in rural sections; • stabilizing/reinforcing ditches based on ditch slope down-gradient from areas of soil disturbance in rural sections; • managing surface water at the construction site to prevent contact with exposed soils and/or treating surface water that comes in contact with exposed soils using stormwater detention ponds, basins, traps and bags; • protecting inlets to catch basins and maintenance holes in urban sections; • placing silt fence along stream margins in areas of soil disturbance; • limiting the extent and duration that soils are exposed to the elements to the minimum area and time necessary to perform the work; • applying old field seed and mulch, tackifier and/or erosion control blanket in areas of soil disturbance to provide adequate slope protection and long-term slope stabilization; and, • monitoring and maintenance of erosion and sedimentation control measures during construction to ensure their effectiveness. The potential impacts of the proposed construction works on soil stability/earth slopes should be assessed along with the more detailed soils data prior to construction and appropriate mitigation measures to maintain soil and earth slope stability should be identified and incorporated into the design.	
	Potential for disturbance to/disposal of contaminated waste and/or excess soils during construction.	See **Section 4.3.3.1** for mitigation measures to manage excess/contaminated soil. In addition, surface water will be managed at the construction site to prevent contact with exposed soil and/or surface water that comes in contact with exposed soils will be treated using stormwater detention ponds, basins, traps and bags.	N/A
Groundwater	Construction Dewatering	• 94 water wells were identified within the construction footprint of the DSBRT project that may require abandonment before or during construction in accordance with O. Reg. 903 (as amended); AND • A Water Taking and Discharge Plan will be developed during the detail design phase to document potential impacts and mitigation associated with construction dewatering activities. The dewatering volumes, zones of influences and discharge plans, impact assessment will be completed during detail design phase.	• Volumes of groundwater discharge must be continuously monitored at discharge locations and a total daily volume be recorded to ensure compliance of the PTTW maximum flow rate.
During Operation			
Landforms/Physiography	N/A	N/A	N/A
Bedrock Geology, Quaternary Geology and Soils	N/A	N/A	N/A
Groundwater	N/A	N/A	N/A

4.4 Tree Inventory

4.4.1 Methodology

An impact assessment was undertaken to determine impacts to tree resources as a result of the preferred design alternative/footprint of the DSBRT. This assessment was conducted using the grading limits provided to LGL by Parsons on November 9, 2020. Trees recommended for removal include trees within or outside the grading limits that would not be able to withstand construction related impacts. Trees identified as being impacted (or injured) require work within the minimum tree protection zone (TPZ); however, impacts to these trees are considered to be minor and it is likely that these trees will survive post construction. Trees identified as being retained are considered to be minimally affected and will be protected through mitigation measures.

The environmental effects/impacts of the undertaking are outlined below. In this case, the footprint and construction impacts have been combined and are discussed together in **Section 4.4.2** to allow for the discussion of impacts per municipality as the removal of existing trees is considered a long-term, permanent impact as a result of the introduction of the DSBRT corridor while the impacts/injury to trees are considered to be a short-term/temporary disruption effect resulting from the construction of the DSBRT corridor. The proposed environmental protection/mitigation measures are described separately for tree resources based on footprint impacts (**Section 4.4.3**) and construction impacts (**Section 4.4.4**).

The operation and maintenance activities of the DSBRT corridor will not affect the existing tree resources with the exception of impacts to trees as a result of salt spray. See **Section 4.2.4.3** for mitigation measures to protect trees from salt spray.

4.4.2 Potential Impacts (Footprint and Construction Impacts Combined)

A total of 3,278 trees have been identified for removal as a result of the proposed DSBRT. In addition, a total of 17 trees will be impacted/injured and 4,031 trees will be retained. A summary of the results of the impact assessment is presented in **TABLE 4.7** per municipality within the Study Area. The results of the impact assessment are outlined in **Appendix D**, including a description of the reason for removal of or impact/injury to each tree. As noted above, the removal of trees is considered a footprint impact and the impact/injury to trees is considered a construction impact.

TABLE 4.7. SUMMARY OF TREE IMPACTS WITHIN THE STUDY AREA BY MUNICIPALITY

Municipality	Number of Trees to be Removed	Number of Trees to be Impacted (Injured)	Number of Trees to be Retained	Total Number of Trees by Municipality
City of Toronto	1,357	270	2,535	4,162
City of Pickering	1,070	135	438	1,643
Town of Ajax	321	98	622	1,041

Municipality	Number of Trees to be Removed	Number of Trees to be Impacted (Injured)	Number of Trees to be Retained	Total Number of Trees by Municipality
Town of Whitby	389	40	171	600
City of Oshawa	141	75	264	480

Impacts to trees within the City of Toronto were further assessed to determine the number of trees that will be removed or impacted per tree By-law category. **TABLE 4.8** provides the summary of impacts to trees within the City of Toronto per tree By-law category.

TABLE 4.8. SUMMARY OF IMPACT ASSESSMENT PER TORONTO TREE BY-LAW CATEGORIES

City of Toronto Tree By-law Category	Trees Identified for Removal	Trees Identified as Impacted (Injured)	Trees Identified for Retention
Category 1: Trees with a diameter of 30 cm or more on private property.	0	0	0
Category 2: Trees with a diameter of 30 cm or more on private property, within 6 metres of the Study Area.	122	65	153
Category 3: Trees of all diameters on City owned parkland.	18	12/	37
Category 4: Trees of all diameters within the Ravine and Natural Feature Protection Limit.	115	67	1,532
Category 5: Trees of all diameters within the City road allowance, adjacent to the Study Area.	857	40	347
Other Trees			
Trees 30 cm DBH or less on private property*	245	86	4466
Total	1,357	270	2,535

*Trees do not meet the requirements of a Toronto Tree By-law Category (i.e., trees located on private property that are less than 30 cm DBH).

Impacts to the two tree SAR identified within the Study Area, the Kentucky coffee-tree and Butternut, were assessed and are described above in **Section 4.2.7.1**. Kentucky coffee-tree is regulated as 'Threatened' under the Ontario ESA and the Canada SARA (Schedule 1). Butternut is regulated as 'Endangered' under the Ontario ESA and the Canada SARA (Schedule 1).

4.4.3 Footprint Mitigation

The footprint of the DSBRT has been minimized to the extent possible to ensure that the maximum number of trees have been retained. The grading limits/DSBRT footprint is outlined in **Appendix D** (see Figures 2.1-2.108). During the detail design phase,

impacts to trees must be reviewed to reflect any refinements to the detail design, such as revised grading limits, and to consider site-specific mitigation measures such as refinement of/exceptions to design criteria, the use of retaining walls and clear zone barriers for tree protection and other site-specific measures to be implemented on a case-by-case basis. A gap analysis must also be undertaken during the detail design phase prior to construction should refinements and changes to the geometry of the preferred design alternative/DSBRT footprint occur. The gap analysis must be undertaken to ensure that all trees are surveyed and impacts to trees within the Study Area are adequately addressed. In particular, the trees at the intersection of Thickson Road and Dundas Street East shall be surveyed. The gap analysis must be undertaken in accordance with municipal and TRCA/CLOCA requirements.

A total of 3,278 trees have been identified for removal as a result of the proposed DSBRT. Compensation for the removal of trees within the Study Area will be provided. A review of the Metrolinx Vegetation Guideline (2020), TRCA Guideline for Determining Ecosystem Compensation (TRCA 2018) and the TRCA Forest Edge Management Plan Guidelines (2004) was undertaken to determine compensation requirements for tree loss within the Study Area.

A preliminary analysis of the compensation required for the removal/impacts (injury) of roadside trees within the Study Area is provided below. However, it should be noted that the Metrolinx Vegetation Guideline (2020) is currently under review by municipal agencies. As such, refinements to compensation requirements will be undertaken during detail design at such time when tree removal permits have been approved by municipal agencies. Compensation requirements as outlined by City of Toronto and Town of Whitby staff are also provided below.

Metrolinx Vegetation Guideline (2020)

Compensation for the removal of trees and vegetation within the Study Area was determined based on the Metrolinx Vegetation Guideline (2020). The By-law and Ecological Compensation Approach was applied for compensation purposes for removals within designated natural areas. For those trees identified for removal outside of a designated natural area, the By-law approach was implemented. The results of the compensation analysis are presented below. During detail design, the compensation analysis for roadside trees must be updated. The ecological compensation approach (Metrolinx Vegetation Guideline 2020) will only apply to those trees located on Metrolinx property. The remainder of the By-law regulated trees located on private or city-owned property will be compensated for based on the requirements of applicable By-laws.

Tree Removals Within a Designated Natural Area

As noted above, the By-law and Ecological Compensation Approach was applied to tree removals within designated natural areas. Where ecological compensation is greater than by-law/regulation requirements, the by-law/regulation must be followed and the difference between the two will be implemented through ecological compensation. As such, tree compensation for removals was calculated using the By-law and Ecological Compensation Approach. A total of 244 trees were identified for removal within a

designated natural area/significant natural heritage feature including the RNFP Boundary, Environmentally Sensitive/Significant Areas, Provincially Significant Wetlands, Areas of Natural and Scientific Interest, Rouge National Urban Park Management Plan Area, Carolinian Core Natural Areas/Carolinian Existing/Potential Connections and the Greenbelt Plan. See **Appendix D** (Table 6a) for a summary of the number of trees removed per size class and the number of trees required as compensation for the ecological compensation approach utilizing the individual tree method (total 2,274 compensation trees required). See **Appendix D** (Table 6b) for a summary of the number of trees required for compensation (total 496 compensation trees) based on the By-law approach for those trees located within designated natural areas. For tree removals in municipalities that do not have a specified replacement ratio, the baseline compensation (replacement ratio 1:1) as outlined in the Metrolinx Vegetation Guideline (2020) was applied.

Tree Removals Outside of Designated Natural Areas

For tree removals outside of designated natural areas, the By-law approach was applied to the entire Study Area. Compensation ratios for the by-laws were obtained from the Metrolinx Vegetation Guideline (2020). Where municipal by-laws do not have specific compensation ratio requirements, the baseline approach (1:1 replacement ratio) as outlined in the Metrolinx Vegetation Guideline (2020) was applied. A total of 5,259 compensation trees are required for removals outside of designated natural areas (see **Appendix D**, Table 7 for a summary of the tree removals and compensation requirements required for trees outside of designated natural areas).

TRCA's Guideline for Determining Ecosystem Compensation (2018)

Within TRCA's jurisdiction, it is recommended that compensation for trees also be considered in accordance with TRCA's Guideline for Determining Ecosystem Compensation (2018). See **Section 4.2.4.1** for a discussion regarding compensation for the loss of forest/wetland communities as a result of the DSBRT corridor. If compensation is undertaken, reporting components will include a description of impacted ecosystems, a description of any proposed compensation locations, a proposed work plan, detail design drawings, construction phasing plan, monitoring plan, etc. When suitable restoration sites cannot be identified, the option to provide cash-in-lieu will be discussed and will adhere to criteria set out in the *Guideline for Determining Ecosystem Compensation and Appendices* (TRCA 2018). Cash-in-lieu compensation must be submitted prior to permit issuance.

TRCA's Forest Edge Management Plan Guidelines (2004)

See **Section 4.2.4.1** for a discussion regarding the loss of forest vegetation/vegetation communities as a result of the DSBRT corridor, and forest edge management recommendations.

City of Toronto's Compensation Requirements

The compensation ratios for the removal of trees within the City of Toronto (and other requirements) were provided by City staff in comments received in November 2020 and April 2021 and are as follows:

- Compensation/replacement ratios by tree category for all By-law regulated trees on private property and city owned property will be based off of applicable By-laws and includes:
    - Private tree located on the Project Site: 3:1;
    - Private tree located on property adjacent to the Project Site or on the boundary of the Project Site and adjacent property: 3:1;
    - Park tree: 3:1;
    - RNFP tree: healthy tree >10 cm: 3:1; healthy tree <10 cm: 1:1; poor condition tree: 1:1; tree injury: 1:1; hedge removal: 1 tree per 5 m of hedge removed; and,
    - City tree: 3:1.
- Trees located on confirmed Metrolinx property may follow the Metrolinx Vegetation Guideline (2020) for compensation;
- During detail design, consultation with private property owners will be required before any tree removals and or tree impacts/injuries occur on private property; and
- Removal of any By-law protected ash trees will require a permit from the City of Toronto. Removal of any By-law protected ash trees infested with EAB will require a permit exemption from the City of Toronto.

Town of Whitby's Compensation Requirements

The compensation requirements for the removal of trees within the Town of Whitby were provided by Town staff in comments received in December 2020 and are as follows:

- Replanting is required within the Dundas Street corridor as part of the DSBRT project at a minimum 2:1 ratio, at locations approved by the municipality, with additional compensation depending on the circumstances, as well as consideration of assessed value;
- Financial compensation is required for the value of the trees (at the time of removal/impact) including the cost and administration of replanting requirements in the urban areas on and adjacent to Dundas Street;

- Additional trees to be transplanted (where feasible) within the DSBRT medians or specific features will not be included in the replanting compensation;
- Any monetary compensation from tree loss must be directed to the Town of Whitby Tree Reserve Budget for future tree planting elsewhere in the Town. Areas in and around that are impacted by the project will be prioritized;
- The specifics of the compensation package for the value of the trees must be completed during the detail design with advance plantings undertaken where applicable and appropriate;
- An ongoing maintenance and establishment program, at the proponent's cost, for a two-year period after planting, including regular watering as necessary, will be a requirement for replacement and transplanted trees planted as part of the project;
- The proponent is encouraged to provide reasonable compensation to private property owners for trees removed or impacted on private property, similar to that provided to the municipality;
- Municipal trees identified to be retained and requiring tree protection must be assessed by Town Forestry staff for a period of five years after completion of the project. If any of these trees require removal within this time period, as a result of decline, the Town will receive monetary compensation for the total value of the tree prior to initiation of works associated with the project, the cost of removal and all replacement costs. The Town will require a surety bond equal to this amount; and,
- Notification of tree removal and or/impact to trees, for both public and private trees, will be the responsibility of the proponent, and must be provided to all affected residents and business owners.

Trees that are suitable candidates for transplanting must be identified at the detail design stage, where feasible. When determining suitable candidates, tree size, species, site conditions, and time of year must all be considered, and a plan for transplanting must be developed. Trees should only be moved once and should be transplanted immediately whenever possible. Trees identified for transplanting on Town property should be assessed by Town Forestry staff and transplanting of trees (where feasible) will require prior approval determined through consultation with the Town.

Liaison with Municipalities and Regulatory Agencies

Further correspondence with lower and upper tier municipalities and regulatory agencies, such as TRCA, CLOCA, MECP, and Parks Canada will occur during detail design to discuss tree compensation and restoration plans. Refinements to compensation requirements will be undertaken at such time when tree removal permits have been approved by municipal agencies. Compensation (as well as all restoration/replanting plans) must be submitted to municipal staff prior to permit

issuance. Tree protection hoarding must be installed and approved prior to permit issuance.

During detail design, if it is determined that impacts to trees will occur within the Rouge National Urban Park beyond the existing road ROW, consultation with Parks Canada must be undertaken.

Consultation will be undertaken with the Study Area municipalities during the detail design phase to reconfirm the requirements for tree removal permits associated with the municipal tree protection By-laws. Where required, tree removal permits will be obtained from the Study Area municipalities prior to the start of construction. In addition, municipal agencies will be provided with the ability to perform on site inspections in regard to tree planting, transplantation and tree protection during implementation of the project, as required.

Butternut Health Assessment

See **Section 4.2.7.1** for the requirements for a detailed Butternut survey and Butternut Health Assessment to be completed during detail design.

Planting Plans

During detail design, planting plans will be prepared by a Landscape Architect for the tree plantings proposed as part of the compensation required. The planting plans will be developed in accordance with municipal standards for landscaping/tree requirements. Restoration plans and replanting plans (along with erosion control fencing plans) must be submitted prior to permit issuance. Consideration will be given to below ground infrastructure when developing the planting plans. Specifically, the limitations associated with tree planting in the vicinity of City of Toronto water infrastructure (and in the vicinity of the infrastructure of the other Study Area municipalities) must be considered during detail design when the locations of the buried infrastructure and the DSBRT infrastructure are better known.

During the development of the planting plans during detail design, municipal staff will be given the opportunity to comment on tree planting specifications, species selection and planting locations. The proponent must provide a warranty on planted materials to ensure that the newly planted material survives and fulfils the intended function. A two-year warranty applies to planted materials when part of a restoration plan for the City of Toronto. **Section 4.2.4.1** provides further details on the plantings plans to be prepared during detail design.

Transplanting

Opportunities to transplant trees identified for removal within the Study Area will be considered during the detail design phase, where feasible. Where and feasible, trees that measure less than or equal to 10 cm DBH and are in good health that have been identified for removal will be transplanted. Of the 3,278 trees identified for removal, a total of 966 trees less than or equal to 10 cm DBH and in good health are within the

Study Area and will be considered for transplanting, where feasible. However, some of these trees may be located in proximity to underground utilities and opportunities for transplanting may be limited in these areas (due to regulations/limits on the use of mechanical equipment for transplanting).

Transplanting, where feasible, will be undertaken in accordance with best management practices and will be in accordance with American National Standard (ANSI) A300 (Part 6) – Transplanting. Once the tree has been removed from the ground, it must be planted as soon as possible. If the tree cannot be replanted on the same day it has been removed from the ground, the root zone of the tree must be protected with moist mulch or soil and the tree will be placed in a shaded area. The root system of the tree must not be allowed to dry out. Post-planting monitoring will be undertaken be a qualified arborist to monitor the health of the trees and provide recommendations for mitigation such as watering, pruning or fertilizing.

Heritage Trees

During detail design, efforts will be undertaken to preserve those trees that are located on properties listed on Heritage Registers and are considered part of a cultural heritage landscape. The retention and protection of heritage trees must be made a priority. To the extent possible, trees located on heritage properties will be retained. Compensation for the removal of any trees located on heritage properties that cannot be retained will be in accordance with the requirements outlined in the Metrolinx Vegetation Guideline (2020).

4.4.4 Construction Mitigation

The footprint of the DSBRT has been minimized to the extent possible to ensure that the maximum number of trees have been retained. The following recommendations are provided to ensure that impacts to all retained trees during construction are minimized. The tree mitigation measures outlined are based on municipal standards within the Study Area including the City of Toronto Tree Protection Policy and Specification for Construction Near Trees (2016) and the Ontario Provincial Standard Specification (OPSS) 801 - Construction Specification for the Protection of Trees. Designation of a tree protection zone (TPZ) is imperative for the protection of trees (roots, trunks, branches) adjacent to construction works. The TPZ will restrict construction related machinery and activities from damaging trees identified for protection. The recommended TPZs for trees within the Study Area are presented below in **TABLE 4.9.** This TPZ is the minimum distance from the tree trunk required for protection, and it varies depending on the diameter of the tree.

TABLE 4.9. MINIMUM TREE PROTECTION ZONES

Trunk Diameter (DBH)	Minimum Tree Protection Zones	City of Toronto Ravine and Natural Feature Protection By-law Minimum TPZ
<10	1.2	1.2

Trunk Diameter (DBH)	Minimum Tree Protection Zones	City of Toronto Ravine and Natural Feature Protection By-law Minimum TPZ
10-29	1.8	3.6
30-40	2.4	4.8
41-50	3.0	6.0
51-60	3.6	7.2
61-70	4.2	8.4
71-80	4.8	9.6
81-90	5.4	10.8
91-100	6.0	12.0
>100	6 cm protection for each 1 cm diameter	12 cm protection for each 1 cm diameter

Tree Protection Recommendations

At a minimum, the following tree protection measures will be implemented during construction to ensure no impacts occur to trees designated for retention including those trees identified as impacted/injured:

- Delineation of the disturbance limits within work areas will be clearly defined;
- The Site Supervisor must be familiar with applicable policy and be cognizant of the purpose and function of TPZs;
- Prior to the start of any site work, the proponent will supply and install tree protection barriers around each tree designated for protection;
- Tree protection fencing for all trees outside of the Toronto RNFP boundary will be comprised of orange plastic web snow fencing on a wood frame;
- Tree protection fencing for trees located in the City of Toronto Ravine and Natural Feature Protection Area will be comprised of plywood hoarding. Proof of installed tree protection hoarding must be submitted for approval prior to permit issuance;
- Heavy machinery must not to be operated within the TPZ (including overhead swinging of machine arms);
- Construction materials, equipment, soil, construction waste or debris are not to be stored within the TPZ or dripline of the trees identified for protection;
- There will be no movement or parking of vehicles, placement of equipment or pedestrian traffic within the TPZ;
- No signs or objects will be displayed or affixed to any protected trees;
- Disposal of any liquids will not occur within the TPZ;

- Tree clearing will ensure compliance with the MBCA. Nesting period restriction will apply to avoid the destruction or disturbance of bird species using the available habitat in the Study Area. Should this not be possible, a nesting bird survey must be undertaken by a qualified Avian Biologist within 24 hours before any vegetation clearing; and,
- Should any additional, incidental or accidental tree injuries occur during construction, a qualified Arborist or City Forester must be consulted to determine if additional mitigation measures must be employed.

Mitigation for Works Within the Minimum TPZ

It is recommended that all work undertaken within the minimum TPZ of a tree will be supervised by an ISA certified Arborist. The Arborist will document the works that were completed, and direct workers as required. In addition, the mitigation measures outlined below will be implemented for works undertaken within the minimum TPZ.

Horizontal Hoarding

To prevent soil compaction and disturbance to the root zone of the trees, horizontal hoarding will be implemented where encroachment into the minimum TPZ is required. Horizontal hoarding will be comprised of a 30 cm base of course wood chips with either staggered plywood fastened together or steel plates.

Canopy Pruning

All canopy and clearance pruning will be undertaken by an ISA Certified Arborist or an Ontario College of Trades 444A Arborist. Any branches that overhang the work site and require pruning are to be pruned using good arboricultural practices in accordance with American National Standard (ANSI) A300 (Part 1) – 2008 Pruning.

Root Pruning

All approved root pruning will be undertaken by an ISA Certified Arborist or an Ontario College of Trades 444A Arborist in accordance with good arboricultural practices, and include practices listed in the Arborist Report.

Best Management Practices

Minimizing Impacts to Trees

During the detail design phase, opportunities to minimize impacts to trees within the Study Area will be explored. Where feasible, the footprint of the DSBRT will be minimized, to the extent possible, to preserve as many trees as possible within the project limits.

Invasive Species Management

Efforts will be made to prevent the spread of invasive plant species during construction both on and off site. Sanitation of construction equipment will be considered in

accordance with the Clean Equipment Protocol (Ontario Invasive Species Plant Council 2013) will including sanitation of construction vehicles and equipment prior to leaving and moving to the next site. This may come in the form of a cleaning station where will vehicles and equipment can be inspected and cleaned regularly. See **Section 4.2.4.1** for additional invasive species management measures.

Emerald Ash Borer

Emerald Ash Borer (EAB) is widespread throughout the Study Area and, as such, precautions must be taken with the removal of ash wood during construction. The majority of ash trees within the Study Area exhibited symptoms of EAB including crown dieback, epicormics branching and the typically 'D-shaped' exit hole. Trees identified showing symptoms of EAB are listed in **Appendix D** (see Appendix B).

The Study Area is located within the Canadian Food Inspection Agency (CFIA) Emerald Ash Borer Regulated Areas of Canada and, as such, the removal of ash trees from the Study Area must be in compliance with the requirements of CFIA Phytosanitary Requirements to Prevent the Introduction Into and Spread Within Canada of the Emerald Ash Borer (D-03-08) (Canadian Food Inspection Agency 2014). Where feasible, ash trees will not be removed from the site during the high-risk season considered to be April 1 to September 30 of any given year.

4.4.5 Operations Impacts and Mitigation

The operation and maintenance activities of the DSBRT corridor will not affect the existing tree resources with the exception of impacts to trees as a result of salt spray. See **Section 4.2.4.3** for impacts and mitigation measures to protect trees from salt spray.

4.4.6 Summary of Potential Impacts, Mitigation Measures and Monitoring

The potential impacts, mitigation measures and monitoring are summarized in **TABLE 4.10**.

TABLE 4.10. SUMMARY OF POTENTIAL IMPACTS, MITIGATION MEASURES AND MONITORING: TREE INVENTORY

Environmental Component	Potential Impacts (Design/Construction/Operation)	Mitigation Measures	Monitoring
During Detail Design			
Tree Resources	Removal of 3,278 trees as a result of the DSBRT corridor footprint including 1,357 in Toronto, 1,070 in Pickering, 321 in Ajax, 389 in Whitby and 141 in Oshawa. 4,030 roadside trees to be retained and not impacted including 2,535 in Toronto, 438 in Pickering, 622 in Ajax, 171 in Whitby and 264 in Oshawa. A total of 244 trees require removal within a designated natural area/significant natural heritage feature.	Minimize the footprint of the DSBRT to the extent possible to ensure that the maximum number of trees have been retained. Review impacts to trees during detail design to reflect any refinements to the detail design and to consider site-specific mitigation measures such as refinement of/exceptions to design criteria, the use of retaining walls and clear zone barriers for tree protection and other site-specific measures to be implemented on a case-by-case basis. Undertake a gap analysis (in accordance with municipal and TRCA/CLOCA requirements) during the detail design phase prior to construction should refinements and changes to the geometry of the preferred design alternative/DSBRT footprint occur to ensure that all trees are surveyed and impacts to trees within the Study Area are adequately addressed. Survey the trees at the intersection of Thickson Road and Dundas Street East. Provide compensation for the removal of roadside trees within the Study Area in accordance with the Metrolinx Vegetation Guideline (2020), TRCA Guideline for Determining Ecosystem Compensation (TRCA 2018) and the TRCA Forest Edge Management Plan Guidelines (2004). Refinements to compensation requirements will be undertaken during detail design at such time when tree removal permits have been approved by municipal agencies. Compensation must be submitted to municipal staff prior to permit issuance. Utilize the ecological compensation approach (Metrolinx Vegetation Guideline 2020) for those trees to be removed that are located on Metrolinx property. Compensate for the remainder of the By-law regulated trees located on private or city-owned property based on the requirements of applicable By-laws. All private property ownership data (including names, addresses and emails) for trees on private property that are proposed to be removed/impacted will be provided to the municipalities by the proponent at the time of permit application during the detail design phase. Compensation for tree removals within a designated natural area: compensation requirements based on ecological compensation approach using individual tree method: 2.274 trees. Compensation requirements based on By-law approach for trees within designated natural areas: 496 trees. Compensation for tree removals outside designated natural areas: 5,259 trees. Update the compensation analysis for roadside trees during detail design when tree removal permits have been approved by municipal agencies. Within TRCA's jurisdiction, consider compensation for trees in accordance with TRCA's Guideline for Determining Ecosystem Compensation (2018). See **Section 4.2.4.1** for details regarding compensation for the loss of forest/wetland communities. Reporting components will include a description of impacted ecosystems, a description of any proposed compensation locations,	Undertake any required post-planting monitoring (by a qualified arborist) and/or maintenance/ establishment program to monitor the health of the replacement/transplanted trees and provide recommendations for mitigation such as watering, pruning or fertilizing.

Environmental Component	Potential Impacts (Design/Construction/Operation)	Mitigation Measures	Monitoring
		a proposed work plan, detail design drawings, construction phasing plan, monitoring plan, etc., should compensation be undertaken. When suitable restoration sites cannot be identified, the option to provide cash-in-lieu will be discussed, and will adhere to criteria set out in the *Guideline for Determining Ecosystem Compensation and Appendices* (TRCA 2018). Cash-in-lieu compensation must be submitted prior to permit issuance. See **Section 4.2.4.1** for mitigation measures for the loss of forest vegetation/vegetation communities and forest edge management recommendations. Adhere to City of Toronto compensation ratios for the removal of trees within the City of Toronto and the City's additional requirements (see **Section 4.4.3**). Consult with private property owners before any tree removals and or tree impacts/injuries occur on private property. Removal of any By-law protected ash trees will require a permit from the City of Toronto. Removal of any By-law protected ash trees infested with EAB will require a permit exemption from the City of Toronto. Adhere to the Town of Whitby's compensation requirements for the removal of trees within the Town of Whitby (see **Section 4.4.3**). Consult further with lower and upper tier municipalities and regulatory agencies, such as TRCA, CLOCA, MECP, and Parks Canada during detail design to discuss tree compensation and restoration plans. Refinements to compensation requirements will be undertaken at such time when tree removal permits have been approved by municipal agencies. Compensation (as well as all restoration/replanting plans) must be submitted to municipal staff prior to permit issuance. Tree protection hoarding must be installed and approved prior to permit issuance. Submit restoration plans and replanting plans (along with erosion control fencing plans) prior to permit issuance. Consult with Parks Canada during detail design if impacts to trees will occur within the Rouge National Urban Park beyond the existing road ROW. Consult with the Study Area municipalities during detail design to reconfirm the requirements for tree removal permits associated with the municipal tree protection By-laws. Where required, tree removal permits will be obtained from the Study Area municipalities prior to the start of construction. Permits related to municipal tree protection by-laws and other applicable tree removal permits will be obtained from municipalities as required during the detail design phase, and as outlined in Metrolinx's Vegetation Guideline (2020), TRCA's Guideline for Determining Ecosystem Compensation (2018), TRCA's Forest Edge Management Plan Guidelines (2004) and the upper and lower tier municipal tree protection by-laws. Provide municipal agencies with the ability to perform on-site inspections in regard to tree planting, transplantation and tree protection during implementation of the project, as required.	

Environmental Component	Potential Impacts (Design/Construction/Operation)	Mitigation Measures	Monitoring
		Ensure a Landscape Architect prepares planting plans during detail design for the tree plantings proposed as part of the compensation required in accordance with municipal standards for landscaping/tree requirements and in consideration of below ground infrastructure when developing the planting plans. Restoration plans and replanting plans (along with erosion control fencing plans) must be submitted prior to permit issuance. Consider the limitations associated with tree planting in the vicinity of City of Toronto water infrastructure (and in the vicinity of the infrastructure of the other Study Area municipalities) during detail design when the locations of the buried infrastructure and the DSBRT infrastructure are better known. Provide municipal staff with the opportunity to comment on tree planting specifications, species selection and planting locations during the development of the planting plans. Ensure the proponent provides a warranty on planted materials to ensure that the newly planted material survives and fulfils the intended function. A two-year warranty applies to planted materials when part of a restoration plan for the City of Toronto. See **Section 4.2.4.1** for further details on the plantings plans to be prepared during detail design. Consider opportunities to transplant trees identified for removal within the Study Area during the detail design phase, where feasible. Where feasible, transplant trees that measure less than or equal to 10 cm DBH and are in good health that have been identified for removal. Where feasible, undertake transplanting in accordance with best management practices and in accordance with American National Standard (ANSI) A300 (Part 6) – Transplanting. Undertake efforts during detail design to preserve those trees that are located on properties listed on Heritage Registers and are considered part of a cultural heritage landscape. The retention and protection of heritage trees must be made a priority. Retain trees located on heritage properties to the extent possible.	
	Impacts to Kentucky coffee-tree and indirect impacts to Butternut.	See **Section 4.2.7.1** for mitigation measures for plant SAR including the detailed Butternut survey and Butternut Health Assessment to be completed during detail design.	Monitoring for SAR to take place as required (based on any Ontario ESA/Canada SARA permit requirements/agreements).
During Construction			
Tree Resources	Impacts/injury to 618 trees during construction of the DSBRT corridor including 270 in Toronto, 135 in Pickering, 98 in Ajax, 40 in Whitby and 75 in Oshawa.	Minimize impacts to all retained trees during construction by implementing the following tree protection measures to ensure no impacts occur to trees designated for retention including those trees identified as impacted/injured: • Designate a TPZ to restrict construction related machinery and activities from damaging trees identified for protection, and to ensure the protection of trees (roots, trunks, branches) adjacent to construction works; • Clearly defined the delineation of the disturbance limits within work areas on drawings and on site prior to construction; • Ensure the Site Supervisor is familiar with the City of Toronto's Tree Protection Policy and Specification for Construction near Trees (2016) and other such policies for municipalities within the Study Area and is cognizant of the purpose and function of TPZs;	All work undertaken within the minimum TPZ of a tree will be supervised by an ISA certified Arborist who will document the works that were completed, and direct workers as required. The mitigation measures outlined in **Section 4.4.4** (including horizontal hoarding, canopy pruning and root pruning) will be implemented for works undertaken within the minimum TPZ. Proof of installed tree protection hoarding must be submitted for approval prior to permit issuance. Consult a qualified Arborist or City Forester to determine if additional mitigation measures must be employed should any

Environmental Component	Potential Impacts (Design/Construction/Operation)	Mitigation Measures	Monitoring
		• Ensure the proponent supplies and installs tree protection barriers around each tree designated for protection prior to the start of any work; • Ensure tree protection fencing for all trees outside of the City of Toronto RNFP boundary is comprised of orange plastic web snow fencing on a wood frame; • Ensure tree protection fencing for trees located in the City of Toronto Ravine and Natural Feature Protection Area is comprised of plywood hoarding and is installed in the recommended locations. Proof of installed tree protection hoarding must be submitted for approval prior to permit issuance; • Prohibit the operation of heavy machinery within the TPZ (including overhead swinging of machine arms); • Do not store construction materials, equipment, soil, construction waste or debris within the TPZ or dripline of the trees identified for protection; • Ensure no movement or parking of vehicles, placement of equipment or pedestrian traffic within the TPZ; • Ensure no signs or objects are displayed or affixed to any trees protected by the City; • Prohibit the disposal of any liquids within the TPZ; and • Ensure tree clearing is undertaken in compliance with the MBCA to avoid the destruction or disturbance of bird species using the available habitat in the Study Area. If tree clearing cannot take place within the timing window, a nesting bird survey must be undertaken by a qualified Avian Biologist within 24 hours before any vegetation clearing.	additional, incidental or accidental tree injuries occur during construction.
	Potential for the spread of invasive plant species during construction both on and off site.	Ensure efforts are made to prevent the spread of invasive plant species during construction both on and off site. Undertaken sanitation of construction equipment in accordance with the Clean Equipment Protocol (Ontario Invasive Species Plant Council 2013) and, at a minimum, include sanitation of construction vehicles and equipment prior to leaving and moving to the next site. Set up a cleaning station to ensure vehicles and equipment can be inspected and cleaned regularly. See **Section 4.2.4.1** for additional invasive species management measures. Ensure precautions are taken with the removal of ash wood during construction as Emerald Ash Borer (EAB) is widespread throughout the Study Area. Ensure the removal of ash trees from the Study Area is in compliance with the requirements of CFIA Phytosanitary Requirements to Prevent the Introduction Into and Spread Within Canada of the Emerald Ash Borer (D-03-08). Where feasible, ash trees will not be removed from the site during the high-risk season considered to be April 1 to September 30 of any given year.	Monitoring of planting will include contingencies to mitigate for invasive species presence/ management.
During Operation			
Tree Resources	Impacts to roadside trees due to salt spray during operation of the DSBRT corridor.	See **Section 4.2.4.3** for mitigation measures to protect trees from salt spray.	N/A

4.5 Cultural Environment

4.5.1 Built Heritage Resources (BHRs) and Cultural Heritage Landscapes (CHLs)

4.5.1.1 Methodology

Based on a review of the proposed limits of impact, a preliminary impact assessment was undertaken to identify if there will be any direct or indirect impacts to known and potential Built Heritage Resources (BHRs) and Cultural Heritage Landscapes (CHLs) in the Project Study Area. The proposed limits of impacts is evaluated with properties identified as potential or known BHRs and CHLs to identify locations where direct impact on to a property occurs. Potential direct and indirect impacts are identified.

- Cultural Heritage Evaluation Reports (CHERs) have been completed for all known or potential BHR/CHLs that may be directly impacted by the project, applying the criteria established by Ontario Regulation 9/06 and Ontario Regulation 10/06;
- Recommended Heritage Impact Assessments (HIA) will be completed following the TPAP;
- Outcomes and findings of the CHERs are included in and appended to the EPR **(Appendix E**); and,
- The impact assessment based on the preliminary design of the DSBRT has been refined based on draft CHER findings to reduce or avoid impacts.

4.5.1.2 Potential Impacts (Footprint and Construction)

The results of the preliminary impact assessment are presented by municipality in the **TABLE 4.11** through **TABLE 4.15**. Maps showing the location of known and potential BHRs and CHLs and the proposed limits of impact are in **Appendix E** (Appendix B).

TABLE 4.11. PRELIMINARY IMPACT ASSESSMENT OF BUILT HERITAGE RESOURCES AND CULTURAL HERITAGE LANDSCAPES WITHIN THE CITY OF TORONTO AND RECOMMENDED MITIGATION MEASURES

BHR/CHL Reference Number	Type of Cultural Heritage Resource	Type of Property	Location	Heritage Recognition	Type and Description of Potential/Anticipated Impact	Mitigation Measures
TO-001	CHL	Park	Ellesmere Road and Military Trail, Toronto	Potential CHL - Commemorative Feature	The proposed limits of impact will encroach upon this property due to reconfiguration of the sidewalk and the proposed platform at the southwest corner of Ellesmere Road and Military Trail. The proposed work will result in **direct impacts** to the plaque at this location through its removal. **No indirect impacts** were identified. In particular, the proposed platform is not expected to result in any negative visual impacts to the commemorative feature.	**Direct Impact**: If reconfiguration of the sidewalk will require removal of this commemorative feature, the plaque should be removed prior to construction for safe-keeping and returned to the same general location once work has been completed. Consultation with heritage staff or other appropriate staff should be undertaken to determine an appropriate storage and relocation strategy for the plaque commemorative feature.
TO-002	CHL	University Campus	University of Toronto Scarborough Campus; 1265 Military Trail, Toronto	Potential CHL - Identified During Desktop/Field Review	Proposed limits of impact along the south side of Ellesmere Road will result in up to 5 m encroachment on to the Ellesmere Road frontage of the campus to accommodate grading limits, a multi-use pathway, and platform. The current design shows that grading limits will directly impact mature vegetation and boulders, all of which may be potential landscape elements associated with this CHL. However, it is understood that the grading limit in this area will be adjusted to avoid direct impacts to boulders and trees, as confirmed by the proponent. As such, **no direct impacts** due to grading activities are anticipated. **No indirect impacts** were identified. The scale of the proposed platform at the southwest corner of Ellesmere Road and Military Trail is not expected to visually impact views to or from this CHL. Further, potential for vibration related impacts is not anticipated given there are no structures within 50 m of the proposed works.	Preferred Option: Continued avoidance of the boulders and trees along northern limits of this CHL is recommended.
TO-003	BHR	Residence	3307 Ellesmere Rd, Toronto	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the south side of Ellesmere Road will result in no direct or indirect impacts to the potential heritage resources or attributes due to encroachment. **No direct impacts** to potential heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
TO-004	BHR	Residence	3344 Ellesmere Rd, Toronto	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the north side of Ellesmere Road will result in significant encroachment on to the property which will require removal/relocation of the residence on this property. **Direct impacts** to this potential BHR are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Direct impacts:** Preferred Option: Avoid removal of the potential BHR. Alternative Option: Should it be determined that there is no other technically feasible option other than to remove the building, it is recommended that a CHER be undertaken to determine if this potential BHR has CHVI. If the property is determined to have CHVI, an HIA is required to determine appropriate site-specific mitigation measures. **Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the

BHR/CHL Reference Number	Type of Cultural Heritage Resource	Type of Property	Location	Heritage Recognition	Type and Description of Potential/Anticipated Impact	Mitigation Measures
						condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
TO-005	BHR	Church	525 Morrish Rd, Toronto	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the north side of Ellesmere Road will result in approximately 3 m encroachment on to the property. This encroachment will impact a portion of the front lawn. The scale of the proposed platform at Morrish Road is not expected to visually impact views to or from this BHR or adversely impact the setting. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
TO-006	BHR	Residence	3682 Ellesmere Rd, Toronto	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the north side of Ellesmere Road will result in approximately 6 m encroachment on to the property. This encroachment will impact a portion of the front lawn, vegetation and driveway. The impacts will not result in direct or indirect impacts, to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
TO-007	BHR	Residence	3695 Ellesmere Rd, Toronto	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the south side of Ellesmere Road will result in approximately 5 m encroachment on to the property and may result in the removal of some vegetation. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
TO-008	BHR	Residence	3701 Ellesmere Rd, Toronto	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the south side of Ellesmere Road will result in approximately 4 m encroachment on to the property, reconfiguration of the existing sidewalk, and may result in the removal of some vegetation. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with	**Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the

BHR/CHL Reference Number	Type of Cultural Heritage Resource	Type of Property	Location	Heritage Recognition	Type and Description of Potential/Anticipated Impact	Mitigation Measures
					bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
TO-009	BHR	Commercial	103 Deep Dene Dr, Toronto	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the south side of Ellesmere Road will result in approximately 6 m encroachment on to the property, reconfiguration of the existing sidewalk, and may result in the removal of some decorative vegetation. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
TO-010	BHR	Residence	6 Zaph Ave, Toronto	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the north side of Ellesmere Road will result in approximately 5 m encroachment on to the property, reconfiguration of the existing sidewalk, and may result in the removal of some vegetation. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
TO-011	BHR	Residence	3832 Ellesmere, Rd Toronto	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the north side of Ellesmere Road will result in approximately 5 m encroachment on to the property, reconfiguration of the existing sidewalk, and may result in the removal of the chain link fence and stone pillars flanking the driveway entrance. **Direct impacts** are anticipated through removal of the stone pillars flanking the driveway entrance, which are potential heritage attributes. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Direct impacts:** Preferred Option: Avoid removal of the stone pillars flanking the driveway entrance. Alternative Option: Should it be determined that there is no other technically feasible option other than to remove the stone pillars, it is recommended that a CHER be undertaken to determine if this potential BHR has CHVI. If the property is determined to have CHVI, an HIA is required to determine appropriate site-specific mitigation measures. **Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.

BHR/CHL Reference Number	Type of Cultural Heritage Resource	Type of Property	Location	Heritage Recognition	Type and Description of Potential/Anticipated Impact	Mitigation Measures
TO-012	BHR	Residence	726 Meadowvale Rd, Toronto	Known BHR - Part IV Designation (By-law #21790)	Proposed limits of impact along the north side of Ellesmere Road will result in approximately 7 m encroachment on to the property, reconfiguration of the existing sidewalk, and significant removal of vegetation. It will not result in removal or alteration of the house on this property. Removal of vegetation is considered significant and may diminish the integrity of the property. **Direct impacts** to this BHR and known heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Direct impacts:** Preferred Option: Reduce encroachment on to this property and minimize removal of vegetation. Alternative Option: Should it be determined that there is no other technically feasible option other than to significantly encroach on to this property and remove vegetation, an HIA is required to determine appropriate site-specific mitigation measures. **Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
TO-013	CHL	Church and Residence	6540-6550 Kingston Rd, Toronto	Known CHL - Part IV Designation (By-law #19127)	Proposed limits of impact along the north side of Kingston Road will result in significant encroachment on to this property and require property acquisition. Grading limits will impact the grass lawn and retaining walls along the driveway. This encroachment and direct impacts to retaining walls along the driveway is considered significant and may alter the character and setting of this property. Further, property acquisition and encroachment on to a designated heritage property triggers the heritage permit process. **Direct impacts** to this BHR and known heritage attributes are anticipated through proposed alterations to this property. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Direct impacts:** Preferred Option: Avoid encroachment on to this property. Alternative Option: Should it be determined that there is no other technically feasible option other than to significantly encroach on to this property, an HIA will be undertaken by a qualified person as early as possible in the detailed design phase following the TPAP. It will be developed in consultation with, and submitted for review to, MHSTCI and interested parties including the municipal heritage planner and/or municipal heritage committee and Indigenous communities, as appropriate. A heritage permit may be required and further consultation with heritage staff at the municipality is recommended. **Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project.
TO-014	CHL	Park	Rouge National Urban Park, 72 and 98 Old Kingston Rd, Toronto	Known CHL - National Urban Park	No new infrastructure is proposed along the frontage of this property. As such, **no direct or indirect impacts** are anticipated.	Preferred Option: Continued avoidance of this CHL is recommended.
TO-015	BHR	Commercial	7451 Graham Farm Ln, Toronto	Potential BHR - Identified During Desktop/Field Review	No new infrastructure is proposed along the frontage of this property. As such, **no direct or indirect impacts** are anticipated.	Preferred Option: Continued avoidance of this BHR is recommended.

TABLE 4.12. PRELIMINARY IMPACT ASSESSMENT OF BUILT HERITAGE RESOURCES AND CULTURAL HERITAGE LANDSCAPES WITHIN THE CITY OF PICKERING AND RECOMMENDED MITIGATION MEASURES

BHR/CHL Reference Number	Type of Cultural Heritage Resource	Type of Property	Location	Heritage Recognition	Type and Description of Potential/Anticipated Impact	Mitigation Measures
PK-001	BHR	Commercial	1320 Altona Rd, Pickering	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the north side of Kingston Road will not encroach on to the subject property. **No direct impacts** to potential heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in close proximity to the BHR which may result in limited and temporary adverse vibration impacts.	No further work is recommended.
PK-002	BHR	Residence	301 Kingston Rd, Pickering	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the south side of Kingston Road will result in approximately 2 m encroachment on to the front yard of this property, reconfiguration of the existing sidewalk more to the south, and may result in the removal of some vegetation. The scale of the proposed platform at Altona Road is not expected to visually impact views to or from this BHR or adversely impact the setting. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct or indirect impacts** due to encroachment are anticipated. Relocation of the driveway may be required and is to be reviewed during detail design. Driveway relocation has the potential to isolate potential heritage attributes from its environment and context and is considered an **indirect impact.** Additional **Indirect impacts** to this property are possible due to construction activities in close proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect impacts due to driveway relocation:** Preferred Option: Avoid relocation of the driveway. Alternative Option: Should it be determined that there is no other technically feasible option other than to relocate the driveway, it is recommended that a CHER be undertaken as early as possible during detailed design to determine if this potential BHR has CHVI. If the property is determined to have CHVI, an HIA will be undertaken by a qualified person as early as possible in the detailed design phase. It will be developed in consultation with, and submitted for review to, MHSTCI and interested parties including the municipal heritage planner and/or municipal heritage committee and Indigenous Nations, as appropriate. **Indirect impacts due to potential for vibration:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
PK-003	BHR	Commercial	357 Kingston Rd, Pickering	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the south side of Kingston Road will result in approximately 7.5 m encroachment on to the north side of this property and reconfiguring the sidewalk. Direct impacts to the front edge of the wrought iron fence and stone pillars are anticipated. **Direct impacts** are anticipated through removal of the wrought iron fence and the stone columns on this property, which are potential heritage attributes. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Direct impacts:** Preferred Option: Avoid removal of the wrought iron fence and stone pillars. Alternative Option: Should it be determined that there is no other technically feasible option other than to remove these potential heritage attributes, it is recommended that a CHER be undertaken to determine if this potential BHR has CHVI. If the property is determined to have CHVI, an HIA is required to determine appropriate site-specific mitigation measures. **Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.

BHR/CHL Reference Number	Type of Cultural Heritage Resource	Type of Property	Location	Heritage Recognition	Type and Description of Potential/Anticipated Impact	Mitigation Measures
PK-004	BHR	School	401 Kingston Rd, Pickering	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the south side of Kingston Road will result in approximately 4 m encroachment on to the front yard of this property. The impacts will not result in significant adverse impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. **No direct impacts** to this property or potential heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in close proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
PK-005	BHR	Residence	422 Kingston Rd, Pickering	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the north side of Kingston Road will result in approximately 5 m encroachment on to the front yard/parking lot on this property. The impacts will not result in significant adverse impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. **No direct impacts** to this property or potential heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in close proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
PK-006	BHR	Residence	420 Kingston Rd, Pickering	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the north side of Kingston Road will result in approximately 6 m encroachment on to the front yard/parking lot on this property. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in close proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
PK-007	BHR	Commercial	1 Evelyn Ave, Pickering	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the south side of Kingston Road will result in encroachment along the northern property line and will result in removal of some vegetation. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in close proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations

BHR/CHL Reference Number	Type of Cultural Heritage Resource	Type of Property	Location	Heritage Recognition	Type and Description of Potential/Anticipated Impact	Mitigation Measures
PK-008	BHR	Church	882 Kingston Rd, Pickering	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the north side of Kingston Road will result in approximately 5 m encroachment on to the parking lot area and entrance drive and removal of some vegetation due to grading. The scale of the proposed platform at Fairport Road is not expected to visually impact views to or from this BHR or adversely impact the setting. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in close proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations
PK-009	BHR	CNR Bridge	Structure 6; 0.32 km west of Liverpool Rd, Pickering	Potential BHR - Identified During Desktop/Field Review	The existing bridge will remain (Parsons 2020). Based on comments received from Parsons the bridge will not be demolished or rehabilitated and used for eastbound lanes, while a new identical structure will be constructed on the north side for future westbound lanes. **No direct impacts** to potential heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
PK-010	BHR	Commercial	898 Kingston Rd, Pickering	Potential BHR - Identified During Desktop/Field Review	No encroachment on to this property is anticipated. **No direct or indirect impacts** were identified. The scale of the proposed platform at Fairport Road is not expected to visually impact views to or from this BHR. Further, potential for vibration related impacts is not anticipated given there are no structures within 50 m of the proposed works.	<u>Preferred Option:</u> Continued avoidance of this BHR is recommended.
PK-011	BHR	Residence	1059 Dunbarton Rd, Pickering	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the north side of Kingston Road will result in approximately 10 m encroachment on to the rear of the property and may result in the removal of some decorative vegetation. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
PK-012	BHR	Residence	1283 Kingston Rd, Pickering	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the south side of Kingston Road will result in approximately 4 m encroachment on the property and may result in the removal of some trees along its frontage. The scale of the proposed platform at Liverpool Road is not expected to visually impact views to or from this BHR or adversely impact the setting. The impacts will not result in direct or indirect impacts to potential	**Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in

BHR/CHL Reference Number	Type of Cultural Heritage Resource	Type of Property	Location	Heritage Recognition	Type and Description of Potential/Anticipated Impact	Mitigation Measures
					heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
PK-013	BHR	Commercial	1294 Kingston Rd, Pickering	Potential BHR - Listed on Municipal Heritage Register	Proposed limits of impact along the north side of Kingston Road will result in approximately 4 m encroachment on the property, reconfiguration of the sidewalk to the north, and the removal of the brick and metal fence bordering the parking lot. ***Note: This property currently has received an application for future development. The status of this development should be reviewed during detailed design by a qualified person with recent, relevant heritage experience to determine if impacts have changed and if further cultural heritage work is required.*** The scale of the proposed platform at Liverpool Road is not expected to visually impact views to or from this BHR or adversely impact the setting. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
PK-014	BHR	Commercial	1970 Brock Rd, Pickering	Known BHR - Part IV Designation (By-law #2570/87)	Proposed limits of impact along the north side of Kingston Road will result in approximately 4 m encroachment on to this property and minor property acquisition along the southern frontage and at the corner of Kingston Road and Brock Road. The scale of the proposed platform at Brock Road is not expected to visually impact views to or from this BHR or adversely impact the setting. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. **Direct impacts** to the BHR are anticipated due to encroachment and property acquisition. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Preferred Option:** Avoid property acquisition and encroachment on to this property. **Alternative Option:** Should it be determined that there is no other technically feasible option other than to significantly encroach on to this property, an HIA will be undertaken by a qualified person as early as possible in the detailed design phase following the TPAP. It will be developed in consultation with, and submitted for review to, MHSTCI and interested parties including the municipal heritage planner and/or municipal heritage committee and Indigenous Nations, as appropriate. A heritage permit may be required and further consultation with heritage staff at the municipality is recommended. **Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations

BHR/CHL Reference Number	Type of Cultural Heritage Resource	Type of Property	Location	Heritage Recognition	Type and Description of Potential/Anticipated Impact	Mitigation Measures
PK-015	CHL	Cemetery	1693 Kingston Rd, Pickering	Potential CHL - Identified During Desktop/Field Review	Proposed limits of impact along the south side of Kingston Road will not result in property impacts to the Post Cemetery (Confirmed with Parsons via email communications, October 23, 2020). The scale of the proposed platform at Brock Road is not expected to visually impact views to or from this CHL or adversely impact the setting. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the CHL which may result in limited and temporary adverse vibration impacts.	A Cemetery Investigation was not recommended as part of the *Stage 1 Archaeological Assessment for the DSBRT TPAP* (ASI 2020a). It is noted in the Stage 1 Report that the burials remain in situ in rows parallel to Brock Road and is set back from the road on a small hill. A cemetery investigation was conducted as part of the Highway 2 BRT project (Archeoworks Inc. 2016). Given the sensitive nature of CHL, the cemetery limits should be flagged based on the results of the Cemetery Investigation and steps taken to ensure that the site is retained and protected during construction-related activities. **Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the feature(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of features within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
PK-016	BHR	Residence	1994 Southview Dr, Pickering	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the south side of Kingston Road will result in approximately 2 m encroachment on to the frontage of the property and may result in removal of decorative vegetation. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in close proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
PK-017	BHR	Residence	1892 Kingston Rd, Pickering	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the north side of Kingston Road will result in approximately 4 m encroachment on to the front lawn and may result in the removal of some trees along its frontage. The scale of the proposed platform at Notion Road is not expected to visually impact views to or from this BHR or adversely impact the setting. The impacts will not result in significant adverse impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in close proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
PK-018	BHR	Residence	1723 Dunchurch St, Pickering	Potential BHR - Identified During Desktop/Field Review	The proposed limits of impact along the southern limits of this property will result in up to 5 m encroachment at the southeast corner of this property and may result in the removal of vegetation along this side of the property. No direct impacts to the residence is	**Direct impacts:** <u>Preferred Option:</u> Avoid encroachment on to this property, property acquisition, and placement of west bound lanes next to this property.

BHR/CHL Reference Number	Type of Cultural Heritage Resource	Type of Property	Location	Heritage Recognition	Type and Description of Potential/Anticipated Impact	Mitigation Measures
					anticipated. However, introduction of a new road to carry west bound lanes of traffic under the railway immediately adjacent to this property, where there was no road before, has the potential for **direct adverse impacts** that have the potential for permanent and irreversible negative effects on the potential CHVI of this property. **Direct impacts** to the potential CHVI of this property. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	Alternative Option: Should it be determined that there is no other technically feasible option, it is recommended that a CHER be undertaken during TPAP to determine if this potential BHR has CHVI. If the property is determined to have CHVI, an HIA will be undertaken by a qualified person as early as possible in the detailed design phase following the TPAP. It will be developed in consultation with, and submitted for review to, MHSTCI and interested parties including the municipal heritage planner and/or municipal heritage committee and Indigenous Nations, as appropriate. **Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.

TABLE 4.13. PRELIMINARY IMPACT ASSESSMENT OF BUILT HERITAGE RESOURCES AND CULTURAL HERITAGE LANDSCAPES WITHIN THE TOWN OF AJAX AND RECOMMENDED MITIGATION MEASURES

BHR/CHL Reference Number	Type of Cultural Heritage Resource	Type of Property	Location	Heritage Recognition	Type and Description of Potential/Anticipated Impact	Mitigation Measures
AJ-001	BHR	Residence	1898 Kingston Rd, Ajax	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the north side of Kingston Road will result in approximately 4 m encroachment on to the front lawn and may result in the removal of decorative vegetation. The scale of the proposed platform at Notion Road is not expected to visually impact views to or from this BHR or adversely impact the setting. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct or indirect impacts** due to encroachment are anticipated. . **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
AJ-002	BHR	Commercial	777 Kingston Rd W, Ajax	Potential BHR - Listed on Municipal Heritage Register	Proposed limits of impact along Kingston Road West will not result in encroachment on to this property. The scale of the proposed platform at Notion Road is not expected to visually impact views to or from this BHR or adversely impact the setting. The impacts will not result in significant adverse impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
AJ-003	CHL	Heritage Conservation District	Pickering Village HCD, Ajax	Known CHL - Part V Designation (By-law #102-2013)	Proposed limits of impact along the north side of Kingston Road West between Elizabeth Street and Linton Avenue will encroach up to 6 m on to the rear parking lots for properties in the HCD that front on to Old Kingston Road. Encroachment will also occur on to the southern limits of the properties in the HCD between Linton Avenue and Old Kingston Road. A platform is proposed at Church Street North and Kingston Road West. This encroachment may result in **direct adverse impacts** to the character and setting of this HCD through impacts to landscape elements. Further, property acquisition and encroachment on to a designated heritage property typically triggers the heritage permit process. **Indirect impacts** are possible due to construction activities in proximity to this property which may result in limited and temporary adverse vibration impacts.	**Direct impacts:** Proposed alterations to this HCD would be minimized through consultation with heritage staff during early stages of detailed design to review the proposed plans for DSBRT related infrastructure, platform placement and encroachment and to determine if a heritage permit is required. Preferred Option: Avoid encroachment on to the HCD. Alternative Option: Should it be determined that there is no other technically feasible option other than to encroach on to parts of the HCD, an HIA will be undertaken by a qualified person as early as possible in the detailed design phase following the TPAP. Scoping of the HIA with heritage staff will be undertaken in order to determine the best approach to the HIA(s) and reporting can be defined at that point. Consideration should be given to addressing impacts through a series of property specific HIAs rather than one full HIA report for the full HCD. It will be developed in consultation with, and submitted for review to, MHSTCI and interested parties including the municipal heritage planner and/or municipal heritage committee and Indigenous Nations, as appropriate. The HIA(s) will discuss the alternatives considered and

BHR/CHL Reference Number	Type of Cultural Heritage Resource	Type of Property	Location	Heritage Recognition	Type and Description of Potential/Anticipated Impact	Mitigation Measures
						recommend the alternative to minimize or mitigate adverse effects on the properties within the HCD. **Indirect impacts:** To ensure that structures in the HCD are not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) in the HCD will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
AJ-004	CHL	Church and Cemetery	77 Randall Dr, Ajax	Known CHL - Part IV Designation (By-law #96-84; 78-2004)	Proposed limits of impact along the south side of Kingston Road West will not result in any encroachment on to St. George's Anglican Church Cemetery in Ajax. **No direct impacts** to potential heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the CHL which may result in limited and temporary adverse vibration impacts.	A Cemetery Investigation to determine the limits of the cemetery is recommended as part of the *Stage 1 Archaeological Assessment for the DSBRT TPAP* (ASI 2020a). Given the sensitive nature of CHL, the cemetery limits should be flagged based on the results of the Cemetery Investigation and steps taken to ensure that the site is retained and protected during construction-related activities. **Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the feature(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of features within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
AJ-005	BHR	Residence	625 Kingston Rd W, Ajax	Potential BHR - Listed on Municipal Heritage Register	Proposed limits of impact along the south side of Kingston Road West will result in approximately 6 m encroachment on to the property and may result in the removal of some vegetation and part of the front walkway. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. As such, **no direct or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
AJ-006	BHR	Commercial	613 Kingston Rd W, Ajax	Potential BHR - Listed on Municipal Heritage Register	Proposed limits of impact along the south side of Kingston Road West will result in approximately 6.5 m encroachment on to the property and may result in the partial removal of the late-twentieth-century commercial building that is located in proximity to the ROW. No direct impacts to the former school (the potential BHR) are anticipated given that it is situated further back on the parcel. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. As such, **no direct or indirect impacts** due to encroachment are anticipated.	**Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.

BHR/CHL Reference Number	Type of Cultural Heritage Resource	Type of Property	Location	Heritage Recognition	Type and Description of Potential/Anticipated Impact	Mitigation Measures
					Indirect impacts to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	
AJ-007	BHR	Commercial	607-611 Kingston Rd W, Ajax	Potential BHR - Listed on Municipal Heritage Register	Proposed limits of impact along the south side of Kingston Road West will result in approximately 7.8 m encroachment on to this property and result in removal of the commercial building. **Direct impacts** to this potential BHR are anticipated through removal of the structure on this property. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Direct impacts:** Preferred Option: Avoid removal of the potential BHR. Alternative Option: Should it be determined that there is no other technically feasible option other than to remove the building, it is recommended that a CHER be undertaken to determine if this potential BHR has CHVI. If the property is determined to have CHVI, an HIA an HIA will be undertaken by a qualified person as early as possible in the detailed design phase following the TPAP. It will be developed in consultation with, and submitted for review to, MHSTCI and interested parties including the municipal heritage planner and/or municipal heritage committee and Indigenous Nations, as appropriate. **Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
AJ-008	BHR	Commercial	605 Kingston Rd W, Ajax	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the south side of Kingston Road West will result in approximately 6.5 m encroachment on to this property and result in removal of the commercial building. **Direct impacts** to this potential BHR are anticipated through removal of the structure on this property. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Direct impacts:** Preferred Option: Avoid removal of the potential BHR. Alternative Option: Should it be determined that there is no other technically feasible option other than to remove the building, it is recommended that a CHER be undertaken to determine if this potential BHR has CHVI. If the property is determined to have CHVI, an HIA will be undertaken by a qualified person as early as possible in the detailed design phase following the TPAP. It will be developed in consultation with, and submitted for review to, MHSTCI and interested parties including the municipal heritage planner and/or municipal heritage committee and Indigenous Nations, as appropriate. **Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
AJ-009	BHR	Commercial	601 Kingston Rd W, Ajax	Potential BHR - Listed on Municipal Heritage Register	Proposed limits of impact along the south side of Kingston Road West will result in approximately 7.5 m encroachment on to this property and result in removal of the commercial building.	**Direct impacts:** Preferred Option: Avoid removal of the potential BHR. Alternative Option: Should it be determined that there is no other technically feasible option other than to remove the building, it is recommended that a

BHR/CHL Reference Number	Type of Cultural Heritage Resource	Type of Property	Location	Heritage Recognition	Type and Description of Potential/Anticipated Impact	Mitigation Measures
					Direct impacts to this potential BHR are anticipated through removal of the structure on this property. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	CHER be undertaken to determine if this potential BHR has CHVI. If the property is determined to have CHVI, an HIA will be undertaken by a qualified person as early as possible in the detailed design phase following the TPAP. It will be developed in consultation with, and submitted for review to, MHSTCI and interested parties including the municipal heritage planner and/or municipal heritage committee and Indigenous Nations, as appropriate. **Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
AJ-010	BHR	Commercial	592 Kingston Rd W, Ajax	Known BHR - Part IV Designation (By-law #116-82)	Proposed limits of impact along the north side of Kingston Road West will result in approximately 1 m encroachment on to a corner of the front yard of this property for grading purposes only (no property acquisition). The scale of the proposed platform at Kingston Road West and Church Street North/South is not expected to visually impact views to or from this BHR or adversely impact the setting. The impacts will not result in direct or indirect impacts to known heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
AJ-011	BHR	Commercial	586 Kingston Rd W, Ajax	Potential BHR - Listed on Municipal Heritage Register	Proposed limits of impact along the north side of Kingston Road West will result in approximately 1 m encroachment on to the front yard of this property. The scale of the proposed platform at Kingston Road West and Church Street North/South is not expected to visually impact views to or from this BHR or adversely impact the setting. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, Contractor must make a commitment to repair any damages caused by vibrations.
AJ-012	BHR	Residence	582 Kingston Rd W, Ajax	Potential BHR - Listed on Municipal Heritage Register	Proposed limits of impact along the north side of Kingston Road West will result in approximately 1 m encroachment on to this property for grading purposes. This encroachment will impact a portion of the front garden and driveway. The scale of the proposed platform at Kingston Road West and Church Street North/South is not expected to visually impact views to or from this BHR or adversely impact the setting. The impacts will not result	**Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should

BHR/CHL Reference Number	Type of Cultural Heritage Resource	Type of Property	Location	Heritage Recognition	Type and Description of Potential/Anticipated Impact	Mitigation Measures
					in significant adverse impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
AJ-013	BHR	Commercial	578 Kingston Rd W, Ajax	Potential BHR - Listed on Municipal Heritage Register	Proposed limits of impact along the north side of Kingston Road West will result in approximately 2.3 m encroachment on to this property for grading purposes. This encroachment will impact a portion of the front lawn and driveway. The impacts will not result in significant adverse impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
AJ-014	BHR	Commercial	579 Kingston Rd W, Ajax	Potential BHR - Listed on Municipal Heritage Register	Proposed limits of impact along the south side of Kingston Road West will result in approximately 5.4 m encroachment on to this property. **Direct impacts** to this potential BHR are anticipated through removal of the structure on this property. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Direct impacts:** Preferred Option: Avoid removal of the potential BHR. Alternative Option: Should it be determined that there is no other technically feasible option other than to remove the building, it is recommended that a CHER be undertaken to determine if this potential BHR has CHVI. If the property is determined to have CHVI, a HIA will be undertaken by a qualified person as early as possible in the detailed design phase following the TPAP. It will be developed in consultation with, and submitted for review to, MHSTCI and interested parties including the municipal heritage planner and/or municipal heritage committee and Indigenous Nations, as appropriate. **Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
AJ-015	BHR	Commercial	577 Kingston Rd W, Ajax	Potential BHR - Listed on Municipal Heritage Register	Proposed limits of impact along the south side of Kingston Road West will result in approximately 5.6 m encroachment on to this property and result in removal of the structure on this property. **Direct impacts** to this potential BHR are anticipated through removal of the structure on this property.	**Direct impacts:** Preferred Option: Avoid removal of the potential BHR. Alternative Option: Should it be determined that there is no other technically feasible option other than to remove the building, it is recommended that a CHER be undertaken to determine if this potential BHR has CHVI. If the property is determined to have CHVI, an HIA will be undertaken by a qualified

BHR/CHL Reference Number	Type of Cultural Heritage Resource	Type of Property	Location	Heritage Recognition	Type and Description of Potential/Anticipated Impact	Mitigation Measures
					Indirect impacts to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	person as early as possible in the detailed design phase following the TPAP. It will be developed in consultation with, and submitted for review to, MHSTCI and interested parties including the municipal heritage planner and/or municipal heritage committee and Indigenous Nations, as appropriate. **Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
AJ-016	BHR	Commercial	575 Kingston Rd W, Ajax	Potential BHR - Listed on Municipal Heritage Register	Proposed limits of impact along the south side of Kingston Road West will result in approximately 5.6 m encroachment on to this property and result in removal of the structure on this property. **Direct impacts** to this potential BHR are anticipated through removal of the structure on this property. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Direct impacts:** <u>Preferred Option:</u> Avoid removal of the potential BHR. <u>Alternative Option:</u> Should it be determined that there is no other technically feasible option other than to remove the building, it is recommended that a CHER be undertaken to determine if this potential BHR has CHVI. If the property is determined to have CHVI, an HIAwill be undertaken by a qualified person as early as possible in the detailed design phase following the TPAP. It will be developed in consultation with, and submitted for review to, MHSTCI and interested parties including the municipal heritage planner and/or municipal heritage committee and Indigenous Nations, as appropriate. **Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
AJ-017	BHR	Commercial	571 Kingston Rd W, Ajax	Potential BHR - Listed on Municipal Heritage Register	Proposed limits of impact along the south side of Kingston Road West will result in approximately 5.5 m encroachment on to this property and result in removal of the structure on this property. **Direct impacts** to this potential BHR are anticipated through removal of the structure on this property. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Direct impacts:** <u>Preferred Option:</u> Avoid removal of the potential BHR. <u>Alternative Option:</u> Should it be determined that there is no other technically feasible option other than to remove the building, it is recommended that a CHER be undertaken to determine if this potential BHR has CHVI. If the property is determined to have CHVI, an HIA will be undertaken by a qualified person as early as possible in the detailed design phase following the TPAP. It will be developed in consultation with, and submitted for review to, MHSTCI and interested parties including the municipal heritage planner and/or municipal heritage committee and Indigenous Nations, as appropriate. **Indirect impacts:**

BHR/CHL Reference Number	Type of Cultural Heritage Resource	Type of Property	Location	Heritage Recognition	Type and Description of Potential/Anticipated Impact	Mitigation Measures
						To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
AJ-018	BHR	Commercial	572 Kingston Rd W, Ajax	Known BHR - Part IV Designation (By-law #43-93)	Proposed limits of impact along the north side of Kingston Road West will result in approximately 2.5 m encroachment on to this property due to grading, property acquisition and proposed realignment of the toe wall. This encroachment will impact a portion of the front landscaped garden and driveway. The impacts will not result in direct or indirect impacts to known heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. However, property acquisition and encroachment on to a designated heritage property will typically trigger the heritage permit process. **Direct impacts** to the BHR are anticipated due to encroachment and property acquisition. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Direct impacts:** Preferred Option: Avoid encroachment on to this property. Alternative Option: Should it be determined that there is no other technically feasible option other than to significantly encroach on to this property, an HIA will be undertaken by a qualified person as early as possible in the detailed design phase following the TPAP. It will be developed in consultation with, and submitted for review to, MHSTCI and interested parties including the municipal heritage planner and/or municipal heritage committee and Indigenous Nations, as appropriate. A heritage permit may be required and further consultation with heritage staff at the municipality is recommended. **Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
AJ-019	BHR	Commercial	567 Kingston Rd W, Ajax	Potential BHR - Listed on Municipal Heritage Register	Proposed limits of impact along the south side of Kingston Road West will result in approximately 4 m encroachment on to the front yard of this property, which consists of modern landscaping and a driveway, through grading and property acquisition. It was confirmed with the proponent that there will be no direct impact to the building on this property. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
AJ-020	BHR	Commercial	566 Kingston Rd W, Ajax	Known BHR - Part IV Designation (By-law #113-97)	Proposed limits of impact along the north side of Kingston Road West will result in approximately 4 m encroachment on to this property due to grading and property acquisition and will result in removal of the front porch. **Direct impacts** to the BHR or its heritage attributes are anticipated.	**Direct impacts:** Preferred Option: Avoid encroachment on to this property. Alternative Option: Should it be determined that there is no other technically feasible option other than to significantly encroach on to this property, an HIA will be undertaken by a qualified person as early as possible in the detailed design phase following the TPAP. It will be developed in consultation with, and

BHR/CHL Reference Number	Type of Cultural Heritage Resource	Type of Property	Location	Heritage Recognition	Type and Description of Potential/Anticipated Impact	Mitigation Measures
					Indirect impacts to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	submitted for review to, MHSTCI and interested parties including the municipal heritage planner and/or municipal heritage committee and Indigenous Nations, as appropriate. A heritage permit may be required and further consultation with heritage staff at the municipality is recommended. **Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
AJ-021	BHR	Commercial	562 Kingston Rd W, Ajax	Known BHR - Part IV Designation (By-law #112-97)	Proposed limits of impact along the north side of Kingston Road West will result in approximately 4.8 m encroachment on to this property due to grading and property acquisition. The impacts will not result in direct or indirect impacts to known heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. However, property acquisition and encroachment on to a designated heritage property will typically trigger the heritage permit process. **Direct impacts** due to encroachment and property acquisition of a Part IV designated property. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Direct impacts:** Preferred Option: Avoid encroachment on to this property. Alternative Option: Should it be determined that there is no other technically feasible option other than to significantly encroach on to this property, an HIA will be undertaken by a qualified person as early as possible in the detailed design phase following the TPAP. It will be developed in consultation with, and submitted for review to, MHSTCI and interested parties including the municipal heritage planner and/or municipal heritage committee and Indigenous Nations, as appropriate. A heritage permit may be required and further consultation with heritage staff at the municipality is recommended. **Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
AJ-022	BHR	Commercial	556 Kingston Rd W, Ajax	Potential BHR - Listed on Municipal Heritage Register	Proposed limits of impact along the north side of Kingston Road West will result in approximately 3.7 m encroachment on to this property, which consists of a grass lawn, modern front pathway and steps, and a driveway. It was confirmed with the proponent that there will be no direct impact to the building on this property. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.

BHR/CHL Reference Number	Type of Cultural Heritage Resource	Type of Property	Location	Heritage Recognition	Type and Description of Potential/Anticipated Impact	Mitigation Measures
AJ-023	CHL	Various	543-549 Kingston Rd W, Ajax	Potential CHL - Listed on Municipal Heritage Register	Proposed limits of impact along the south side of Kingston Road West will result in approximately 7.2 m on to this property and will result in the removal of some vegetation and front pathways of modern construction. The proponent confirmed that there will be no impact to the buildings or cemetery. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions as such, **no direct or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the CHL which may result in limited and temporary adverse vibration impacts.	**Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
AJ-024	BHR	Residence	539 Kingston Rd W, Ajax	Potential BHR - Listed on Municipal Heritage Register	Proposed limits of impact along the south side of Kingston Road West will result in approximately 5.7 m encroachment on to this property. This encroachment will impact a portion of the front lawn, driveway, and will result in the removal of some vegetation. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct or indirect impacts** due to encroachment are anticipated. . **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
AJ-025	BHR	Commercial	536 Kingston Rd W, Ajax	Potential BHR - Listed on Municipal Heritage Register	Proposed limits of impact along the north side of Kingston Road West will result in approximately 6.3 m encroachment on to this property due to grading and property acquisition. The proponent has confirmed that the structure will not be directly impacted. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
AJ-026	BHR	Residence	531 Kingston Rd W, Ajax	Potential BHR - Listed on Municipal Heritage Register	Proposed limits of impact along the south side of Kingston Road West will result in approximately 5.9 m encroachment on to the front yard of this property. This encroachment will impact a portion of the front lawn, driveway, and will result in the removal of some vegetation. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct or indirect impacts** due to encroachment are anticipated.	**Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.

BHR/CHL Reference Number	Type of Cultural Heritage Resource	Type of Property	Location	Heritage Recognition	Type and Description of Potential/Anticipated Impact	Mitigation Measures
					Indirect impacts to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	
AJ-027	BHR	Commercial	530 Kingston Rd W, Ajax	Potential BHR - Listed on Municipal Heritage Register	Proposed limits of impact along the north side of Kingston Road West will result in approximately 5 m encroachment on to this property due to grading and property acquisition. It was confirmed with the proponent that there will be no direct impact to the building on this property, or to the front porch/steps. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
AJ-028	BHR	Commercial	527 Kingston Rd W, Ajax	Potential BHR - Listed on Municipal Heritage Register	Proposed limits of impact along the south side of Kingston Road West will result in approximately 1.5 m encroachment on to this property and will result in the removal of some vegetation. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
AJ-029	BHR	Residence	526 Kingston Rd W, Ajax	Potential BHR - Listed on Municipal Heritage Register	Proposed limits of impact along the north side of Kingston Road West will result in approximately 4.8 m encroachment on to the front yard of this property. This encroachment will impact a portion of the front lawn, driveway, and will result in some vegetation/landscaping removal. The impacts will not result in significant adverse impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
AJ-030	BHR	Residence	519 Kingston Rd W, Ajax	Potential BHR - Listed on Municipal Heritage Register	Proposed limits of impact along the south side of Kingston Road West will result in approximately 4.8 m encroachment on to the front yard of this property. This encroachment will impact a portion of the front lawn, driveway, and will result in the removal of some vegetation. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place.	**Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the

BHR/CHL Reference Number	Type of Cultural Heritage Resource	Type of Property	Location	Heritage Recognition	Type and Description of Potential/Anticipated Impact	Mitigation Measures
					Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
AJ-031	BHR	Residence	522 Kingston Rd W, Ajax	Potential BHR - Listed on Municipal Heritage Register	Proposed limits of impact along the north side of Kingston Road West will result in approximately 4.2 m encroachment on to the front yard of this property. This encroachment will impact a portion of the front lawn, driveway, and will result in the removal of some vegetation. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
AJ-032	BHR	Residence	515 Kingston Rd W, Ajax	Potential BHR - Listed on Municipal Heritage Register	Proposed limits of impact along the south side of Kingston Road West will result in approximately 5.1 m encroachment on to the front yard of this property. This encroachment will impact a portion of the front lawn, driveway, and will result in the removal of some vegetation. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
AJ-033	BHR	Commercial	516 Kingston Rd W, Ajax	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the north side of Kingston Road West will result in approximately 4.2 m encroachment on to the frontage of this property. This encroachment will impact a portion of the parking lot and will result in the removal of some vegetation. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
AJ-034	BHR	Residence	511 Kingston Rd W, Ajax	Potential BHR - Listed on Municipal Heritage Register	Proposed limits of impact along the south side of Kingston Road West will result in approximately 5 m encroachment on to the front yard of this property. This encroachment will impact a portion of the front lawn, driveway, and will result in the removal of some vegetation. The impacts	**Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan

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					will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
AJ-035	BHR	Commercial	510 Kingston Rd W, Ajax	Potential BHR - Listed on Municipal Heritage Register	Proposed limits of impact along the north side of Kingston Road West will result in approximately 4.3 m encroachment on to the front yard of this property. This encroachment will impact a portion of the front lawn and driveway. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
AJ-036	BHR	Residence	505 Kingston Rd W, Ajax	Potential BHR - Listed on Municipal Heritage Register	Proposed limits of impact along the south side of Kingston Road West will result in approximately 6 m encroachment on to the front yard of this property. This encroachment will impact a portion of the front lawn, driveway, and will result in the removal of some vegetation. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
AJ-037	BHR	Commercial	504 Kingston Rd W, Ajax	Known BHR - Part IV Designation (By-law #67-2001)	Proposed limits of impact along the north side of Kingston Road West will result in approximately 4.1 m encroachment on to the front yard of this property due to grading and property acquisition. The encroachment will impact a portion of the front lawn, driveway, and result in the realignment of the toe wall. The impacts will not result in direct or indirect impacts to known heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. However, property acquisition and encroachment on to a designated heritage property will typically trigger the heritage permit process. **Direct impacts** due to encroachment and property acquisition of a Part IV designated property.	**Direct impacts:** Preferred Option: Avoid encroachment on to this property. Alternative Option: Should it be determined that there is no other technically feasible option other than to significantly encroach on to this property, an HIA will be undertaken by a qualified person as early as possible in the detailed design phase following the TPAP. It will be developed in consultation with, and submitted for review to, MHSTCI and interested parties including the municipal heritage planner and/or municipal heritage committee and Indigenous Nations, as appropriate. A heritage permit may be required and further consultation with heritage staff at the municipality is recommended. **Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan

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					Indirect impacts to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
AJ-038	BHR	Residence	497 Kingston Rd W, Ajax	Known BHR - Part IV Designation (By-law #112-82; 78-2012)	Proposed limits of impact along the south side of Kingston Road West will result in approximately 6 m encroachment on to the front yard of this property due to grading and property acquisition. This encroachment will impact the front lawn, driveway, and will result in the removal of some vegetation. The impacts will not result in direct or indirect impacts to known heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. However, property acquisition and encroachment on to a designated heritage property will typically trigger the heritage permit process. **Direct impacts** due to encroachment and property acquisition of a Part IV designated property **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Direct impacts:** Preferred Option: Avoid encroachment on to this property. Alternative Option: Should it be determined that there is no other technically feasible option other than to significantly encroach on to this property, an HIA will be undertaken by a qualified person as early as possible in the detailed design phase following the TPAP. It will be developed in consultation with, and submitted for review to, MHSTCI and interested parties including the municipal heritage planner and/or municipal heritage committee and Indigenous Nations, as appropriate. A heritage permit may be required and further consultation with heritage staff at the municipality is recommended. **Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
AJ-039	BHR	Commercial	489 Kingston Rd W, Ajax	Potential BHR - Listed on Municipal Heritage Register	Proposed limits of impact along the south side of Kingston Road West will result in approximately 6.1 m encroachment on to the front yard of this property. This encroachment will impact the front lawn, driveway, and will result in the removal of some vegetation. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
AJ-040	BHR	Commercial	479 Kingston Rd W, Ajax	Known BHR - Part IV Designation (By-law #8-89)	Proposed limits of impact along the south side of Kingston Road West will result in approximately 6.6 m on to the front yard of this property due to grading and property acquisition. This encroachment will impact a portion of the front lawn, mature trees, and driveway. The updated preliminary designs have been adjusted to avoid the two stone pillars located at the entrance driveway. The impacts will not result in direct or indirect impacts to known heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. However, property acquisition and encroachment on to a designated heritage property will typically trigger the heritage permit process.	**Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.

BHR/CHL Reference Number	Type of Cultural Heritage Resource	Type of Property	Location	Heritage Recognition	Type and Description of Potential/Anticipated Impact	Mitigation Measures
					Direct impacts due to encroachment and property acquisition of a Part IV designated property. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	
AJ-041	BHR	Church	465 Kingston Rd W, Ajax	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the south side of Kingston Road West will result in approximately 4.1 m encroachment on to this property. This encroachment will impact a portion of the front lawn, driveway, and mature tree. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to property which may result in limited and temporary adverse vibration impacts.	**Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
AJ-042	BHR	Residence	456 Kingston Rd W, Ajax	Potential BHR - Listed on Municipal Heritage Register	Proposed limits of impact along the north side of Kingston Road West will result in approximately 10 m encroachment on to this property. This encroachment will impact a portion of the front lawn, driveway, and will result in the removal of modern landscaping. The impacts will not result in significant adverse impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to property which may result in limited and temporary adverse vibration impacts.	**Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
AJ-043	BHR	Church	457 Kingston Rd W, Ajax	Known BHR - Part IV Designation (By-law #53-2018)	Proposed limits of impact along the south side of Kingston Road West will result in approximately 10.8 m encroachment on to this property due to grading and property acquisition. This encroachment will impact a portion of the grassed lawn and parking lot. The impacts will not result in direct or indirect impacts to known heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. However, property acquisition and encroachment on to a designated heritage property will typically trigger the heritage permit process. **Direct impacts** due to encroachment and property acquisition of a Part IV designated property **Indirect impacts** to this property are possible due to construction activities in proximity to property which may result in limited and temporary adverse vibration impacts.	**Direct impacts:** Preferred Option: Avoid encroachment on to this property. Alternative Option: Should it be determined that there is no other technically feasible option other than to significantly encroach on to this property, an HIA will be undertaken by a qualified person as early as possible in the detailed design phase following the TPAP. It will be developed in consultation with, and submitted for review to, MHSTCI and interested parties including the municipal heritage planner and/or municipal heritage committee and Indigenous Nations, as appropriate. A heritage permit may be required and further consultation with heritage staff at the municipality is recommended. **Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this

BHR/CHL Reference Number	Type of Cultural Heritage Resource	Type of Property	Location	Heritage Recognition	Type and Description of Potential/Anticipated Impact	Mitigation Measures
						project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
AJ-044	BHR	Residence	419 Kingston Rd W, Ajax	Potential BHR - Listed on Municipal Heritage Register	Proposed limits of impact along the south side of Kingston Road West will result in approximately 2.5 m encroachment on to the front yard of this property. This encroachment will impact a portion of the front lawn and driveway. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to property which may result in limited and temporary adverse vibration impacts.	**Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
AJ-045	BHR	Residence	411 Kingston Rd W, Ajax	Potential BHR - Listed on Municipal Heritage Register	Proposed limits of impact on the south side of Kingston Road West will result in approximately 6 m encroachment on to this property. This encroachment will impact the front lawn, front walkway, and driveway. The scale of the proposed platform at Kingston Road West/Rotherglen Road North is not expected to visually impact views to or from this BHR or adversely impact the setting. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to property which may result in limited and temporary adverse vibration impacts.	**Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
AJ-046	BHR	Residence	408 Kingston Rd W, Ajax	Potential BHR - Listed on Municipal Heritage Register	Proposed limits of impact along the north side of Kingston Road West will result in approximately 15 m encroachment on to this property due to grading, property acquisition, and relocation of the sidewalk further on to this property. The proposed grading will impact the front yard, vegetation, and the driveway. The scale of the proposed platform at Kingston Road West/Rotherglen Road North is not expected to visually impact views to or from this BHR or adversely impact the setting. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to property which may result in limited and temporary adverse vibration impacts.	**Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
AJ-047	BHR	Residence	407 Kingston Rd W, Ajax	Potential BHR - Listed on Municipal Heritage Register	Proposed limits of impact along the south side of Kingston Road West will result in approximately 6 m encroachment on to this property. This encroachment will impact a portion of the front yard and driveway. The scale of the proposed platform at Kingston Road West/Rotherglen Road North is not expected to visually impact views to or from this BHR or	**Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential

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					adversely impact the setting. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to property which may result in limited and temporary adverse vibration impacts.	adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
AJ-048	BHR	Commercial	368 Kingston Rd W, Ajax	Potential BHR - Listed on Municipal Heritage Register	Proposed limits of impact will not result in encroachment on to this property. **No direct impacts** to potential heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to property which may result in limited and temporary adverse vibration impacts.	**Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
AJ-049	BHR	Residence	2 Ritchie Ave, Ajax	Potential BHR - Listed on Municipal Heritage Register	Proposed limits of impact will not result in encroachment on to this property. **No direct impacts** to potential heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to property which may result in limited and temporary adverse vibration impacts.	**Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
AJ-050	BHR	Commercial	244 Kingston Rd E, Ajax	Known BHR - Part IV Designation (By-law #41-2010)	Proposed limits of impact will not result in encroachment on to this property. The former residential structure that is designated under Part IV has been incorporated into a modern plaza development and is set back approximately 180 m from Kingston Road, fronting on to Salem Road. **No direct or indirect impacts are anticipated.**	No further work is required.
AJ-051	CHL	Farmstead	380 Kingston Rd E, Ajax	Potential CHL - Listed on Municipal Heritage Register	Proposed limits of impact along the north side of Kingston Road East will result in approximately 15 m encroachment on to this property. This encroachment will result in the removal of a fence line fronting on to Kingston Road East and some vegetation. However, neither of these features are identified as potential heritage attributes. Encroachment on to the fields associated with this farm complex are considered minimal. The farm complex of potential heritage interest is located more than 100 m back on to the property. The scale of the proposed platform at Kingston Road East/Galea Drive is not expected to visually impact views to or from this CHL or adversely impact the setting. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct impacts or indirect impacts** due to encroachment are anticipated.	No further work is required.

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					No direct or indirect impacts are anticipated.	
AJ-052	CHL	Cemetery	Kingston Rd E - Hicksite / Brown Quaker Cemetery, Ajax	Known CHL - Part IV Designation (By-law #14-2007)	Proposed limits of impact will not result in encroachment on to this property. The cemetery is set back from Kingston Road by more than 50 m, and is separated by the proposed infrastructure improvements by another property. **No direct or indirect impacts are anticipated.**	No further work is required.
AJ-053	BHR	Other	365 Kingston Rd E, Ajax	Known BHR - Part IV Designation (By-law #148-92; #125-2009)	Proposed limits of impact will not result in encroachment on to this property. The scale of the proposed platform at Kingston Road East/Galea Drive is not expected to visually impact views to or from this BHR or adversely impact the setting. The impacts will not result in direct or indirect impacts to known heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
AJ-054	BHR	Mixed Use	462 Kingston Rd E, Ajax	Potential BHR - Listed on Municipal Heritage Register	Proposed limits of impact will not result in encroachment on to this property. The structures on this property are set back more than 100 m on to this property. **No direct or indirect impacts are anticipated.**	No further work is required.
AJ-055	CHL	Farmstead	320 Audley Rd N, Ajax	Potential CHL - Listed on Municipal Heritage Register	Proposed limits of impact along the north side of Kingston Road East will result in approximately 5 m encroachment on to the southern boundary of this property. The encroachment will impact the grassed area along the southern boundary of the property. The farm complex of potential heritage interest is located more than 600 m back on to the property, fronting on to Audley Rd, and will not be impacted. The impacts from encroachment will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct or indirect impacts** due to encroachment are anticipated. **No other direct or indirect impacts are anticipated.**	No further work is required.
AJ-056	CHL	Farmstead	644 Kingston Rd E, Ajax	Potential CHL - Listed on Municipal Heritage Register	Proposed limits of impact along the north side of Kingston Road East will result in approximately 4.5 m encroachment on to the southern boundary of this property. This encroachment will impact the grassed area along the southern boundary, mature trees, and driveway. The remnant farm complex of potential heritage interest is located more than 350 m back on to the property and will not be impacted. The impacts from encroachment will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct or indirect impacts** due to encroachment are anticipated. **No other direct or indirect impacts are anticipated.**	No further work is required.

BHR/CHL Reference Number	Type of Cultural Heritage Resource	Type of Property	Location	Heritage Recognition	Type and Description of Potential/Anticipated Impact	Mitigation Measures
AJ-057	CHL	Residence	704 Kingston Rd E, Ajax	Potential CHL - Listed on Municipal Heritage Register	Proposed limits of impact along the north side of Kingston Road East will result in approximately 1 m encroachment on to portions of the frontage of this property. No impacts to the stone walls surrounding the driveway entrance or concrete/iron fence line are expected. The residence on this property is located more than 100 m back from the ROW. The impacts from encroachment will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct or indirect impacts** due to encroachment are anticipated. **No other direct or indirect impacts are anticipated.**	No further work is required.
AJ-058	CHL	Farmstead	744 Kingston Rd E	Potential CHL - Listed on Municipal Heritage Register	Proposed limits of impact along the north side of Kingston Road East will result in approximately 0.8 m encroachment on to a small portion of the frontage of this property. This encroachment is not expected to impact the concrete/iron fencing, wood fencing, or stone pillars marking the driveway entrance on to the property. The impacts from encroachment will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the dwelling located within this CHL which may result in limited and temporary adverse vibration impacts.	**Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project.
AJ-059	CHL	Farmstead	775 Kingston Rd E, Ajax	Known CHL - Part IV Designation (By-law # 32-2021)	Proposed limits of impact along the south side of Kingston Road East will result in approximately 3 m encroachment on to this property. This encroachment will impact a portion of the front lawn and driveway. However, property acquisition and encroachment on to a designated heritage property will typically trigger the heritage permit process. **Direct impacts** to the CHL are anticipated due to encroachment and property acquisition. **Indirect impacts** to this property are possible due to construction activities in proximity to property which may result in limited and temporary adverse vibration impacts.	**Direct impacts:** Preferred Option: Avoid encroachment on to this property. Alternative Option: Should it be determined that there is no other technically feasible option other than to significantly encroach on to this property, an HIA will be undertaken by a qualified person as early as possible in the detailed design phase following the TPAP. It will be developed in consultation with, and submitted for review to, MHSTCI and interested parties including the municipal heritage planner and/or municipal heritage committee and Indigenous Nations, as appropriate. A heritage permit may be required and further consultation with heritage staff at the municipality is recommended. **Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project.

TABLE 4.14. PRELIMINARY IMPACT ASSESSMENT OF BUILT HERITAGE RESOURCES AND CULTURAL HERITAGE LANDSCAPES WITHIN THE TOWN OF WHITBY AND RECOMMENDED MITIGATION MEASURES

BHR/CHL Reference Number	Type of Cultural Heritage Resource	Type of Property	Location	Heritage Recognition	Type and Description of Potential/Anticipated Impact	Mitigation Measures
WI-001	BHR	Residence	1610 Dundas St W, Whitby	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the north side of Dundas Street West will result in approximately 1 m encroachment on the southwest corner and the southeast corner of the property. This encroachment will impact a portion of the front lawn of the property. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the dwelling which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
WI-002	BHR	Other	1605 Dundas St W, Whitby	Potential BHR - Commemorative Feature	Proposed limits of impact will result in **a direct impact** through removal of the commemorative feature (miniature church model). **No indirect impacts** were identified.	**Direct Impacts:** As infrastructure improvements will require removal of this commemorative feature, the miniature church model should be removed prior to construction for safe-keeping and returned to an appropriate location on the same parcel once work has been completed. Consultation with heritage staff or other appropriate staff at the Town of Whitby should be undertaken to determine an appropriate storage and relocation strategy.
WI-003	BHR	Residence	925 Dundas St W, Whitby	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the south side of Dundas Street West will result in approximately 5.6 m encroachment on to the front yard of this property. This encroachment will impact a portion of the front lawn and trees along the frontage of the property. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to this property which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
WI-004	BHR	Residence	816 Dundas St W, Whitby	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the north side of Dundas Street West will result in approximately 2 m encroachment on the front yard of this property. This encroachment will impact a portion of the front lawn. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to this property which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.

BHR/CHL Reference Number	Type of Cultural Heritage Resource	Type of Property	Location	Heritage Recognition	Type and Description of Potential/Anticipated Impact	Mitigation Measures
WI-005	BHR	Residence	915 Dundas St W, Whitby	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the south side of Dundas Street East will result in approximately 8.5 m encroachment on the front yard of this property. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to this property which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
WI-006	BHR	Residence	812 Dundas St W, Whitby	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the north side of Dundas Street West will result in approximately 2 m encroachment on the front yard of this property. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to this property which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
WI-007	BHR	Residence	808 Dundas St W, Whitby	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact will not encroach on to this property. **No direct impacts** to this potential BHR or potential heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
WI-008	BHR	Residence	752 Dundas St W, Whitby	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the north side of Dundas Street West will result in up to 5 m encroachment on the front yard of this property. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to this property which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
WI-009	BHR	Residence	859 Dundas St W, Whitby	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the south side of Dundas Street West will result in approximately 4 m encroachment on the front yard of this property due to grading. This encroachment will impact a portion of the front yard, driveway, and parking area. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should

BHR/CHL Reference Number	Type of Cultural Heritage Resource	Type of Property	Location	Heritage Recognition	Type and Description of Potential/Anticipated Impact	Mitigation Measures
					thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
WI-010	BHR	Residence	738 Dundas St W, Whitby	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the north side of Dundas Street West will result in up to 5 m encroachment on the front yard of this property. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to this property which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
WI-011	BHR	Commercial	843 Dundas St W, Whitby	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the south side of Dundas Street West will result in approximately 4.7 m encroachment on the parking lot of this property. This encroachment will impact the parking lot. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to this property which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
WI-012	BHR	Residence	724 Dundas St W, Whitby	Potential BHR - Listed on Municipal Heritage Register	Proposed limits of impact along the north side of Dundas Street West will result in approximately 3 m encroachment on the front yard of this property due to grading. This encroachment will impact the front lawn, driveway, and side yard. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks in place. Accordingly, the resulting visual conditions will be similar to existing conditions. Further, the encroachment is not anticipated to limit long-term viability of the resource or limit sufficient vehicular access to the property. As such, **no direct or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
WI-013	BHR	Residence	708 Dundas St W, Whitby	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the north side of Dundas Street West will encroach approximately 3.5 m on to this property. The proposed limit of impact is shown to be bisecting the dwelling which is in very close proximity to the road	**Direct impacts:** Preferred Option: Avoid impacts to the building.

BHR/CHL Reference Number	Type of Cultural Heritage Resource	Type of Property	Location	Heritage Recognition	Type and Description of Potential/Anticipated Impact	Mitigation Measures
					Direct impacts to this potential BHR or potential heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to this property which may result in limited and temporary adverse vibration impacts.	Alternative Option: Should it be determined that there is no other technically feasible option other than to remove the house, it is recommended that a CHER be undertaken to determine if this potential BHR has CHVI. If the property is determined to have CHVI, an HIA will be undertaken by a qualified person as early as possible in the detailed design phase following the TPAP. It will be developed in consultation with, and submitted for review to, MHSTCI and interested parties including the municipal heritage planner and/or municipal heritage committee and Indigenous Nations, as appropriate. **Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
WI-014	BHR	Residence	723 Dundas St W, Whitby	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the south side of Dundas Street West will encroach approximately 5 m on to the front yard of this property. This encroachment will impact the front yard and front parking area, with some vegetation removal. The scale of the proposed platform at Dundas Street West and Annes Street is not expected to visually impact views to or from this BHR or adversely impact the setting. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct or indirect impacts** due to encroachment are anticipated. ***Note: This property currently has received approval for future development. The status of this development should be reviewed during detailed design by a qualified person with recent, relevant heritage experience to determine if impacts have changed and if further cultural heritage work is required.*** **Indirect impacts** to this property are possible due to construction activities in proximity to this property which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
WI-015	BHR	Residence	610 Dundas St W, Whitby	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the north side of Dundas Street West will result in approximately 3.5 m encroachment on to the front yard of this property. This encroachment will impact a portion of the front yard and driveway. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct or indirect impacts** due to encroachment are anticipated.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.

BHR/CHL Reference Number	Type of Cultural Heritage Resource	Type of Property	Location	Heritage Recognition	Type and Description of Potential/Anticipated Impact	Mitigation Measures
					Indirect impacts to this property are possible due to construction activities in proximity to this property which may result in limited and temporary adverse vibration impacts.	
WI-016	BHR	Residence	600 Dundas St W, Whitby	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the north side of Dundas Street West will encroach approximately 3.1 m on to the front yard of this property. This encroachment will impact a portion of the front yard. The impacts will not in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to this property which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
WI-017	BHR	Residence	504 Dundas St W, Whitby	Potential BHR - Listed on Municipal Heritage Register	Proposed limits of impact along the north side of Dundas Street West will result in approximately 1.7 m on to this property. This encroachment will impact a portion of the front yard and driveway. The scale of the proposed platform at Dundas Street West/Euclid Street is not expected to visually impact views to or from this BHR or adversely impact the setting. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to this property which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
WI-018	BHR	Residence	501 Dundas St W, Whitby	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the south side of Dundas Street West will result in approximately 7.4 m on to this property. This encroachment will impact a portion of the front yard and pathway. The scale of the proposed platform at Dundas Street West/Euclid Street is not expected to visually impact views to or from this BHR or adversely impact the setting. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to this property which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
WI-019	BHR	Other	500 Dundas St W, Whitby	Potential BHR - Identified During	Proposed limits of impact along the north side of Dundas Street West will result in approximately 1.4 m on to the front lawn of this property. This encroachment will impact the front lawn and modern landscaping.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the

BHR/CHL Reference Number	Type of Cultural Heritage Resource	Type of Property	Location	Heritage Recognition	Type and Description of Potential/Anticipated Impact	Mitigation Measures
				Desktop/Field Review	The scale of the proposed platform at Dundas Street West/Euclid Street is not expected to visually impact views to or from this BHR or adversely impact the setting. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to this property which may result in limited and temporary adverse vibration impacts.	structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
WI-020	BHR	Church	300 Dundas St W, Whitby	Potential BHR - Listed on Municipal Heritage Register	Proposed limits of impact along the north side of Dundas Street West will result in approximately 2 m encroachment on to the grassed lawn of this property. This encroachment will avoid signage and plaques fronting on to Dundas Street West, but may impact plaques on the east side of the property. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to this property which may result in limited and temporary adverse vibration impacts.	**Should encroachment result in removal of any plaques on this property,** consultation with the property owner and/or appropriate staff at the Town of Whitby should be undertaken to determine an appropriate storage and relocation strategy. **Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
WI-021	BHR	Commercial	132 Dundas St W, Whitby	Known BHR - Part IV Designation (By-law #1813-85)	Proposed limits of impact will not encroach on to this property. However, a loading area and parking spaces are being introduced adjacent to the property. Possible **direct impacts** to the views to/from the building are identified. **Indirect impacts** to this property are possible due to construction activities in proximity to this property which may result in limited and temporary adverse vibration impacts.	**Direct Impacts:** <u>Preferred Option:</u> Avoid placement of loading area next to this designated property. <u>Alternative Option:</u> Should it be determined that there is no other technically feasible option, an HIA will be undertaken by a qualified person as early as possible in the detailed design phase following the TPAP. It will be developed in consultation with, and submitted for review to, MHSTCI and interested parties including the municipal heritage planner and/or municipal heritage committee and Indigenous Nations, as appropriate. A heritage permit may be required and further consultation with heritage staff at the municipality is recommended. **Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
WI-022	BHR	Commercial	115 Dundas St W, Whitby	Potential BHR - Identified During	Proposed limits of impact along the south side of Dundas Street West will not result in any encroachment on to the property.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of

BHR/CHL Reference Number	Type of Cultural Heritage Resource	Type of Property	Location	Heritage Recognition	Type and Description of Potential/Anticipated Impact	Mitigation Measures
				Desktop/Field Review	**No direct impacts** to potential heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
WI-023	BHR	Commercial	130 Dundas St W, Whitby	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the north side of Dundas Street West will not result any encroachment on to the property. **No direct impacts** to potential heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
WI-024	BHR	Commercial	113 Dundas St W, Whitby	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the south side of Dundas Street West will not result any encroachment on to the property. **No direct impacts** to potential heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
WI-025	BHR	Commercial	128 Dundas St W, Whitby	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the north side of Dundas Street West will not result any encroachment on to the property. **No direct impacts** to potential heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
WI-026	BHR	Commercial	111 Dundas St W, Whitby	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the south side of Dundas Street West will not result any encroachment on to the property. **No direct impacts** to potential heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
WI-027	BHR	Commercial	126 Dundas St W, Whitby	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the north side of Dundas Street West will not result any encroachment on to the property. **No direct impacts** to potential heritage attributes are anticipated.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential

BHR/CHL Reference Number	Type of Cultural Heritage Resource	Type of Property	Location	Heritage Recognition	Type and Description of Potential/Anticipated Impact	Mitigation Measures
					Indirect impacts to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
WI-028	BHR	Commercial	124 Dundas St W, Whitby	Potential BHR - Listed on Municipal Heritage Register	Proposed limits of impact along the north side of Dundas Street West will not result any encroachment on to the property. **No direct impacts** to potential heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
WI-029	BHR	Commercial	109 Dundas St W, Whitby	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the south side of Dundas Street West will not result any encroachment on to the property. **No direct impacts** to potential heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
WI-030	BHR	Commercial	120 Dundas St W, Whitby	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the north side of Dundas Street West will not result any encroachment on to the property. **No direct impacts** to potential heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
WI-031	BHR	Commercial	105 Dundas St W, Whitby	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the south side of Dundas Street West will not result any encroachment on to the property. **No direct impacts** to potential heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
WI-032	BHR	Commercial	116 Dundas St W, Whitby	Potential BHR - Listed on Municipal Heritage Register	Proposed limits of impact along the north side of Dundas Street West will not result any encroachment on to the property. **No direct impacts** to potential heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration

BHR/CHL Reference Number	Type of Cultural Heritage Resource	Type of Property	Location	Heritage Recognition	Type and Description of Potential/Anticipated Impact	Mitigation Measures
						zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
WI-033	BHR	Commercial	114 Dundas St W, Whitby	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the north side of Dundas Street West will not result any encroachment on to the property. **No direct impacts** to potential heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
WI-034	BHR	Mixed Use	110 Dundas St W, Whitby	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the north side of Dundas Street West will not result any encroachment on to the property. **No direct impacts** to potential heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
WI-035	BHR	Mixed Use	106-108 Dundas St W, Whitby	Listed on Municipal Heritage Register	Proposed limits of impact along the north side of Dundas Street West will not result any encroachment on to the property. **No direct impacts** to potential heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
WI-036	BHR	Commercial	104 Dundas St W, Whitby	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the north side of Dundas Street West will not result any encroachment on to the property. **No direct impacts** to potential heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
WI-037	BHR	Mixed Use	100 Dundas St W, Whitby	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the north side of Dundas Street West will not result any encroachment on to the property. **No direct impacts** to potential heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.

BHR/CHL Reference Number	Type of Cultural Heritage Resource	Type of Property	Location	Heritage Recognition	Type and Description of Potential/Anticipated Impact	Mitigation Measures
WI-038	BHR	Commercial	101 Brock St S, Whitby	Potential BHR - Listed on Municipal Heritage Register	Proposed limits of impact along the south side of Dundas Street East will not result any encroachment on to the property. **No direct impacts** to potential heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
WI-039	BHR	Commercial	107 Brock St S, Whitby	Potential BHR - Listed on Municipal Heritage Register	Proposed limits of impact along the south side of Dundas Street East will not result any encroachment on to the property. **No direct impacts** to this property or potential heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
WI-040	BHR	Commercial	103 Dundas St E, Whitby	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the south side of Dundas Street East will not result any encroachment on to the property. **No direct impacts** to potential heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
WI-041	CHL	Park	111 Dundas St E, Whitby	Potential CHL - Identified During Desktop/Field Review	Proposed limits of impact along the south side of Dundas Street East will not result any encroachment on to the property. **No direct impacts** to potential heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
WI-042	BHR	Mixed Use	215 Dundas St E, Whitby	Potential BHR - Listed on Municipal Heritage Register	Proposed limits of impact along the south side of Dundas Street East will not result any encroachment on to the property. **No direct impacts** to potential heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
WI-043	BHR	Mixed Use	218 Dundas St E, Whitby	Potential BHR - Identified During	Proposed limits of impact will encroach less than 1 m on to this property. Impacts are limited to the parking area in front.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of

BHR/CHL Reference Number	Type of Cultural Heritage Resource	Type of Property	Location	Heritage Recognition	Type and Description of Potential/Anticipated Impact	Mitigation Measures
				Desktop/Field Review	**No direct impacts** to potential heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to this BHR which may result in limited and temporary adverse vibration impacts.	construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
WI-044	BHR	Commercial	318 Dundas St E, Whitby	Potential BHR - Listed on Municipal Heritage Register	Proposed limits of impact along the north side of Dundas Street East will not encroach on to this property. The scale of the proposed platform at Dundas Street East and Hickory Street is not expected to visually impact views to or from this BHR or adversely impact the setting. The impacts will not result indirect or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. **No direct impacts** to this property or potential heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to this BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
WI-045	BHR	Commercial	326 Dundas St E, Whitby	Potential BHR - Listed on Municipal Heritage Register	Proposed limits of impact along the north side of Dundas Street East will not encroach on to this property. The scale of the proposed platform at Dundas Street East and Hickory Street is not expected to visually impact views to or from this BHR or adversely impact the setting. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to this BHR which may result in limited and temporary adverse vibration impacts.	**Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
WI-046	BHR	Residence	425 Dundas St E, Whitby	Potential BHR - Listed on Municipal Heritage Register	Proposed limits of impact along the south side of Dundas Street East will result in approximately 4.7 m encroachment on to the front yard of this property. The encroachment will have a direct impact to the front porch and steps of this building, which are potential heritage attributes. **Direct impacts** to this potential BHR are anticipated through removal of the front porch/steps on this property. **Indirect impacts** to this property are possible due to construction activities in proximity to this BHR which may result in limited and temporary adverse vibration impacts.	**Direct impacts:** Preferred Option: Avoid direct impacts to this potential BHR. Alternative Option: Should it be determined that there is no other technically feasible option other than to remove the front porch/steps, it is recommended that a CHER be undertaken to determine if this potential BHR has CHVI. If the property is determined to have CHVI, an HIA will be undertaken by a qualified person as early as possible in the detailed design phase following the TPAP, and developed in consultation with, and submitted for review to, MHSTCI and interested parties including the municipal heritage planner and/or municipal heritage committee and Indigenous Nations, as appropriate. **Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan

BHR/CHL Reference Number	Type of Cultural Heritage Resource	Type of Property	Location	Heritage Recognition	Type and Description of Potential/Anticipated Impact	Mitigation Measures
						construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
WI-047	BHR	Commercial	500 Dundas St E, Whitby	Potential BHR - Formerly Listed on Municipal Heritage Register; Commemorative Feature	Proposed limits of impact along the north side of Dundas Street East will not encroach on to this property. ***Note: This property currently has received approval for future development. The status of this development should be reviewed during detailed design by a qualified person with recent, relevant heritage experience to determine if impacts have changed and if further cultural heritage work is required. The project involves placement of a bronze heritage plaque on the property next to the Dundas Street East ROW, and may be impacted by encroachment.*** **No direct impacts** to this property or potential heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to this BHR which may result in limited and temporary adverse vibration impacts.	**Direct impacts:** Should any impacts to the proposed heritage plaque be identified, consultation with the property owner will be undertaken to determine an appropriate storage and relocation strategy. Note that the development timeframe was not known at the time of report preparation. **Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
WI-048	BHR	Residence	528 Dundas St E, Whitby	Potential BHR - Listed on Municipal Heritage Register	Proposed limits of impact along the north side of Dundas Street East will result in approximately 3.3 m encroachment on to the property and result in removal of the structure on this property. **Direct impacts** to this potential BHR are anticipated through removal of the structure on this property. **Indirect impacts** to this property are possible due to construction activities in proximity to this property which may result in limited and temporary adverse vibration impacts.	**Direct impacts:** <u>Preferred Option:</u> Avoid removal of the potential BHR. <u>Alternative Option:</u> Should it be determined that there is no other technically feasible option other than to remove the building, it is recommended that a CHER be undertaken to determine if this potential BHR has CHVI. If the property is determined to have CHVI, an HIA will be undertaken by a qualified person as early as possible in the detailed design phase following the TPAP. It will be developed in consultation with, and submitted for review to, MHSTCI and interested parties including the municipal heritage planner and/or municipal heritage committee and Indigenous Nations, as appropriate. **Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
WI-049	BHR	Commercial	540 Dundas St E, Whitby	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the north side of Dundas Street East will result in approximately 2.8 m encroachment on to the front yard of this property. This encroachment will impact a portion of the front lawn, vegetation, and driveway The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration

BHR/CHL Reference Number	Type of Cultural Heritage Resource	Type of Property	Location	Heritage Recognition	Type and Description of Potential/Anticipated Impact	Mitigation Measures
					such, **no direct or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to this property which may result in limited and temporary adverse vibration impacts.	zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
WI-050	BHR	Bridge	Structure 14, Pringle Creek, Whitby	Potential BHR - Identified During Desktop/Field Review	Proposed infrastructure improvements will result in culvert extensions on both sides of the existing culvert. **Direct impacts** to this property are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Direct impacts:** Preferred Option: Avoid removal of the potential BHR. Alternative Option: Should it be determined that there is no other technically feasible option other than alter the culvert through the addition of extensions, it is recommended that a CHER be undertaken to determine if this potential BHR has CHVI. If the property is determined to have CHVI, an HIA will be undertaken by a qualified person as early as possible in the detailed design phase following the TPAP. It will be developed in consultation with, and submitted for review to, MHSTCI and interested parties including the municipal heritage planner and/or municipal heritage committee and Indigenous Nations, as appropriate. **Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
WI-051	BHR	Commercial	519 Dundas St E, Whitby	Known BHR - Part IV Designation (By-law #2739-89)	Proposed limits of impact along the south side of Dundas Street East will result in approximately 1.7 m encroachment on to the front yard of this property due to grading and property acquisition. The impacts will not result in direct or indirect impacts to known heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. However, property acquisition and encroachment on to a designated heritage property will typically trigger the heritage permit process. **Direct impacts** due to encroachment and property acquisition of a Part IV designated property **Indirect impacts** to this property are possible due to construction activities in proximity to this property which may result in limited and temporary adverse vibration impacts.	**Direct impacts:** Preferred Option: Avoid encroachment on to this property. Alternative Option: Should it be determined that there is no other technically feasible option other than to significantly encroach on to this property, an HIA will be undertaken by a qualified person as early as possible in the detailed design phase following the TPAP. It will be developed in consultation with, and submitted for review to, MHSTCI and interested parties including the municipal heritage planner and/or municipal heritage committee and Indigenous Nations, as appropriate. A heritage permit may be required and further consultation with heritage staff at the municipality is recommended. **Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
WI-052	BHR	Residence	839 Dundas St E, Whitby	Potential BHR - Identified During	Proposed limits of impact along the south side of Dundas Street East will result in approximately 5.3 m encroachment on to the front yard of this property. This encroachment will impact the driveway and grass	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the

BHR/CHL Reference Number	Type of Cultural Heritage Resource	Type of Property	Location	Heritage Recognition	Type and Description of Potential/Anticipated Impact	Mitigation Measures
				Desktop/Field Review	lawn. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to this property which may result in limited and temporary adverse vibration impacts.	structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
WI-053	BHR	Residence	944 Dundas St E, Whitby	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the north side of Dundas Street East will result in approximately 7 m on to the front yard of this property. A number of mature trees will be directly impacted and removed, which may change the character of this property. **Direct impacts** to this property or potential heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to this property which may result in limited and temporary adverse vibration impacts.	**Direct impacts:** Preferred Option: Minimize encroachment and avoid removal of mature vegetation. Alternative Option: Should it be determined that there is no other technically feasible option other than to significantly encroach on to this property and remove mature vegetation, it is recommended that a CHER be undertaken to determine if this potential BHR has CHVI. If the property is determined to have CHVI, an HIA will be undertaken by a qualified person as early as possible in the detailed design phase following the TPAP. It will be developed in consultation with, and submitted for review to, MHSTCI and interested parties including the municipal heritage planner and/or municipal heritage committee and Indigenous Nations, as appropriate. **Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
WI-054	BHR	Residence	991 Dundas St E, Whitby	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the south side of Dundas Street East will encroach approximately 2 m on to this property. Impacts are limited to the driveway and grass lawn and modern retaining wall. Consultation with the proponent confirmed no direct impacts to the building on this property. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. **No direct impacts** to this property or potential heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to this property which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
WI-055	BHR	Bridge	Structure 15, CP Railway, Whitby	Potential BHR - Identified During	Proposed infrastructure improvements will result in the full replacement of the bridge as per the DSBRT Structural List (Parsons 2021).	**Direct impacts:** Preferred Option: Avoid removal of the potential BHR.

BHR/CHL Reference Number	Type of Cultural Heritage Resource	Type of Property	Location	Heritage Recognition	Type and Description of Potential/Anticipated Impact	Mitigation Measures
				Desktop/Field Review	**Direct impacts** to this property are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	Alternative Option: Should it be determined that there is no other technically feasible option other than to remove the bridge, it is recommended that a CHER be undertaken to determine if this potential BHR has CHVI. If the property is determined to have CHVI, an HIA will be undertaken by a qualified person as early as possible in the detailed design phase following the TPAP. It will be developed in consultation with, and submitted for review to, MHSTCI and interested parties including the municipal heritage planner and/or municipal heritage committee and Indigenous Nations, as appropriate. **Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
WI-056	BHR	Other	1635 Dundas St E, Whitby	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact will not encroach on to this property. **No direct impacts** to potential heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to this property which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
WI-057	BHR	Commercial	1750 Dundas St E, Whitby	Potential BHR - Listed on Municipal Heritage Register	Proposed limits of impact will not encroach on to this property. **No direct impacts** to potential heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to this property which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
WI-058	CHL	Other	1801 Dundas St E, Whitby	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact at the southwest corner of Dundas Street East and Kendalwood Road will result in approximately 1 m encroachment on to the corner. Encroachment will not impact the cairn/commemorative feature located at the northeast corner of this property. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to this property which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.

BHR/CHL Reference Number	Type of Cultural Heritage Resource	Type of Property	Location	Heritage Recognition	Type and Description of Potential/Anticipated Impact	Mitigation Measures
WI-059	BHR	Residence	1917 Dundas St E, Whitby	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the south side of Dundas Street East will result in approximately 7 m encroachment on to the front yard of this property. This encroachment will impact the driveway and grass lawn. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to this property which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
WI-060	BHR	Residence	1919 Dundas St E, Whitby	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the south side of Dundas Street East will result in approximately 4 m encroachment on to the front yard of this property. This encroachment will impact the driveway and grass lawn. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to this property which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
WI-061	BHR	Residence	1921 Dundas St E, Whitby	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the south side of Dundas Street East will result in approximately 4 m encroachment. This encroachment will impact the driveway, grass lawn, and some vegetation. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to this property which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
WI-062	CHL	Cemetery	2000 Dundas St E, Whitby	Potential CHL - Identified During Desktop/Field Review	Proposed limits of impact along the north side of Dundas Street East will not encroach on to the Mount Lawn Cemetery. **No direct impacts** are anticipated to this cemetery. **Indirect impacts** to this property are possible due to construction activities in proximity to this property which may result in limited and temporary adverse vibration impacts.	As Mount Lawn Cemetery is a twentieth-century cemetery and does not exhibit potential for unmarked graves beyond the cemetery property, a Cemetery Investigation is not being recommended in the *Stage 1 Archaeological Assessment for the DSBRT TPAP* (ASI 2020a). **Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the feature(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of features within the vibration zone of influence for this

BHR/CHL Reference Number	Type of Cultural Heritage Resource	Type of Property	Location	Heritage Recognition	Type and Description of Potential/Anticipated Impact	Mitigation Measures
						project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
WI-063	BHR	Commercial	207 Dundas St W, Whitby	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the south side of Dundas Street West will result in less than 1 m encroachment on to this property. This encroachment will impact the outdoor seating area and will result in the reconfiguration of the building entrance. **Direct impacts** to this known property or heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to this property which may result in limited and temporary adverse vibration impacts.	**Direct impacts:** Preferred Option: Avoid encroachment on to this potential BHR. Alternative Option: Should it be determined that there is no other technically feasible option, it is recommended that a CHER be undertaken to determine if this potential BHR has CHVI. If the property is determined to have CHVI, an HIA will be undertaken by a qualified person as early as possible in the detailed design phase following the TPAP. It will be developed in consultation with, and submitted for review to, MHSTCI and interested parties including the municipal heritage planner and/or municipal heritage committee and Indigenous Nations, as appropriate. **Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
WI-064	CHL	Heritage Conservation District	Werden's Plan Neighbourhood Heritage Conservation District	Known CHL - Part V Designation (By-law #7297-17) The BRT Study Area includes 405 Dundas Street West, the Whitby Central Library, identified in the HCD Plan as a Complementary Property (exemplary) and is considered a contemporary landmark.	Proposed limits of impact encroach significantly on to 405 Dundas Street West, specifically the public square in front of the Whitby Central Library, which is identified in the Werden's Plan Neighbourhood HCD Plan as a complementary (exemplary) property. This is determined to be a direct impact as it will result in alterations to a known heritage attribute (the public square) and potential visual impacts to/from this HCD given placement of a platform at Dundas Street West/Henry Street. **Direct impacts** to this property are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to this property which may result in limited and temporary adverse vibration impacts.	**Direct Impacts:** Proposed alterations to 405 Dundas Street West in the Werden's Plan Neighbourhood HCD would be minimized through consultation with heritage staff during early stages of detailed design to review the proposed plans for DSBRT related infrastructure and encroachment and to determine if a heritage permit is required. Preferred Option: Avoid encroachment on to 405 Dundas Street West. Alternative Option: Should it be determined that there is no other technically feasible option other than to encroach on to the public square, it is recommended that a HIA be undertaken during detailed design to determine appropriate site-specific mitigation measures. **Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
WI-065	CHL	Proposed Heritage Conservation District	Four Corners Proposed Heritage Conservation District	Potential CHL – Proposed Part V Designation	Proposed limits of impact will remain within the ROW and will not directly impact any buildings/properties in the proposed HCD. However, the introduction of DSBRT infrastructure (including platforms) through the Four Corners proposed HCD may result in	**Direct impacts:** Proposed alterations to this proposed HCD would be minimized through consultation with heritage staff during early stages of detailed design to review the proposed plans for DSBRT related infrastructure including platform placement and to determine if a heritage permit is required.

BHR/CHL Reference Number	Type of Cultural Heritage Resource	Type of Property	Location	Heritage Recognition	Type and Description of Potential/Anticipated Impact	Mitigation Measures
					direct adverse impacts to the character and setting of this CHL through impacts to landscape elements. **Direct impacts** to this CHL or potential heritage attributes are anticipated. **Indirect impacts** are possible due to potential disruption to this proposed HCD and due to construction activities in proximity to this property which may result in limited and temporary adverse vibration impacts.	Preferred Option: Avoid proposed infrastructure improvements through this CHL. Alternative Option: Should it be determined that there is no other technically feasible option other than to impact this CHL, an HIA will be undertaken by a qualified person as early as possible in the detailed design phase following the TPAP. It will be developed in consultation with, and submitted for review to, MHSTCI and interested parties including the municipal heritage planner and/or municipal heritage committee and Indigenous Nations, as appropriate. **Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
WI-066	CHL	Proposed Heritage Conservation District	Perry's Plan Neighbourhood Proposed Heritage Conservation District	Potential CHL – Proposed Part V Designation;	Proposed limits of impact will encroach approximately 1.5 m on to one property identified in the proposed HCD (See WI-020). Impacts are limited to part of the front pathway, grass lawn, and some vegetation, and will not impact potential heritage attributes on WI-020. Given the Perry's Plan Proposed HCD is primarily focused on the neighbourhood extending north of the Project Study Area, the introduction of DSBRT infrastructure is not expected to have a direct adverse impact on the potential CHVI of this CHL. **No direct impacts** to this CHL or potential heritage attributes are anticipated. **Indirect impacts** to this CHL are possible due to construction activities in proximity to this property which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.

TABLE 4.15. PRELIMINARY IMPACT ASSESSMENT OF BUILT HERITAGE RESOURCES AND CULTURAL HERITAGE LANDSCAPES WITHIN THE CITY OF OSHAWA AND RECOMMENDED MITIGATION MEASURES

BHR/CHL Reference Number	Type of Cultural Heritage Resource	Type of Property	Location	Heritage Recognition	Type and Description of Potential/Anticipated Impact	Mitigation Measures
OS-001	BHR	Residence	797 King St W, Oshawa	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact will encroach approximately 7.5 m on to the King Street West frontage and approximately 1 m on the Thornton Road South frontage on this property. The impacts will be limited to the front lawn and some vegetation, and no building impacts are anticipated. The proponent has confirmed that the proposed property line, which currently goes through the house, will be revised to go around the house. The scale of the proposed platform at King Street West and Thornton Road is not expected to visually impact views to or from this BHR or adversely impact the setting. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct impacts or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to this property which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
OS-002	BHR	Residence	791 King St W, Oshawa	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact will encroach approximately 7.5 m on to the King Street West frontage. The impacts will be limited to the front lawn and some vegetation. The proponent has confirmed that there will be no building impacts. The scale of the proposed platform at King Street West and Thornton Road is not expected to visually impact views to or from this BHR or adversely impact the setting. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct impacts or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
OS-003	CHL	Cemetery	760 King St W, Oshawa	Potential CHL - Listed on Municipal Heritage Register	Proposed limits of impact along the north side of King Street West will not result any encroachment on to the Union Cemetery. The scale of the proposed platform at King Street West and Thornton Road is not expected to visually impact views to or from this CHL or adversely impact the setting. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct impacts or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the CHL which may result in limited and temporary adverse vibration impacts.	A Cemetery Investigation to determine the limits of the cemetery is recommended as part of the *Stage 1 Archaeological Assessment for the DSBRT TPAP* (ASI 2020a). Given the sensitive nature of CHL, the cemetery limits should be flagged based on the results of the Cemetery Investigation and steps taken to ensure that the site is retained and protected during construction-related activities. **Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the feature(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of features within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.

BHR/CHL Reference Number	Type of Cultural Heritage Resource	Type of Property	Location	Heritage Recognition	Type and Description of Potential/Anticipated Impact	Mitigation Measures
OS-004	BHR	Residence	773 King St W, Oshawa	Potential BHR - Listed on Municipal Heritage Register	Proposed limits of impact along the south side of King Street West will result in approximately 9.4 m encroachment on to the front yard of this property. This encroachment will impact a portion of the front lawn, driveway, and removal of vegetation. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct impacts or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
OS-005	BHR	Residence	767 King St W, Oshawa	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the south side of King Street West will result in approximately 8.2 m encroachment on to the front yard of this property. This encroachment will impact a portion of the front lawn, driveway, and some vegetation. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct impacts or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
OS-006	BHR	Commercial	731 King St W, Oshawa	Potential BHR - Listed on Municipal Heritage Register	Proposed limits of impact along the south side of King Street West will result in significant encroachment on to the property which will require removal/relocation of the structure on this property. **Direct impacts** to this property are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Direct impacts:** Preferred Option: Avoid removal of the potential BHR. Alternative Option: Should it be determined that there is no other technically feasible option other than to remove the building, it is recommended that a CHER be undertaken to determine if this potential BHR has CHVI. If the property is determined to have CHVI, an HIA will be undertaken by a qualified person as early as possible in the detailed design phase following the TPAP. It will be developed in consultation with, and submitted for review to, MHSTCI and interested parties including the municipal heritage planner and/or municipal heritage committee and Indigenous Nations, as appropriate. **Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
OS-007	BHR	Residence	707 King St W, Oshawa	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the south side of King Street West will result in approximately 4.5 m encroachment on to the front yard of this property. This encroachment will impact a portion of the front lawn and driveway. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should

BHR/CHL Reference Number	Type of Cultural Heritage Resource	Type of Property	Location	Heritage Recognition	Type and Description of Potential/Anticipated Impact	Mitigation Measures
					sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct impacts or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
OS-008	BHR	Residence	705 King St W, Oshawa	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the south side of King Street West will result in approximately 4.3 m encroachment on to the front yard of this property. This encroachment will impact a portion of the front lawn and driveway. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct impacts or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
OS-009	BHR	Residence	703 King St W, Oshawa	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the south side of King Street West will result in approximately 3.8 m encroachment on to the front yard of this property. This encroachment will impact a portion of the front lawn and driveway. The impacts will not result in significant adverse impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. **No direct impacts** to this property or potential heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
OS-010	BHR	Residence	697 King St W, Oshawa	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the south side of King Street West will result in approximately 3.5 m encroachment on to the front yard of this property. This encroachment will impact the driveway and grass lawn. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct impacts or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
OS-011	BHR	Other	696 King St W, Oshawa	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the north side of King Street West will result in approximately 4.5 m encroachment on to the front yard of this property. This encroachment will impact a portion of the front lawn and driveway. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the

BHR/CHL Reference Number	Type of Cultural Heritage Resource	Type of Property	Location	Heritage Recognition	Type and Description of Potential/Anticipated Impact	Mitigation Measures
					be similar to existing conditions. As such, **no direct impacts or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
OS-012	BHR	Residence	688 King St W, Oshawa	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the north side of King Street West will result in approximately 5.4 m encroachment on to the front yard of this property. This encroachment will impact a portion of the front lawn and driveway. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct impacts or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
OS-013	BHR	Residence	678 King St W, Oshawa	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the north side of King Street West will result in approximately 7.6 m encroachment on to the front yard of this property. This encroachment will impact a portion of the front lawn, driveway, and may result in the removal of the chain link fence. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct impacts or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
OS-014	BHR	Residence	685 King St W, Oshawa	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the south side of King Street West will result in in approximately 2.4 m encroachment on to the front yard of this property. This encroachment will impact a portion of the front lawn, driveway, and vegetation. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct impacts or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
OS-015	BHR	Residence	673 King St W, Oshawa	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the south side of King Street West will result in approximately less than 1 m encroachment on to the front yard of this property. This encroachment will impact a portion of the front lawn and driveway. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the

BHR/CHL Reference Number	Type of Cultural Heritage Resource	Type of Property	Location	Heritage Recognition	Type and Description of Potential/Anticipated Impact	Mitigation Measures
					be similar to existing conditions. As such, **no direct impacts or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
OS-016	BHR	Church	611 King St W, Oshawa	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the south side of King Street West will not result in any encroachment on to the property. **No direct impacts** to potential heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
OS-017	BHR	Residence	36 Fernhill Blvd, Oshawa	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the north side of Bond Street West will encroach on to the southeast corner of this property only. This encroachment will impact a portion of the front lawn. The impacts will not result in significant adverse impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. **No direct impacts** to this property or potential heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
OS-018	BHR	Commercial	460 King St W, Oshawa	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the north side of King Street West will results in approximately 3 m to 4 m encroachment on to the front yard of this property and approximately 1 m to 2 m encroachment on to the parking lot of the property. This encroachment will impact a portion of the front lawn and parking lot. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct impacts or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
OS-019	BHR	Residence	456 Bond St W, Oshawa	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the north side of Bond Street West will not result in any encroachment on to the property. **No direct impacts** to potential heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.

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OS-020	BHR	Residence	454 Bond St W, Oshawa	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the north side of Bond Street West will result in approximately 1.8 m encroachment on to the front yard of this property. This encroachment will impact a portion of the front lawn and pathway. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct impacts or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
OS-021	BHR	Residence	36 Rosehill Blvd, Oshawa	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the north side of Bond Street West will result in approximately 1 m encroachment on to the front yard of this property. This encroachment will impact a portion of the driveway. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct impacts or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
OS-022	BHR	Church	19 Rosehill Blvd, Oshawa	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the south side of Bond Street West will result in approximately 1 m encroachment on to the Bond Street West frontage of this property. This encroachment will impact a portion of the grassed lawn. The impacts will not result in significant adverse impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct impacts or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
OS-023	BHR	Residence	35 Rosehill Blvd, Oshawa	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the north side of Bond Street West will result in approximately 1.3 m encroachment on to the front yard of this property. This encroachment will impact the southeast corner of the front lawn only. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct impacts or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.

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OS-024	BHR	Mixed Use	18-26 Gibbons St, Oshawa	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the north side of Bond Street West will not result in any encroachment on to the property. **No direct impacts** to potential heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
OS-025	BHR	Residence	36 Gibbons St, Oshawa	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the north side of Bond Street West will not result in any encroachment on to the property. **No direct impacts** to potential heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
OS-026	BHR	Residence	35 Gibbons St, Oshawa	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the north side of Bond Street West will result in approximately 1.5 m encroachment on to this property. This encroachment will impact a portion of the lawn at the southeast corner of the property only. The scale of the proposed platform at Bond Street West is not expected to visually impact views to or from this BHR or adversely impact the setting. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct impacts or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
OS-027	BHR	Commercial	403 King St W, Oshawa	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the south side of King Street West will result in approximately 1.7 m encroachment on to the King Street West frontage of this property. This encroachment will impact a portion of the front lawn and driveway. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct impacts or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
OS-028	BHR	Commercial	399 King St W, Oshawa	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the south side of King Street West will result in approximately less than 1 m encroachment on to the King Street West frontage of this property. This encroachment will impact a portion of the parking area and driveway. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should

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					transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct impacts or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
OS-029	BHR	Residence	367 Buena Vista Ave, Oshawa	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the north side of Bond Street West will result in approximately 1 m encroachment on to the back yard of this property. This encroachment will impact a portion of the rear lawn, fence, and removal of vegetation. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct impacts or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
OS-030	BHR	Residence	363 Buena Vista Ave, Oshawa	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the north side of Bond Street West will result in approximately 1 m encroachment on to the back yard of this property. This encroachment will impact a portion of the rear lawn, fence, and removal of vegetation. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct impacts or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
OS-031	BHR	Commercial	343 King St W, Oshawa	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the south side of King Street West will result in approximately less than 1 m encroachment on to the King Street West frontage of this property. This encroachment will impact a portion of the parking area and driveway. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct impacts or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
OS-032	BHR	Residence	329 Buena Vista Ave, Oshawa	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the north side of Bond Street West will not result in any encroachment on to the property. **No direct impacts** to potential heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the

BHR/CHL Reference Number	Type of Cultural Heritage Resource	Type of Property	Location	Heritage Recognition	Type and Description of Potential/Anticipated Impact	Mitigation Measures
						vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
OS-033	BHR	Residence	325 Buena Vista Ave, Oshawa	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the north side of Bond Street West will result in approximately 1 m encroachment on to the back yard of this property. This encroachment will impact a portion of the rear lawn and fence. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct impacts or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
OS-034	BHR	Mixed Use	282 King St W, Oshawa	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the north side of King Street West will result in approximately 1 m encroachment on to the King Street West frontage of this property. This encroachment will impact a portion of the parking area. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct impacts or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
OS-035	BHR	Commercial	270 Bond St W, Oshawa	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the north side of Bond Street West will not result in any encroachment on to the property. **No direct impacts** to potential heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
OS-036	BHR	Commercial	42 Warren Ave, Oshawa	Potential BHR - Listed on Municipal Heritage Register	Proposed limits of impact along the north side of Bond Street West will not result in any encroachment on to the property. **No direct impacts** to potential heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
OS-037	BHR	Residence	41 Warren Ave, Oshawa	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the north side of Bond Street West will not result in any encroachment on to the property. **No direct impacts** to potential heritage attributes are anticipated.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should

BHR/CHL Reference Number	Type of Cultural Heritage Resource	Type of Property	Location	Heritage Recognition	Type and Description of Potential/Anticipated Impact	Mitigation Measures
					Indirect impacts to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
OS-038	BHR	Residence	27 Warren Ave, Oshawa	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the south side of Bond Street West will not result in any encroachment on to the property. **No direct impacts** to potential heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
OS-039	BHR	Commercial	223-229 King St W, Oshawa	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the south side of King Street West will result in approximately less than 1 m encroachment on to the King Street West frontage of this property. This encroachment will impact a portion of the sidewalk. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct impacts or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
OS-040	BHR	Other	29 Gladstone Ave, Oshawa	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the south side of Bond Street West will not result in any encroachment on to the property. **No direct impacts** to potential heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
OS-041	BHR	Mixed Use	205 Bond St W, Oshawa	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the south side of Bond Street West will result in approximately less than 1 m encroachment on to the Bond Street West frontage of this property. This encroachment will impact a portion of the parking area. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct impacts or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
OS-042	BHR	Commercial	210 Bond St W, Oshawa	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the north side of Bond Street West will not result in any encroachment on to the property. **No direct impacts** to potential heritage attributes are anticipated.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential

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					Indirect impacts to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
OS-043	BHR	Residence	204 Bond St W, Oshawa	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the north side of Bond Street West will not result in any encroachment on to the property. **No direct impacts** to potential heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
OS-044	CHL	Cemetery	185-201 Bond St W, Oshawa	Known CHL - Part IV Designation (By-law #68-2015)	Proposed limits of impact along the south side of Bond Street West will not result in any encroachment on to the Pioneer Memorial Garden Cemetery. **No direct impacts** to potential heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the CHL which may result in limited and temporary adverse vibration impacts.	A Cemetery Investigation to determine the limits of the cemetery is recommended as part of the *Stage 1 Archaeological Assessment for the DSBRT TPAP* (ASI 2020a). Given the sensitive nature of CHL, the cemetery limits should be flagged based on the results of the Cemetery Investigation and steps taken to ensure that the site is retained and protected during construction-related activities. **Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the feature(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of features within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
OS-045	BHR	Commercial	145 King St W, Oshawa	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the south side of King Street West will result in approximately 1 m encroachment on to the King Street West frontage of this property. This encroachment will impact a portion of the grassed lawn. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct impacts or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
OS-046	BHR	Commercial	92 Bond St W, Oshawa	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the north side of Bond Street West will not result in any encroachment on to the property. **No direct impacts** to potential heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.

BHR/CHL Reference Number	Type of Cultural Heritage Resource	Type of Property	Location	Heritage Recognition	Type and Description of Potential/Anticipated Impact	Mitigation Measures
OS-047	BHR	Commercial	90 Bond St W, Oshawa	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the north side of Bond Street West will result in less than 1 m encroachment on to the Bond Street West frontage of this property. This encroachment will impact a portion of the parking area only. The impacts will not result in significant adverse impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct impacts or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
OS-048	BHR	Commercial	88 Bond St W, Oshawa	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the north side of Bond Street West will result in approximately less than 1 m encroachment on to the frontage of this property. This encroachment will impact a portion of the parking area. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct impacts or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
OS-049	BHR	Commercial	25 McMillian Dr, Oshawa	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the south side of Bond Street West will result in less than 1 m encroachment on to the side yard of this property. This encroachment will impact a grassy area. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct impacts or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
OS-050	BHR	Residence	89 Bond St W, Oshawa	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the south side of Bond Street West will result in approximately less than 1 m encroachment on to the front yard of this property. This encroachment will impact a portion of the parking area. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct impacts or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.

BHR/CHL Reference Number	Type of Cultural Heritage Resource	Type of Property	Location	Heritage Recognition	Type and Description of Potential/Anticipated Impact	Mitigation Measures
OS-051	BHR	Residence	85 Bond St W, Oshawa	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the south side of Bond Street West will result in approximately less than 1 m encroachment on to the front yard of this property. This encroachment will impact a portion of the front lawn and driveway. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct impacts or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
OS-052	BHR	Residence	81 Bond St W, Oshawa	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the south side of Bond Street West will result in approximately less than 1 m encroachment on to the front yard of this property. This encroachment will impact a portion of the front garden, pathway, and driveway. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct impacts or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
OS-053	BHR	Residence	77 Bond St W, Oshawa	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the south side of Bond Street West will result in approximately less than 1 m encroachment on to the front yard of this property. This encroachment will impact a portion of the front lawn, pathway, and driveway. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct impacts or indirect impacts** due to encroachment are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
OS-054	BHR	Mixed Use	84 King St W, Oshawa	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the north side of King Street West will not result in any encroachment on to the property. **No direct impacts** to potential heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
OS-055	BHR	Commercial	78-82 King St W, Oshawa	Potential BHR - Listed on Municipal Heritage Register	Proposed limits of impact along the north side of King Street West will not result in any encroachment on to the property. **No direct impacts** to potential heritage attributes are anticipated.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential

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					Indirect impacts to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
OS-056	BHR	Other	74-76 King St W, Oshawa	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the north side of King Street West will not result in any encroachment on to the property. **No direct impacts** to potential heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
OS-057	BHR	Other	62-70 King St W, Oshawa	Potential BHR - Listed on Municipal Heritage Register	Proposed limits of impact along the north side of King Street West will not result in any encroachment on to the property. **No direct impacts** to this potential heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
OS-058	CHL	Park	61-67 King St W, Oshawa	Potential CHL - Commemorative Feature	Proposed limits of impact along the south side of King Street West may result in encroachment on to the park property. The encroachment along the northern edge of the property may result in **direct impacts** to the plaque through its removal. **No indirect impacts** were identified.	If infrastructure improvements will require removal of this commemorative feature, the stone commemorative feature should be removed or protected prior to construction for safe-keeping and returned to an appropriate location on the same parcel once work has been completed. Consultation with the City's Culture and Central Recreation Services branch in the Community Services Department concerning temporary relocation and storage of the commemorative feature is recommended.
OS-059	BHR	Mixed Use	21-23 King St W, Oshawa	Potential BHR - Listed on Municipal Heritage Register	Proposed limits of impact along the south side of King Street West will not result in any encroachment on to the property. **No direct impacts** to potential heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
OS-060	BHR	Mixed Use	19 King St W, Oshawa	Potential BHR - Listed on Municipal Heritage Register	Proposed limits of impact along the south side of King Street West will not result in any encroachment on to the property. **No direct impacts** to potential heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
OS-061	BHR	Mixed Use	17 King St W, Oshawa	Potential BHR - Listed on Municipal Heritage Register	Proposed limits of impact along the south side of King Street West will not result in any encroachment on to the property.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the

BHR/CHL Reference Number	Type of Cultural Heritage Resource	Type of Property	Location	Heritage Recognition	Type and Description of Potential/Anticipated Impact	Mitigation Measures
					No direct impacts to potential heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
OS-062	BHR	Mixed Use	15 King St W, Oshawa	Potential BHR - Listed on Municipal Heritage Register	Proposed limits of impact along the south side of King Street West will not result in any encroachment on to the property. **No direct impacts** to potential heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
OS-063	BHR	Mixed Use	13 King St W, Oshawa	Potential BHR - Listed on Municipal Heritage Register	Proposed limits of impact along the south side of King Street West will not result in any encroachment on to the property. **No direct impacts** to potential heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
OS-064	BHR	Commercial	9 Bond St W, Oshawa	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the south side of Bond Street West will not result in any encroachment on to the property. **No direct impacts** to potential heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
OS-065	BHR	Mixed Use	10-16 Bond St W, Oshawa	Potential BHR - Listed on Municipal Heritage Register	Proposed limits of impact along the north side of Bond Street West will not result in any encroachment on to the property. **No direct impacts** to potential heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
OS-066	BHR	Mixed Use	4-8 Bond St W, Oshawa	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the north side of Bond Street West will not result in any encroachment on to the property. **No direct impacts** to potential heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the

BHR/CHL Reference Number	Type of Cultural Heritage Resource	Type of Property	Location	Heritage Recognition	Type and Description of Potential/Anticipated Impact	Mitigation Measures
						vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
OS-067	BHR	Commercial	26-28 Simcoe St N, Oshawa	Potential BHR - Listed on Municipal Heritage Register	Proposed limits of impact along the south side of Bond Street West will not result in any encroachment on to the property. **No direct impacts** to potential heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
OS-068	BHR	Other	27 Simcoe St N, Oshawa	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along the south side of Bond Street East will not result in any encroachment on to the property. The scale of the proposed platform at Bond Street East and Simcoe Street North/South is not expected to visually impact views to or from this BHR or adversely impact the setting. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct impacts or indirect impacts** to this property or potential heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
OS-069	BHR	Mixed Use	1-5 Simcoe St S, Oshawa	Potential BHR - Listed on Municipal Heritage Register	Proposed limits of impact along the south side of King Street East will not result in any encroachment on to the property. The scale of the proposed platform at King Street East and Simcoe Street North/South is not expected to visually impact views to or from this BHR or adversely impact the setting. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct impacts or indirect impacts** to this property or potential heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
OS-070	BHR	Commercial	27 Bond St E, Oshawa	Potential BHR - Listed on a Municipal Heritage Register	Proposed limits of impact along the south side of Bond Street West will not result in any encroachment on to the property. **No direct impacts** to potential heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
OS-071	BHR	Commercial	17 Ontario St, Oshawa	Potential BHR - Listed on Municipal Heritage Register	Proposed limits of impact along King Street East and Bond Street East and will not result in any encroachment on to the property. **No direct impacts** to potential heritage attributes are anticipated.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan

BHR/CHL Reference Number	Type of Cultural Heritage Resource	Type of Property	Location	Heritage Recognition	Type and Description of Potential/Anticipated Impact	Mitigation Measures
					Indirect impacts to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
OS-072	BHR	Commercial	11 Ontario St, Oshawa	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along King Street East and Bond Street East and will not result in any encroachment on to the property. **No direct impacts** to potential heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
OS-073	BHR	Commercial	6-18 King St E, Oshawa	Potential BHR - Listed on Municipal Heritage Register	Proposed limits of impact along the north side of King Street East will not result in any encroachment on to the property. The scale of the proposed platform at King Street East and Simcoe Street North/South is not expected to visually impact views to or from this BHR or adversely impact the setting. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct impacts or indirect impacts** to this property or potential heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
OS-074	BHR	Commercial	20-22 King St E, Oshawa	Potential BHR - Listed on Municipal Heritage Register	Proposed limits of impact along the north side of King Street East will not result in any encroachment on to the property. The scale of the proposed platform at King Street East and Simcoe Street North/South is not expected to visually impact views to or from this BHR or adversely impact the setting. The impacts will not result in direct or indirect impacts to potential heritage attributes or to the setting given that this property is already located on an existing thoroughfare with bus transportation and sidewalks already in place. Accordingly, the resulting visual conditions will be similar to existing conditions. As such, **no direct impacts or indirect impacts** to this property or potential heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
OS-075	BHR	Commercial	27-33 King St E, Oshawa	Potential BHR - Listed on Municipal Heritage Register	Proposed limits of impact along the south side of King Street East will not result in any encroachment on to the property. **No direct impacts** to potential heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.

BHR/CHL Reference Number	Type of Cultural Heritage Resource	Type of Property	Location	Heritage Recognition	Type and Description of Potential/Anticipated Impact	Mitigation Measures
OS-076	BHR	Commercial	35-37 King St E, Oshawa	Potential BHR - Listed on Municipal Heritage Register	Proposed limits of impact along the south side of King Street East will not result in any encroachment on to the property. **No direct impacts** to potential heritage attributes are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Indirect Impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.
OS-077	BHR	Bridge	Structure 16; Oshawa Creek	Potential BHR - Identified During Desktop/Field Review	Proposed limits of impact along King Street East will result in the full replacement of the bridge as per the DSBRT Structural List (Parsons 2021) **Direct impacts** to this property are anticipated. **Indirect impacts** to this property are possible due to construction activities in proximity to the BHR which may result in limited and temporary adverse vibration impacts.	**Direct impacts:** Preferred Option: Avoid removal of the potential BHR. Alternative Option: Should it be determined that there is no other technically feasible option other than to remove the bridge, it is recommended that a CHER be undertaken to determine if this potential BHR has CHVI. If the property is determined to have CHVI, an HIA will be undertaken by a qualified person as early as possible in the detailed design phase following the TPAP. It will be developed in consultation with, and submitted for review to, MHSTCI and interested parties including the municipal heritage planner and/or municipal heritage committee and Indigenous Nations, as appropriate. **Indirect impacts:** To ensure this property is not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. Further, the Contractor must make a commitment to repair any damages caused by vibrations.

4.5.1.3 Mitigation

Footprint Mitigation

During detail design, the extent to which the introduction of DSBRT infrastructure, including stop infrastructure, adversely alters the setting of known and potential BHRs and CHLs shall be minimized. As part of the proposed undertaking, design principles and branding strategies should be sympathetically developed to compliment adjacent heritage properties and to respect their scenic amenity, contextual values, and character. There are opportunities to sympathetically integrate the proposed infrastructure into the existing fabric of heritage resources through the design and branding of stop infrastructure, platforms, signage, shelters, and seating, resulting in a transit undertaking that compliments the existing heritage resources. The proposed infrastructure also has the potential to present new opportunities for conserving and interpreting BHRs and CHLs located within the Study Area.

Where a known or potential BHR or CHL may be directly impacted, and where it has not yet been evaluated for CHVI, completion of a CHER is required to understand its CHVI. CHERs have been completed for the following properties that are anticipated to be directly impacted: TO-004; TO-011; PK-003; PK-018, AJ-007, AJ-008, AJ-009, AJ-014, AJ-015, AJ-016, AJ-017, WI-013; WI-045; WI-046, WI-048, WI-050; WI-053; WI-055; WI-063, OS-006; OS-077. Based on the results from CHERs and documentation of known cultural heritage value and heritage attributes, the following properties are found to be of CHVI and an HIA is recommended be undertaken by a qualified person: TO-012, TO-013, PK-014, AJ-003, AJ-007, AJ-009, AJ-014, AJ-015, AJ-016, AJ-017, AJ-018, AJ-020, AJ-021, AJ-037, AJ-038, AJ-040, AJ-043, WI-021, WI-045, WI-046, WI-051, WI-063, WI-064, WI-065, OS-006. The HIAs will be completed in consultation with municipal heritage staff and the MHSTCI as early as possible during detail design. Property ownership will be confirmed during detail design. Once ownership and control are determined during detail design, Metrolinx will confirm the properties that come under provincial ownership or control and determine if they meet the criteria set out on O. Reg. 9/06 of the *Ontario Heritage Act*, as Provincial Heritage Properties. Based on the results of CHERs, reviewed by Metrolinx Heritage Committee, none of the properties meet the criteria for provincial significance set out in Ontario Regulation 10/06. Therefore, the requirement that Metrolinx obtain the MHSTCI Minister's consent before removing or demolishing any buildings or structures on a Provincial Heritage Property of Provincial Significance will not apply.

Six cemeteries have been identified in the Project Study Area: PK-015, AJ-004, AJ-052, WI-062, OS-003, OS-044. The proposed undertaking will not encroach on the known property boundaries of the cemeteries. For further discussion on potential impacts on archaeological resources, please refer to **Section 4.5.2** (Archaeology Resources).

Property ownership as a result of the direct impacts identified in **TABLE 4.11** through **TABLE 4.15** will be confirmed during detail design. CHERs completed are presented in **Appendices E1 to E10.**

Construction Mitigation

Indirect impacts to identified BHRs and CHLs within 50 m of the proposed limits of impact are possible due to construction activities which may result in limited and temporary adverse vibration impacts. To ensure that identified BHRs and CHLS are not adversely impacted during construction, baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that any features on these properties will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. **Chapter 8** of this report presents this commitment. Further, the Contractor shall be responsible for any damages caused by vibrations.

Additional Heritage Studies

The following is a summary of additional cultural heritage studies recommended based on CHERs prepared.

TABLE 4.16. SUMMARY OF CULTURAL HERITAGE EVALUATION REPORT (CHER) RESULTS

BHR/CHL Reference Number	Address	Required Assessment (Unless otherwise mitigated)
TO-004	3344 Ellesmere Rd, Toronto	A Cultural Heritage Evaluation Report (CHER) was recommended. A CHER has been prepared and this property was found to meet Ontario Regulation 9/06. The property does not have CHVI under Ontario Regulation 10/06. An HIA will be completed as early as possible during detailed design. The HIA will be developed in consultation with municipal heritage staff, local heritage advisory committees, and MHSTCI.
TO-011	3832 Ellesmere, Rd Toronto	A CHER was recommended. A CHER was completed and this property was determined to not retain CHVI under *Ontario Regulations* 9/06 or 10/06. A HIA is not recommended.
PK-003	357 Kingston Rd, Pickering	A CHER was recommended. A CHER was completed and this property was determined to not retain CHVI under *Ontario Regulations* 9/06 or 10/06. Note that the CHER determined the correct address for this property is 365 Kingston Road, Pickering. A HIA is not recommended.
PK-018	1723 Dunchurch St	A CHER was recommended. A CHER was completed and this property was found to meet Ontario Regulation 9/06. The

BHR/CHL Reference Number	Address	Required Assessment (Unless otherwise mitigated)
		property does not have CHVI under *Ontario Regulation* 10/06. An HIA will be completed as early as possible during detailed design. The HIA will be developed in consultation with municipal heritage staff, local heritage advisory committees, and MHSTCI.
AJ-007	607-611 Kingston Rd W, Ajax	A CHER was recommended. A CHER was completed and this property was found to meet Ontario Regulation 9/06. The property does not have CHVI under *Ontario Regulation* 10/06. An HIA will be completed as early as possible during detailed design. The HIA will be developed in consultation with municipal heritage staff, local heritage advisory committees, and MHSTCI).
AJ-008	605 Kingston Rd W, Ajax	A CHER was recommended. A CHER was completed and this property was determined to not retain CHVI under *Ontario Regulations* 9/06 or 10/06. A HIA is not recommended.
AJ-009	601 Kingston Rd W, Ajax	A CHER was recommended. A CHER was completed and this property was found to have potential to meet Ontario Regulation 9/06. The property does not have CHVI under *Ontario Regulation* 10/06. An HIA will be completed as early as possible during detailed design. The HIA will be developed in consultation with municipal heritage staff, local heritage advisory committees, and MHSTCI
AJ-014	579 Kingston Rd W, Ajax	A CHER was recommended. A CHER was completed and this property was found to have potential to meet Ontario Regulation 9/06. The property does not have CHVI under *Ontario Regulation* 10/06. An HIA will be completed as early as possible during detailed design. The HIA will be developed in consultation with municipal heritage staff, local heritage advisory committees, and MHSTCI
AJ-015	577 Kingston Rd W, Ajax	A CHER was recommended. A CHER was completed and this property was found to have potential to meet Ontario Regulation 9/06. The property does not have CHVI under *Ontario Regulation* 10/06. An HIA will be completed as early as possible during detailed design. The HIA will be developed in consultation with municipal heritage staff, local heritage advisory committees, and MHSTCI

BHR/CHL Reference Number	Address	Required Assessment (Unless otherwise mitigated)
AJ-016	575 Kingston Rd W, Ajax	A CHER was recommended. A CHER was completed and this property was found to have potential to meet Ontario Regulation 9/06. The property does not have CHVI under *Ontario Regulation* 10/06. An HIA will be completed as early as possible during detailed design. The HIA will be developed in consultation with municipal heritage staff, local heritage advisory committees, and MHSTCI
AJ-017	571 Kingston Rd W, Ajax	A CHER was recommended. A CHER was completed and this property was found to have potential to meet Ontario Regulation 9/06. The property does not have CHVI under *Ontario Regulation* 10/06. An HIA will be completed as early as possible during detailed design. The HIA will be developed in consultation with municipal heritage staff, local heritage advisory committees, and MHSTCI
WI-013	708 Dundas St W, Whitby	A CHER was recommended. A CHER was completed and this property was determined to not retain CHVI under *Ontario Regulations* 9/06 or 10/06. A HIA is not recommended.
WI-045	326 Dundas St E, Whitby	A CHER was recommended. A CHER was completed and this property was found to have potential to meet *Ontario Regulation* 9/06, but did not meet *Ontario Regulation* 10/06. *Note: The project footprint was further refined between the 75% and 90% design, which resulted in a change to reduce the adverse direct impacts identified to this property. This property will no longer be subject to adverse direct impacts and therefore a HIA is not required during detail design.*
WI-046	425 Dundas St E, Whitby	A CHER was recommended. A CHER was completed and this property was found to have potential to meet Ontario Regulation 9/06. The property does not have CHVI under *Ontario Regulation* 10/06. An HIA will be completed as early as possible during detailed design. The HIA will be developed in consultation with municipal heritage staff, local heritage advisory committees, and MHSTCI.
WI-048	528 Dundas St E	A CHER was recommended. A CHER was completed and this property was determined to not retain CHVI under *Ontario Regulations* 9/06 or 10/06. A HIA is not recommended.
WI-050	Structure 14, Pringle Creek, Whitby	A CHER was recommended.

BHR/CHL Reference Number	Address	Required Assessment (Unless otherwise mitigated)
		A CHER was completed and this property was determined to not retain CHVI under *Ontario Regulations* 9/06 or 10/06. A HIA is not recommended.
WI-053	944 Dundas St E, Whitby	A CHER was recommended. A CHER was completed and this property was determined to not retain CHVI under *Ontario Regulations* 9/06 or 10/06. A HIA is not recommended.
WI-055	Structure 15, CP Railway, Whitby	A CHER was recommended. A CHER was completed and this property was determined to not retain CHVI under *Ontario Regulations* 9/06 or 10/06. A HIA is not recommended.
WI-063	207 Dundas St W	A CHER was recommended. A CHER was completed and this property was found to have potential to meet Ontario Regulation 9/06. The property does not have CHVI under *Ontario Regulation* 10/06. An HIA will be completed as early as possible during detailed design. The HIA will be developed in consultation with municipal heritage staff, local heritage advisory committees, and MHSTCI
OS-006	731 King St W, Oshawa	A CHER was recommended. A CHER has been completed and this property was found to have potential to meet *Ontario Regulation 9/06*. The property does not have CHVI under *Ontario Regulation 10/06.* An HIA will be completed as early as possible during detailed design. The HIA will be developed in consultation with municipal heritage staff, local heritage advisory committees, and MHSTC.
OS-077	Structure 16; Oshawa Creek	A CHER was recommended. A CHER has been completed and this property was determined to not retain CHVI under *Ontario Regulations 9/06* or 10/06. A HIA is not recommended.

The recommended CHERs have been drafted on behalf of the local municipalities and will be finalized after TPAP as municipal evaluations.

The following is a summary of additional cultural heritage studies recommended based on the CHR and the 10 CHERs completed.

TABLE 4.17. NEXT STEPS AND ADDITIONAL CULTURAL HERITAGE STUDIES FOLLOWING TPAP

BHR/CHL Reference Number	Address	Required Assessment (Unless otherwise mitigated)
TO-001	Ellesmere Road and Military Trail, Toronto	The plaque should be removed prior to construction for safe-keeping and returned to the same general location once work has been completed. Consultation with heritage staff or appropriate municipal department should be undertaken during detail design to determine an appropriate storage and relocation strategy.
TO-004	3344 Ellesmere Rd, Toronto	An HIA will be undertaken by a qualified person as early as possible in the detailed design phase following the TPAP. It will be developed in consultation with, and submitted for review to, MHSTCI and interested parties including the municipal heritage planner and/or municipal heritage committee and Indigenous Nations, as appropriate. The HIA will discuss the alternatives considered and recommend the alternative to minimize or mitigate adverse effects on the property.
TO-012	726 Meadowvale Rd, Toronto	An HIA will be undertaken by a qualified person as early as possible in the detailed design phase following the TPAP. It will be developed in consultation with, and submitted for review to, MHSTCI and interested parties including the municipal heritage planner and/or municipal heritage committee and Indigenous Nations, as appropriate. The HIA will discuss the alternatives considered and recommend the alternative to minimize or mitigate adverse effects on the property. A heritage permit may be required and further consultation with heritage staff at the municipality is recommended.
TO-013	6540-6550 Kingston Rd, Toronto	An HIA will be undertaken by a qualified person as early as possible in the detailed design phase following the TPAP. It will be developed in consultation with, and submitted for review to, MHSTCI and interested parties including the municipal heritage planner and/or municipal heritage committee and Indigenous Nations, as appropriate. The HIA will discuss the alternatives considered and recommend the alternative to minimize or mitigate adverse effects on the property. A heritage permit may be required and further consultation with heritage staff at the municipality is recommended.
PK-002	301 Kingston Rd, Pickering	To address indirect impacts, a CHER is recommended to be undertaken as early as possible during detailed design to determine if this

BHR/CHL Reference Number	Address	Required Assessment (Unless otherwise mitigated)
		potential BHR has CHVI. If the property is determined to have CHVI, an HIA will be undertaken by a qualified person as early as possible in the detailed design phase. It will be developed in consultation with, and submitted for review to, MHSTCI and interested parties including the municipal heritage planner and/or municipal heritage committee and Indigenous Nations, as appropriate. The HIA will discuss the alternatives considered and recommend the alternative to minimize or mitigate adverse effects on the property.
PK-013	1294 Kingston Rd, Pickering	This property currently has received an application for future development. The status of this development should be reviewed during detailed design by a qualified person with recent, relevant heritage experience to determine if impacts have changed and if further cultural heritage work is required.
PK-014	1970 Brock Rd, Pickering	An HIA will be undertaken by a qualified person as early as possible in the detailed design phase following the TPAP. It will be developed in consultation with, and submitted for review to, MHSTCI and interested parties including the municipal heritage planner and/or municipal heritage committee and Indigenous Nations, as appropriate. The HIA will discuss the alternatives considered and recommend the alternative to minimize or mitigate adverse effects on the property. A heritage permit may be required and further consultation with heritage staff at the municipality is recommended.
PK-018	1723 Dunchurch St	An HIA will be undertaken by a qualified person as early as possible in the detailed design phase following the TPAP. It will be developed in consultation with, and submitted for review to, MHSTCI and interested parties including the municipal heritage planner and/or municipal heritage committee and Indigenous Nations, as appropriate. The HIA will discuss the alternatives considered and recommend the alternative to minimize or mitigate adverse effects on the property. A heritage permit may be required and further consultation with heritage staff at the municipality is recommended.
AJ-003	Pickering Village HCD, Ajax	Proposed alterations to this HCD would be minimized through consultation with heritage staff during early stages of detailed design to review the proposed plans for DSBRT related infrastructure, platform placement and encroachment and to determine if a heritage permit is required.

BHR/CHL Reference Number	Address	Required Assessment (Unless otherwise mitigated)
		An HIA will be undertaken by a qualified person as early as possible in the detailed design phase following the TPAP. Scoping of the HIA with heritage staff will be undertaken in order to determine the best approach to the HIA(s) and reporting can be defined at that point. Consideration should be given to addressing impacts through a series of property specific HIAs rather than one full HIA report for the full HCD. It will be developed in consultation with, and submitted for review to, MHSTCI and interested parties including the municipal heritage planner and/or municipal heritage committee and Indigenous Nations, as appropriate. The HIA will discuss the alternatives considered and recommend the alternative to minimize or mitigate adverse effects on the properties within the HCD.
AJ-007	607-611 Kingston Rd W, Ajax	An HIA will be undertaken by a qualified person as early as possible in the detailed design phase following the TPAP. It will be developed in consultation with, and submitted for review to, MHSTCI and interested parties including the municipal heritage planner and/or municipal heritage committee and Indigenous Nations, as appropriate. The HIA will discuss the alternatives considered and recommend the alternative to minimize or mitigate adverse effects on the property.
AJ-009	601 Kingston Rd W, Ajax	An HIA will be undertaken by a qualified person as early as possible in the detailed design phase following the TPAP. It will be developed in consultation with, and submitted for review to, MHSTCI and interested parties including the municipal heritage planner and/or municipal heritage committee and Indigenous Nations, as appropriate. The HIA will discuss the alternatives considered and recommend the alternative to minimize or mitigate adverse effects on the property.
AJ-014	579 Kingston Rd W, Ajax	An HIA will be undertaken by a qualified person as early as possible in the detailed design phase following the TPAP. It will be developed in consultation with, and submitted for review to, MHSTCI and interested parties including the municipal heritage planner and/or municipal heritage committee and Indigenous Nations, as appropriate. The HIA will discuss the alternatives considered and recommend the alternative to minimize or mitigate adverse effects on the property.

BHR/CHL Reference Number	Address	Required Assessment (Unless otherwise mitigated)
AJ-015	577 Kingston Rd W, Ajax	An HIA will be undertaken by a qualified person as early as possible in the detailed design phase following the TPAP. It will be developed in consultation with, and submitted for review to, MHSTCI and interested parties including the municipal heritage planner and/or municipal heritage committee and Indigenous Nations, as appropriate. The HIA will discuss the alternatives considered and recommend the alternative to minimize or mitigate adverse effects on the property.
AJ-016	575 Kingston Rd W, Ajax	An HIA will be undertaken by a qualified person as early as possible in the detailed design phase following the TPAP. It will be developed in consultation with, and submitted for review to, MHSTCI and interested parties including the municipal heritage planner and/or municipal heritage committee and Indigenous Nations, as appropriate. The HIA will discuss the alternatives considered and recommend the alternative to minimize or mitigate adverse effects on the property.
AJ-017	571 Kingston Rd W, Ajax	An HIA will be undertaken by a qualified person as early as possible in the detailed design phase following the TPAP. It will be developed in consultation with, and submitted for review to, MHSTCI and interested parties including the municipal heritage planner and/or municipal heritage committee and Indigenous Nations, as appropriate. The HIA will discuss the alternatives considered and recommend the alternative to minimize or mitigate adverse effects on the property.
AJ-018	572 Kingston Rd W, Ajax	An HIA will be undertaken by a qualified person as early as possible in the detailed design phase following the TPAP. It will be developed in consultation with, and submitted for review to, MHSTCI and interested parties including the municipal heritage planner and/or municipal heritage committee and Indigenous Nations, as appropriate. A heritage permit may be required and further consultation with heritage staff at the municipality is recommended. The HIA will discuss the alternatives considered and recommend the alternative to minimize or mitigate adverse effects on the property.
AJ-020	566 Kingston Rd W, Ajax	An HIA will be undertaken by a qualified person as early as possible in the detailed design phase following the TPAP. It will be developed in consultation with, and submitted for review to, MHSTCI and interested parties including the

BHR/CHL Reference Number	Address	Required Assessment (Unless otherwise mitigated)
		municipal heritage planner and/or municipal heritage committee and Indigenous Nations, as appropriate. The HIA will discuss the alternatives considered and recommend the alternative to minimize or mitigate adverse effects on the property. A heritage permit may be required and further consultation with heritage staff at the municipality is recommended.
AJ-021	562 Kingston Rd W, Ajax	An HIA will be undertaken by a qualified person as early as possible in the detailed design phase following the TPAP. It will be developed in consultation with, and submitted for review to, MHSTCI and interested parties including the municipal heritage planner and/or municipal heritage committee and Indigenous Nations, as appropriate. The HIA will discuss the alternatives considered and recommend the alternative to minimize or mitigate adverse effects on the property. A heritage permit may be required and further consultation with heritage staff at the municipality is recommended.
AJ-037	504 Kingston Rd W, Ajax	An HIA will be undertaken by a qualified person as early as possible in the detailed design phase following the TPAP. It will be developed in consultation with, and submitted for review to, MHSTCI and interested parties including the municipal heritage planner and/or municipal heritage committee and Indigenous Nations, as appropriate. The HIA will discuss the alternatives considered and recommend the alternative to minimize or mitigate adverse effects on the property.
AJ-038	497 Kingston Rd W, Ajax	An HIA will be undertaken by a qualified person as early as possible in the detailed design phase following the TPAP. It will be developed in consultation with, and submitted for review to, MHSTCI and interested parties including the municipal heritage planner and/or municipal heritage committee and Indigenous Nations, as appropriate. The HIA will discuss the alternatives considered and recommend the alternative to minimize or mitigate adverse effects on the property. A heritage permit may be required and further consultation with heritage staff at the municipality is recommended.
AJ-040	479 Kingston Rd W, Ajax	An HIA will be undertaken by a qualified person as early as possible in the detailed design phase following the TPAP. It will be developed in consultation with, and submitted for review to, MHSTCI and interested parties including the municipal heritage planner and/or municipal

BHR/CHL Reference Number	Address	Required Assessment (Unless otherwise mitigated)
		heritage committee and Indigenous Nations, as appropriate. The HIA will discuss the alternatives considered and recommend the alternative to minimize or mitigate adverse effects on the property. A heritage permit may be required and further consultation with heritage staff at the municipality is recommended.
AJ-043	457 Kingston Rd W, Ajax	An HIA will be undertaken by a qualified person as early as possible in the detailed design phase following the TPAP. It will be developed in consultation with, and submitted for review to, MHSTCI and interested parties including the municipal heritage planner and/or municipal heritage committee and Indigenous Nations, as appropriate. The HIA will discuss the alternatives considered and recommend the alternative to minimize or mitigate adverse effects on the property. A heritage permit may be required and further consultation with heritage staff at the municipality is recommended.
AJ-059	775 Kingston Rd E, Ajax	An HIA will be undertaken by a qualified person as early as possible in the detailed design phase following the TPAP. It will be developed in consultation with, and submitted for review to, MHSTCI and interested parties including the municipal heritage planner and/or municipal heritage committee and Indigenous Nations, as appropriate. The HIA will discuss the alternatives considered and recommend the alternative to minimize or mitigate adverse effects on the property. A heritage permit may be required and further consultation with heritage staff at the municipality is recommended.
WI-002	1605 Dundas St W, Whitby	The miniature church model should be removed prior to construction for safe-keeping and returned to an appropriate location on the same parcel once work has been completed. Consultation with the owner during detailed design should be undertaken to determine an appropriate storage and relocation strategy.
WI-014	723 Dundas St W, Whitby	This property currently has received approval for future development. The status of this development should be reviewed during detailed design by a qualified person with recent, relevant heritage experience to determine if impacts have changed and if further cultural heritage work is required.
WI-020	300 Dundas St W, Whitby	Should encroachment result in removal of any plaques on this property, consultation with the property owner and/or appropriate staff at the

BHR/CHL Reference Number	Address	Required Assessment (Unless otherwise mitigated)
		Town of Whitby should be undertaken to determine an appropriate storage and relocation strategy. These potential impacts should be reviewed early in detailed design.
WI-021	132 Dundas St W, Whitby	An HIA will be undertaken by a qualified person as early as possible in the detailed design phase following the TPAP. It will be developed in consultation with, and submitted for review to, MHSTCI and interested parties including the municipal heritage planner and/or municipal heritage committee and Indigenous Nations, as appropriate. The HIA will discuss the alternatives considered and recommend the alternative to minimize or mitigate adverse effects on the property.
WI-046	425 Dundas St E, Whitby	An HIA will be undertaken by a qualified person as early as possible in the detailed design phase following the TPAP. It will be developed in consultation with, and submitted for review to, MHSTCI and interested parties including the municipal heritage planner and/or municipal heritage committee and Indigenous Nations, as appropriate. The HIA will discuss the alternatives considered and recommend the alternative to minimize or mitigate adverse effects on the property.
WI-047	500 Dundas St E, Whitby	This property currently has received approval for future development. The status of this development should be reviewed during detailed design by a qualified person with recent, relevant heritage experience to determine if impacts have changed and if further cultural heritage work is required. Should any impacts to the proposed heritage plaque be identified, consultation with the property owner will be undertaken to determine an appropriate storage and relocation strategy. Note that the development timeframe was not known at the time of report preparation.
WI-051	519 Dundas St E, Whitby	An HIA will be undertaken by a qualified person as early as possible in the detailed design phase following the TPAP. It will be developed in consultation with, and submitted for review to, MHSTCI and interested parties including the municipal heritage planner and/or municipal heritage committee and Indigenous Nations, as appropriate. The HIA will discuss the alternatives considered and recommend the alternative to minimize or mitigate adverse effects on the property. A heritage permit may be required and

BHR/CHL Reference Number	Address	Required Assessment (Unless otherwise mitigated)
		further consultation with heritage staff at the municipality is recommended.
WI-063	207 Dundas St W	An HIA will be undertaken by a qualified person as early as possible in the detailed design phase following the TPAP. It will be developed in consultation with, and submitted for review to, MHSTCI and interested parties including the municipal heritage planner and/or municipal heritage committee and Indigenous Nations, as appropriate. The HIA will discuss the alternatives considered and recommend the alternative to minimize or mitigate adverse effects on the property.
WI-064	Werden's Plan Neighbourhood HCD, Whitby	Proposed alterations to 405 Dundas Street West in the Werden's Plan Neighbourhood HCD would be minimized through consultation with heritage staff during early stages of detailed design to review the proposed plans for DSBRT related infrastructure, platform placement, and encroachment and to determine if a heritage permit is required. An HIA will be undertaken by a qualified person as early as possible in the detailed design phase following the TPAP. It will be developed in consultation with, and submitted for review to, MHSTCI and interested parties including the municipal heritage planner and/or municipal heritage committee and Indigenous Nations, as appropriate. The HIA will discuss the alternatives considered and recommend the alternative to minimize or mitigate adverse effects on the property.
WI-065	Four Corners Proposed HCD	Proposed alterations to this proposed HCD would be minimized through consultation with heritage staff during early stages of detailed design to review the proposed plans for DSBRT related infrastructure including platform placement and to determine if a heritage permit is required. An HIA will be undertaken by a qualified person as early as possible in the detailed design phase following the TPAP. It will be developed in consultation with, and submitted for review to, MHSTCI and interested parties including the municipal heritage planner and/or municipal heritage committee and Indigenous Nations, as appropriate. The HIA will discuss the alternatives considered and recommend the alternative to minimize or mitigate adverse effects on the property.
OS-006	731 King St W, Oshawa	An HIA will be undertaken by a qualified person as early as possible in the detailed design phase

BHR/CHL Reference Number	Address	Required Assessment (Unless otherwise mitigated)
		following the TPAP. It will be developed in consultation with, and submitted for review to, MHSTCI and interested parties including the municipal heritage planner and/or municipal heritage committee and Indigenous Nations, as appropriate. The HIA will discuss the alternatives considered and recommend the alternative to minimize or mitigate adverse effects on the property.
OS-058	61-67 King St W, Oshawa	The stone commemorative feature should be removed or protected prior to construction for safe-keeping and returned to an appropriate location on the same parcel once work has been completed. Consultation with the City's Culture and Central Recreation Services branch in the Community Services Department concerning temporary relocation and storage of the commemorative feature is recommended.

4.5.2 Archaeology Resources

4.5.2.1 Methodology

A Draft Stage 1 archaeological assessment was undertaken in 2021 by ASI for the Study Area and submitted to the Ministry of Heritage, Sport, Tourism and Culture Industries (MHSTCI) on November 9, 2021. This draft report is currently being updated based on comments received from MHSTCI on January 10, 2022. This report will be resubmitted by end of January 2022 and clearance is anticipated in February 2022. A Stage 1 AA consists of a review of geographic, land use and historical information for the property and the relevant surrounding area, a property visit to inspect its current condition and contacting MHSTCI to find out whether, or not, there are any known archaeological sites on or near the property. Its purpose is to identify areas of archaeological potential and further archaeological assessment (e.g., Stage 2-4) as necessary. The Draft Stage 1 AA is included in **Appendix F**.

4.5.2.2 Potential Impacts

The Stage 1 background study determined that 77 previously registered archaeological sites are located within one kilometre of the Study Area. A total of 12 sites are within 50 metres of the Study Area. Two of the sites within 50 metres (AlGs-449 and AlGr-520) retain Cultural Heritage Value or Interest and require further assessment. One cemetery (Post Cemetery) was identified within the Study Area, and four were identified directly adjacent, including Pioneer Memorial Garden Cemetery which requires further assessment. The property inspection and background research determined that parts of the Study Area exhibit archaeological potential, and all required archaeological assessments (e.g., Stage 2 AA, and Stage 3, if recommended in the Stage 2 AA) will be

completed as early as possible during detail design and well in advance of any ground disturbing activities.

4.5.2.3 Mitigation

The following recommendations are made:

1. Parts of the Study Area exhibit archaeological potential in Segments 1, 2, 3, 4, and 5 (Figures 34-36, 39-40, 42, 46-50, 54-61, 63-64, 66-67 in **Appendix F**). These lands require Stage 2 archaeological assessment by test pit survey at five metre intervals. Stage 2 is required prior to any proposed construction activities on these lands;
2. Part of the Study Area is adjacent to the Pioneer Memorial Garden Cemetery in Oshawa (Figure 70 in **Appendix F**). Grave markers have been removed from their original locations and placed in a central cairn. Additionally, the current legal cemetery boundary may not be consistent with the historical cemetery boundary. Therefore, there is potential for unmarked burials associated with the cemetery to extend beyond the current cemetery boundary;

    - If available, mapping depicting the legal boundaries of the cemetery should be obtained from the licensed operator for the cemetery, prior to any proposed project impacts adjacent to the cemetery to help further determine to what extent, if any, this work might impact the legal boundaries of the cemetery;
    - Stage 3 Cemetery Investigation should be conducted on any lands impacted by the project between the paved road edge and the retaining wall, to confirm the presence or absence of unmarked graves outside the current fenced limits. Mechanical topsoil removal is not feasible thus ASI recommends that the portion of the Study Area within lands between the paved road edge and the retaining all be subject to a program of archaeological construction monitoring if these lands are to be impacted by construction;
    - A licensed archaeologist will be present on site for the duration of any additional impacts within the Study Area adjacent to the cemetery property to monitor for the presence of burial shafts outside the known limits of the cemetery. Any archaeological resources identified in this manner must be subject to the appropriate mitigations;
    - A Cemetery Investigation Authorization issued by the Bereavement Authority of Ontario will be required for any “invasive” (Stages 2-4) fieldwork because the boundaries of the cemetery are not clear. The Authorization will relieve the archaeologist of the prohibition and liability related to the intentional disturbance of a human burial within a cemetery extend beyond the currently mapped boundaries;
    - If evidence of burials associated with this cemetery are encountered, all work must cease and MHSTCI and the Bereavement Authority of Ontario will need to be contacted for direction on next steps;

- The cemetery lands within and adjacent to the Study Area do not retain near-surface archaeological potential and thus do not require Stage 2 survey prior to any Stage 3 investigations;

3. The Disciples Church Site within Post Cemetery is considered to have Cultural Heritage Value or Interest and is within the Study Area (See Appendix F2). The MHSTCI notes that a Stage 4 PIF P1066-0133-2020 has been taken out for proposed work at the Disciples Church Site within the Post Cemetery, however no further information about the Stage 4 or an associated report was available from the Ministry at the time of writing. MHSTCI should be consulted prior to any further work near the site;
4. The Garden Site abuts the Study Area and is considered to have Cultural Heritage Value or Interest and to require Stage 4 Mitigation of Impacts (see Appendix F2). At the time of writing, the Stage 3 report (P059-0985-2021) had not yet been accepted into the MHSTCI register and was not available for review, thus detailed Stage 4 recommendations cannot yet be provided. MHSTCI should be consulted prior to any further work near the site;
5. The marine archaeological potential of Petticoat Creek, Duffins Creek, Carruthers Creek, Lynde Creek, and Pringle Creek within the Study area are to be evaluated by following the MHSTCI Criteria For Evaluating Marine Archaeological Potential checklist if project impacts to the riverbeds are proposed;
6. The remainder of the Study Area does not retain archaeological potential on account of deep and extensive land disturbance, low and wet conditions, slopes in excess of 20 degrees, or being previously assessed. These lands do not require further archaeological assessment; and,
7. Should the proposed work extend beyond the current Study Area, further archaeological assessment should be conducted to determine the archaeological potential of the surrounding lands.

4.5.3 Summary of Potential Impacts, Mitigation Measures and Monitoring

The potential impacts, mitigation measures and monitoring are summarized in **TABLE 4.18**.

TABLE 4.18. SUMMARY OF POTENTIAL IMPACTS, MITIGATION MEASURES AND MONITORING: CULTURAL ENVIRONMENT

Environmental Component	Impacts (Design/Construction/Operation)	Mitigation Measures	Monitoring
During Detail Design			
Built Heritage Resources and Cultural Heritage Landscapes	Direct impact to TO-001, TO-004, TO-011, TO-012, TO-013, PK-003, PK-018, AJ-003, AJ-007, AJ-008, AJ-009, AJ-014, AJ-015, AJ-016, AJ-017, AJ-020, AJ-021, AJ-037,AJ-038, AJ-040, AJ-043, WI-002, WI-013, WI-021, WI-046, WI-048, WI-050, WI-051, WI-053, WI-055, WI-063, WI-064, WI-065, OS-006, OS-058, OS-077.	During design, the recommendations of all HIAs and the Cultural Heritage Report will be followed and adhered to during design and construction, including but not limited to strategies to protect heritage attributes. Should it be determined that there is no other technically feasible option to avoid direct impact, it is recommended that a CHER be undertaken, where not already completed, to determine if a directly impacted potential BHR has CHVI. If the directly impacted potential BHR is determined to have CHVI, an HIA is required to determine appropriate site-specific mitigation measures. The recommendations of the HIA shall be followed and adhered to during design and construction, including but not limited to strategies to protect heritage attributes. Consultation with municipal heritage staff, MHSTCI and local heritage advisory committees will be undertaken as appropriate to determine if proposed infrastructure will be subject to specific policies within heritage conservation districts or conservation areas (parks). A Heritage Impact Assessment (HIA) will be undertaken by a qualified person for the following properties: TO-004, TO-012, TO-013, PK-014, PK-018, AJ-003, AJ-007, AJ-009, AJ-014, AJ-015, AJ-016, AJ-017, AJ-018, AJ-020, AJ-021, AJ-037, AJ-038, AJ-040, AJ-043, AJ-059, WI-021,WI-046, WI-051, WI-063, WI-064, WI-065, and OS-006. The HIAs will be completed in consultation with municipal heritage staff and the MHSTCI as early as possible during detail design.	N/A
Archaeology Resources	Parts of the Study Area exhibit archaeological potential in Segments 1, 2, 3, 4, and 5. Part of the Study Area is adjacent to the Pioneer Memorial Garden Cemetery in Oshawa. Therefore, there is potential for unmarked burials associated with the cemetery to extend beyond the current cemetery boundary.	These lands require Stage 2 archaeological assessment by test pit survey at five metre intervals, prior to any proposed construction activities. Indigenous Nations will be invited to participate in future archaeological assessment studies. All required archaeological assessments (e.g., Stage 2 AA, and Stage 3, if recommended in the Stage 2AA) will be completed as early as possible during detail design and well in advance of any ground disturbing activities. The following Stage 3 recommendations are to be reviewed upon receipt of mapping from the City of Oshawa and/or the BAO. • If available, mapping depicting the legal boundaries of the cemetery should be obtained from the licensed operator for the cemetery, prior to any proposed project impacts adjacent to the cemetery to help further determine to what extent, if any, this work might impact the legal boundaries of the cemetery; • Stage 3 Cemetery Investigation should be conducted on any lands impacted by the project between the paved road edge and the retaining wall, to confirm the presence or absence of unmarked graves outside the current fenced limits. Mechanical topsoil removal is not feasible thus ASI recommends that the portion of the Study Area within lands between the paved road edge and the retaining all be subject to a program of archaeological construction monitoring if these lands are to be impacted by construction; • A licensed archaeologist will be present on site for the duration of any additional impacts within the Study Area adjacent to the cemetery property to monitor for the presence of burial shafts outside the known limits of the cemetery. Any archaeological resources identified in this manner must be subject to the appropriate mitigations; • A Cemetery Investigation Authorization issued by the Bereavement Authority of Ontario will be required for any “invasive” (Stages 2-4) fieldwork because the boundaries of the cemetery are not clear. The Authorization will relieve the archaeologist of the prohibition and liability related to the intentional disturbance of a human burial within a cemetery extend beyond the currently mapped boundaries;	N/A

Environmental Component	Impacts (Design/Construction/Operation)	Mitigation Measures	Monitoring
During Detail Design			
		• If evidence of burials associated with this cemetery are encountered, all work must cease and MHSTCI and the Bereavement Authority of Ontario will need to be contacted for direction on next steps; and • The cemetery lands within and adjacent to the Study Area do not retain near-surface archaeological potential and thus do not require Stage 2 survey prior to any Stage 3 investigations.	
	The Disciples Church Site is considered to have further CHVI and is within the Study Area.	MHSTCI should be consulted prior to any further work near the site to allow for review of the Stage 4 report to confirm location of any outstanding areas of archaeological concern.	
	The Garden Site abuts the Study Area and is considered to have Cultural Heritage Value or Interest.	A Stage 4 Mitigation of Impacts is required. MHSTCI should be consulted prior to any further work near the site.	
	Potential project impacts to the riverbeds.	The marine archaeological potential of Petticoat Creek, Duffins Creek, Carruthers Creek, Lynde Creek, and Pringle Creek within the Study area are to be evaluated by following the MHSTCI Criteria For Evaluating Marine Archaeological Potential checklist if project impacts to the riverbeds are proposed	
During Construction			
Built Heritage Resources and Cultural Heritage Landscapes	Potential indirect impacts on known or potential properties of CHVI resulting from construction activities In addition to the specific properties listed below, a number of sites could be impacted by construction.	During design, the recommendations of all HIAs and the Cultural Heritage Report will be followed and adhered to during design and construction, including but not limited to strategies to protect heritage attributes. Selection of construction staging and laydown areas will follow Metrolinx's selection procedures which include avoiding heritage attributes wherever possible or effectively mitigating impacts where not possible.	Baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project.
Archaeology Resources	N/A	N/A	N/A
During Operation			
Built Heritage Resources and Cultural Heritage Landscapes	N/A	N/A	N/A
Archaeology Resources	N/A	N/A	N/A

4.6 Socio-Economic Environment and Land Use

This section outlines the assessment of the project's potential impacts on the socio-economic and land use environments within the Study Area and provides a summary of mitigation and monitoring measures.

4.6.1 Methodology

This assessment addresses the following three elements:

- Demographics and Community Resources;
- Local Businesses; and
- Land Uses.

The impact assessment identifies potential impacts during the construction and operational phases of the project. Mitigation and monitoring measures are recommended to help minimize or eliminate potential negative impacts.

The severity of the potential impacts identified for this assessment will be uneven throughout the Study Area given that there are varied land use and socio-economic conditions and because construction will take place at different segments of the corridor at different points in time. Construction is anticipated to commence in 2025, and due to the length of the corridor, construction will be completed in three phases. As such, businesses, community resources, and land uses in different route segments of the corridor may experience the potential impacts for a longer or shorter duration during construction, with the varied severity.

Given the length of the route, and the fact that conditions may change during the construction period, more granular work must be completed as the design is refined and construction phases unfold to identify appropriate mitigation and monitoring measures. The following mitigation and monitoring measures should be revisited to account for the changing conditions, when and where appropriate.

4.6.2 Summary of Recommended Plans and Assessments

Several action plans and assessments are recommended as part of the mitigation measures for the various elements in the following sections. Each action plan and assessment is described below.

The recommended plans must conform to the jurisdictional requirements and regulations in each municipality. Developing these plans will provide a tailored approach in each jurisdiction that can also be aligned with the phasing of the project. These plans will be developed in consultation with the municipalities and impacted community resources, businesses and institutions. The following plans and assessments are recommended as part of mitigation measures:

- **Signage and Wayfinding Action Plan:** Directs vehicle and pedestrian traffic through the Study Area during construction by identifying appropriate locations for signage and types of signage required. Signage will help establish that that community resources, businesses and institutions are accessible during project construction and that movement within the Study Area is managed effectively. The scope of this action plan will encompass cycling traffic in addition to walking, vehicular traffic, and walking routes to/from public transit. The development of this action plan will address signage and wayfinding requirements by land use type - e.g. residential, commercial, industrial, and institutional;

- **Emergency Response and Incident Management Plan:** Develops a framework to respond to different types of emergencies that may occur in the Study Area. This includes ensuring that emergency vehicles will have enough space to navigate the Study Area during peak traffic periods, that emergency vehicles are provided with sufficient turning radius, swept path and vehicle turning envelope to access incident sites, and that infrastructure built into the street such as fire hydrants are always accessible;

- **Haul Route Analysis and Truck Route Plan:** The corridor encompasses an arterial road that accommodates heavy truck traffic. A haul route analysis must be completed to confirm that heavy single unit trucks are not subject to detour routes through residential areas, review turning radius for safe operation on detour routes, and that heavy single unit trucks can safely and easily access loading and unloading facilities;

- **Traffic Management and Control Plan:** Works together with the Signage and Wayfinding Action Plan, Emergency Response and Incident Management Plan, and Haul Route Analysis to direct traffic through the Study Area successfully during construction. Transit stop locations may need to be temporarily relocated during construction. Such changes should be identified and communicated to the local community, businesses, and the travelling public. Access routes for cyclists and pedestrians should be included. This plan will help establish the ways that all road users travelling within the Study Area can operate safely and efficiently. Metrolinx will consult with business owners when developing the Plan prior to construction. During detail design, review commercial property driveways and consider design refinements to support turning trucks while meeting design standards;

- **Dust Management Plan:** Works together with the Signage and Wayfinding Action Plan to identify measures in the Study Area that can be applied during and post construction to reduce the amount of dust created and areas where signage should be placed to communicate these measures throughout the Study Area;

- **Curbside Management Plan:** Identifies how curbside operations will be altered during construction to communicate to businesses, institutions, community resources and service providers how to successfully manage their day-to-day

processes, especially in areas that front onto the corridor, such as in downtown Whitby and downtown Oshawa;

- **Business Retention and Management Plan:** Project construction may cause businesses to experience a loss of revenue. This plan will be developed during detail design, in collaboration with the local Chambers of Commerce and Business Improvement Areas (BIAs) to establish supports to retain existing businesses. Through understanding concerns by completing consultations with business improvement areas, business owners and other applicable stakeholders to clearly communicate available supports. Metrolinx has an established community benefits and supports program that focuses on ensuring that residents, businesses, and communities understand the benefits that these major transit projects will bring to their communities and what supports are available for mitigating construction impacts. Examples of supports from other projects that may be applicable to the Project include direct one-to-one individual business supports; a suite of flexible and responsive community support initiatives including engagement, local procurement opportunities, construction mitigation and opportunities for local employment; Shop Local marketing and support for event initiatives with Chamber/BIAs;
- **Community Liaison Committee:** Prior to the start of construction, create Community Liaison Committees to meet and review the detail design, provide more feedback, and stay up to date on project process and the construction schedule; and,
- **Tree Inventory Assessment:** A tree inventory should be undertaken to document the health and location of each tree in the Study Area, which can be compared to tree conditions after construction is complete.

4.6.3 Community Resources

4.6.3.1 Construction Impacts and Mitigation

The potential impacts to demographics and community resources that are anticipated during the construction phase include:

- Pedestrian and cycling infrastructure may be closed during construction for an extended period, potentially resulting in pedestrian and cycling infrastructure gaps;
- Safety concerns when using pedestrian and cycling infrastructure such as bike lanes and sidewalks due to reduced lanes and parked construction equipment;
- Driveways, sidewalks, cycling facilities and transit stops of community resources that front onto Ellesmere Road, Kingston Road, Dundas Street, Bond Street and King Street may have access interrupted during construction;
- Access to community resources may be reduced;

- In the case of an emergency, emergency services such as police or fire may have difficulty accessing community resources due to reduced lanes and road closures. Infrastructure built into the streetscape, such as fire hydrants, may also be difficult to access in the construction zone during an emergency; and,
- Potential nuisance impacts related to dust, emissions, and noise from operating construction equipment for community resources and users of pedestrian and cycling infrastructure.

Recommended mitigation and monitoring measures to address potential construction related impacts are listed below. The following Plans are recommended as part of the mitigation measures: Traffic Management and Control Plan, Signage and Wayfinding Action Plan and Emergency Response and Incident Management Plan. Details on the plans are provided in **Appendix G**.

- Determine if cyclists can be safely accommodated during construction. If the operating condition is considered potentially unsafe for cyclists, facilities will be temporarily closed and an alternate facility or routing shall be developed for cyclists;
- Determine whether the use of sidewalks and other pedestrian infrastructure in and around work zones are safe to use during construction. Walking paths that are considered unsafe will be temporarily closed and replaced with a safer alternative. Detour routes will be safe and accessible in well lit areas;
- Community resources that front onto the corridor or with access located on the corridor, will be contacted to inform staff that access to facilities may be interrupted during project construction and to provide opportunity to participate in the development of the plans listed in **Section 4.6.2**. Prior to project construction, the community facilities that will experience access issues will be identified;
- Adjacent road closures and construction on adjacent crossings should be avoided;
- Community resource operators will be notified at least two weeks in advance of any road closures that may impact them. The anticipated duration of the closure will also be specified. The specific protocol for notification and the protocol for communication, between the construction project and the community resource operators, will be defined and established as part of the development of mitigation plans with the identified Community resources;
- A point of contact will be provided to accommodate questions and concerns from community resource staff regarding access to facilities during the construction period. The specific communication protocols will be defined and established as part of the development of mitigation plans with the identified community resources;

- Implement a Signage and Wayfinding Action Plan that identifies appropriate signage, alternative access points and parking arrangements will be developed to maintain access to community resources, and other businesses and institutions, during project construction. The community resources that may experience access interruptions will be a priority;
- The development of an Emergency Response and Incidence Management Plan will be a collaborative effort carried out by a team consisting of staff from fire, police, ambulance, engineering, construction services, transportation services, and other applicable departments from City of Toronto/the TTC, Durham Region, City of Pickering, Town of Ajax, Town of Whitby and City of Oshawa. The project proponent or the construction project team shall work with municipal staff to confirm that each jurisdictions rules and regulations are upheld; and,
- An environmental scan of all Community resources located within a buffer/zone of influence of the corridor will be carried out to identify the specific Community resources that will be directly or indirectly impacted by the project. The nature of the potential impact will be assessed and verified as part of the review to inform the subsequent development of mitigation plans.

4.6.3.2 Operations Impacts and Mitigation

The potential impacts to demographics and community resources that are anticipated during the operational phase of the include:

- Given the high traffic volume and speed of arterial roads, cycling facilities may be unsafe without a separated bike lane, which is why separated facilities are proposed along the majority of the corridor;
- As the corridor intensifies and accommodates additional population, there will be further demand created for community resources to uphold current service levels. Demand for services should be examined by each municipality as the corridor intensifies;
- As the corridor intensifies and accommodates additional population, there will be further demand for open space and parks. Demand for open space and parks should be examined by each municipality as the corridor intensifies;
- It is expected that the project will have a positive impact on the existing demographics and community resources as these areas will be served by higher order transit, providing an enhanced service by reducing travel times for users and providing more frequent service; and,
- Enhanced transit service is expected to encourage further transit ridership and will provide time savings for existing users. In addition, enhanced transit service will be provided to access destinations served by the broader transit network.

Recommended mitigation and monitoring measures to address potential operational impacts include:

- The active transportation network will continue to develop to accommodate the incoming population as lands along the Durham-Scarborough BRT are redeveloped. As part of the planning approvals process, staff reviewing development applications should encourage connections to and further development of the active transportation network. This will help to expand and eliminate gaps that may exist in the surrounding network;
- High traffic volumes coupled with high posted speeds in certain segments of the corridor suggest the need for separated cycling facilities to enhance safety. Physically separated cycling facilities have been included in the preliminary design in a context-sensitive manner consistent with active transportation plans in each municipality;
- Staff reviewing development applications should create criteria that would trigger a full Community Services and Facilities Study. This would require applicants to submit a study as part of a complete development application. The study will identify potential impact on community resources that a development may have, and where expansions will need to occur to service the incoming population; and,
- Given that each municipality has parkland dedication provisions in place, no mitigation and monitoring measures are required to uphold the service levels related to parkland and open space.

4.6.4 Local Businesses

4.6.4.1 Construction Impacts and Mitigation

Potential impacts, mitigation and monitoring measures that have been identified in this section are commented on further within **Section 4.6.5** to address any broader impacts to Centres, Commercial, Mixed-use, Institutional and Industrial uses. Those impacts identified in **Section 4.6.5** provide insight into potential impacts that would apply to all business establishments under each land use category. Potential impacts to each consolidated business category during construction include:

- **Employment Area Employment:** Arterial roads in the City of Toronto and Durham Region accommodate heavy truck traffic. Employment areas may experience temporary nuisance impacts resulting from longer than expected delivery times to and from facilities due to a reduction in traffic lanes. Truck traffic may also have difficulty turning onto roads where construction is taking place due to a reduced turning radius;
- **Power Retail & Malls:** Most retail establishments within the Study Area are in the power retail or mall format, which are set back from the corridor. Potential nuisance impacts include delivery delays due to a reduction in traffic lanes. Some

retail centre accesses may be interrupted during construction. Access restrictions may cause further negative impacts related to reduced revenue;

- **Main Street Retail & Services:** Main street retail may experience greater negative impacts than Power Retail & Malls during construction. Impacts may include limited access to on-street parking, reduced business visibility, reduced access to storefronts, and public perception that businesses are not operational. Revenue may be impacted due to access restrictions. Impacts will be greatest to retail storefronts that front directly onto the corridor where construction will occur will have;
- **Office:** Offices that directly abut the corridor may experience nuisance impacts related to longer than average travel times for employees; and,
- **Institutional:** Institutional establishments fronting onto the corridor may experience nuisance impacts related to longer than average travel times to get to and from the facilities due to a reduction in travel lanes. Further potential negative impacts include reduced visibility of the institutions and reduced access to driveways and parking lots, which may also impact revenue generation depending on the type of institution being examined.

During construction, recommended mitigation and monitoring measures by consolidated business classification include:

- **Employment Area Employment:** Provide enough space for heavy single unit trucks to make right and left-turns onto the route/arterial where construction is taking place. This can be accomplished by providing a minimum effective turning radius for heavy single unit trucks, especially on roads that connect to Highway 401 interchanges. If appropriate radii cannot be accommodated, appropriate detour routes must be provided for heavy single unit trucks. Consult with City of Toronto, Durham Region, City of Pickering, Town of Ajax, Town of Whitby and City of Oshawa to develop a Traffic Management and Control Plan that identifies appropriate routes for heavy truck traffic that is supported by a Haul Route Analysis;
- **Power Retail & Malls:** Keep entry points into malls and power retail centres along the corridor operational and unobstructed. Ahead of construction, intersections that may experience temporary closures or interruptions to operations should be identified, as well as the potential timing and duration of the interruptions. Property owners and managers of the mall and power retail facilities must be contacted and made aware of potential obstructions or closures to main entry points. Arrangements should be made with concerned property owners and managers to address potential issues due to limited access. Deliveries into these facilities may be impacted and visitors may be confused about how to access these businesses – both factors should be considered in the Traffic Management and Control Plan. Consultation with the affect property

owners and managers will occur in development of the Traffic Management and Control Plan;

- **Main Street Retail & Services:** Storefronts should remain visible by implementing transparent fencing in place of plywood where it is possible and safe to do so. Main street retail and services should be considered in the Signage and Wayfinding Action Plan, especially in areas that comprise concentrations of main street retail, such as Downtown Whitby and Downtown Oshawa. The Signage and Wayfinding Action Plan should determine how to best direct customers to where parking is available in the absence of on-street parking, and help identify which businesses are operational during the construction period;
- **Office:** No mitigation or monitoring measures required; and,
- **Institutional:** The Signage and Wayfinding Action Plan must also cover institutions in Downtown Whitby and Downtown Oshawa, and other applicable areas. The Plan should communicate what facilities are operational and where to park if on-street parking is impacted. Consultation with these institutions will occur during the development of the Traffic Management and Control Plan, Signage and Wayfinding Action Plan, and the Emergency Response and Incident Management Plan.

As described in **Section 4.6.2**, various plans will be developed during detail design and prior to construction. During construction, Metrolinx will communicate clearly and regularly with all businesses and employers regarding available supports, along with mitigation and monitoring measures to support businesses.

4.6.4.2 Operations Impacts and Mitigation

All business types are expected to experience positive impacts from the project. Potential operational impacts for each consolidated business category include:

- **Employment Area Employment:** No negative impacts are anticipated during operations. Positive impacts include enhanced transit access for employees and visitors that use transit through reduced travel times and more frequent service;
- **Power Retail & Malls:** No negative impacts are anticipated during operations. Potential positive impacts include the encouragement of site redevelopment through enhanced transit access, which will help establish transit supportive densities and mixed-use, complete communities. Further positive impacts include enhanced transit access for employees and customers that use transit by reducing travel times and providing access to more frequent service;
- **Main Street Retail & Services:** Potential negative impacts include decreased on-street parking spaces to accommodate visitors. Positive impacts include enhanced transit access for employees and customers that use transit by

reducing travel times and providing access to more frequent service, as well as an improved streetscape to help attract pedestrian traffic;

- **Office:** Offices abutting the corridor may experience positive impacts related to enhanced transit access to support employees, and an improved streetscape to benefit the environment of these offices. On-street parking is a minimal concern for offices as many offices in the Study Area have dedicated parking lots to serve them; and,
- **Institutional:** Institutional facilities fronting onto the corridor may experience positive impacts related to enhanced transit access to support employees and users, and an improved streetscape to benefit the environment of these institutions.

During operations, mitigation and monitoring measures by business classification include:

- **Employment Area Employment:** No mitigation or monitoring measures required;
- **Power Retail & Malls:** No mitigation or monitoring measures required;
- **Main Street Retail & Services:** Relocate on-street parking spaces that are to be removed by the project. Where possible spots should be maintained in close proximity to main street retail;
- **Office:** No mitigation or monitoring measures required; and,
- **Institutional:** No mitigation or monitoring measures required.

4.6.5 Land Use

4.6.5.1 Construction Impacts and Mitigation

Residential & Multi-family Residential

Residential uses are scattered throughout the Study Area and are comprised primarily of lower density, ground related residential uses. The majority of these areas appear to be built out. As such, these areas are primarily stable residential neighborhoods. Potential impacts for both lower density and multi-family residential areas include:

- Emissions and dust from construction equipment and trucks may result in temporary potential negative impacts. Long-term negative impacts from construction vehicles and equipment are not anticipated;
- Noise and vibration from construction equipment may present potential temporary nuisance impacts for residential uses;

- Detour routes through residential areas during construction will result in negative impacts including excessive noise, emissions, truck traffic, dirt, and debris to local roads;
- Emergency response personnel may have difficulty accessing residential areas during construction;
- A number of residential areas along the route have driveways that front onto the corridor. Potential negative impacts include reduced driveway access and associated construction traffic. Traffic pattern changes to left-turns will be required at unsignalized side streets and driveways; and,
- Road closures may impact residents' ability to easily access their dwellings during construction.

Recommended mitigation and monitoring measures to address potential construction related impacts are listed below. The following Plans are recommended as part of the mitigation measures: Traffic Management and Control Plan, Haul Route Analysis and Truck Route Plan, Dust Management Plan, Signage and Wayfinding Action Plan and Emergency Response and Incident Management Plan. Details on the plans are provided in **Appendix G**.

- Create and implement Dust Management Plan to identify a full list of measures to minimize the spread of dust and emissions that will be applied by the entity completing construction;
- Fences and wind screens will be utilized to help minimize the spread of dust. Truckloads carrying dust-producing material will be covered;
- Soil surfaces capable of producing dust will undergo wetting, covering, or paving to minimize the spread of dust;
- Traffic speeds within the construction zone will be reduced to minimize the spread of dust;
- Construction work schedules and procedures will adapt to changing weather conditions when negative impacts are possible, such as wetting during high speed winds;
- Construction equipment and machinery will be in good working condition and undergo regular maintenance and will comply with federal and provincial regulations. Emissions and noise will be minimized where possible;
- Prohibit construction equipment and machinery from idling for extended periods of time through posting signage throughout the construction site with guidelines to minimize emissions. This can be integrated into the Signage and Wayfinding Action Plan;

- Comply with by-law provisions imposed by the local area municipalities and Durham Region, and permit exemptions where necessary;
- Complete construction during permitted hours, generally between 6 AM and 8 PM or between sunrise and sunset, and notify residents during periods where construction is anticipated to take place after permitted hours with the anticipated duration;
- Construction equipment will comply with noise regulations mandated by the province and local area municipalities;
- Through the Haul Route Analysis and Traffic Management and Control Plan, help establish that detour routes and haulage routes use main roads where possible to minimize adverse impacts to residential areas. In addition, help establish that heavy truck traffic does not pass through residential areas where possible.
- Property owners with driveways fronting onto the corridor will be identified and notified that driveway access may be reduced during construction. The anticipated duration of will be identified; and
- If road closures will impact property owners, property owners will be notified by mail at least two weeks prior to the road closures. The anticipated duration will be identified;

Centres & Mixed Use

In addition to the potential negative impacts identified for each business type outlined in **Section 4.6.4,** further potential negative impacts to areas designated for Centres and Mixed-Use uses are:

- Centres within the Study Area have a limited number of entry points, which are generally located at or near major intersections. Entry points and major intersections that provide access to Centres may be reduced during construction;
- Left hand turns into Centres and Mixed-Use areas will be limited during construction;
- Road closures may result in reduced access to Centres and Mixed-Use areas;
- Heavy single unit trucks making deliveries to or from Centres and Mixed-Use areas may have difficulty turning into facilities given the reduced turning radius attributed to reduced lanes during construction;
- In the event of an emergency, it may be difficult for emergency response personnel to access Centres and Mixed-Use areas during construction;
- Traffic pattern changes to left-turns will be required at unsignalized side streets and driveways; and,

- Centres and Mixed-Use Areas that front onto the corridor may experience potential negative impacts related to dust, emissions, and noise during construction hours. It is expected that emissions will be minimal, as construction equipment must comply with provincial and federal air quality standards.

Recommended mitigation and monitoring measures to address potential construction related impacts are listed below. The following Plans are recommended as part of the mitigation measures: Traffic Management and Control Plan, Haul Route Analysis and Truck Route Plan, Dust Management Plan, Signage and Wayfinding Action Plan and Emergency Response and Incident Management Plan. Details on the plans are provided in **Appendix G**.

- Through the Traffic Management and Control Plan, ensure that major intersections and entry points into Centres and Mixed-Use areas remain fully operational, where possible. This is intended to support the effective movement of traffic through these areas, and to avoid business interruptions during the construction phase. At minimum, key intersections that should remain fully operational during construction, if possible, include:
    - **City of Toronto Route Segment:** Ellesmere Road and McCowan Road, Kingston Road and Sheppard Avenue East, and Ellesmere Road and Markham Road;
    - **City of Pickering Route Segment:** Kingston Road and Whites Road North, Kingston Road and Liverpool Road, Kingston Road and Glenanna Road, and Kingston Road and Brock Road.
    - **Town of Ajax Route Segment:** Kingston Road West and Westney Road North, Kingston Road West and Hardwood Avenue North, and Kingston Road East and Salem Road.
    - **Town of Whitby Route Segment:** Dundas Street East and Thickson Road South, and Dundas Street East and Garrard Road; and
    - **City of Oshawa Route Segment:** King Street West and Stevenson Road.
- Road closures will be communicated to businesses within Centres and Mixed-Use areas at least two weeks prior to the road closure;
- Maintain adequate turning radii for heavy single unit trucks turning into Centres or Mixed-Use Areas. Post signage in areas where heavy truck traffic would experience unsafe turning conditions. This should be included within the Signage and Wayfinding Action Plan;
- Consult with staff from fire, police, ambulance, engineering, construction services, transportation services, and other applicable departments from City of Toronto, Durham Region, City of Pickering, Town of Ajax, Town of Whitby and City of Oshawa to develop an Emergency Response and Incidence Management

Plan. Consultation with municipal staff will confirm that each jurisdictions rules and regulations are upheld;

- Implement a Dust Management Plan to minimize the spread of dust;
- Fences and wind screens will be utilized to help minimize the spread of dust, and truckloads carrying dust-producing material will be covered;
- Soil surfaces capable of producing dust will undergo wetting, covering, or paving in order to minimize the spread of dust;
- Traffic speeds within the construction zone will be reduced to minimize the spread of dust;
- Work schedules and procedures will adapt to changing weather conditions when negative impacts are possible, such as wetting during high speed winds;
- Construction equipment and machinery will be in good working condition and undergo regular maintenance and will comply with federal and provincial regulations. Emissions and noise will be minimized where possible;
- Prohibit construction equipment and machinery from idling for extended periods of time by posting signage throughout the construction site with guidelines to minimize emissions. This should be included within the Signage and Wayfinding Action Plan; and,
- Construction equipment will comply with noise regulations mandated by the province and local area municipalities.

Commercial

Areas zoned for commercial uses are scattered along the corridor, in many instances abutting the Centres and Mixed-Use areas, and within the downtown areas. The potential impacts include:

- Commercial uses that front onto the corridor and have loading, unloading and delivery procedures that take place in the front of the building may experience temporary negative impacts related to successfully carrying out these procedures during construction;
- If traffic is reduced to one lane, this will disrupt the flow of traffic and is not ideal for curbside management purposes;
- On-street parking spaces may be impacted, which may result in negative impacts to businesses with customers who rely on on-street parking;
- Access to commercial parking lots that businesses rely on to accommodate customers may be reduced;

- Deliveries to and from facilities may be delayed due to delivery vehicles having to take detour routes to reach the destination;
- Heavy truck units that are delivering to or from commercial areas may experience difficulty turning into driveways or accessing loading or unloading facilities that are in the rear of the building due to reduced turning radius;
- The placement of construction equipment, fencing and signage may reduce the visibility of businesses that front onto the corridor;
- The placement of construction equipment, fencing and signage may block streetlights, making walking and other pedestrian activities unsafe at night time;
- Potential negative impacts related to dust, emissions, and noise during construction hours. Dust may dirty merchants' windows, creating an unattractive environment;
- Customers may be discouraged to enter the Study Area due to construction, which may negatively impact the ability to attract customers and generate revenue;
- If certain segments of the road or sidewalk are shut down during construction, it is unlikely and difficult for businesses to attract customers and generate revenue;
- The pedestrian environment that abuts commercial uses will be noisy, dusty and have emissions from construction equipment which may discourage foot traffic during construction;
- People with disabilities may have difficulty navigating the pedestrian environment during construction due to the placement of equipment, fencing and narrower than normal sidewalks; and,
- If an emergency such as a fire occurs, emergency vehicles may have difficulty accessing the site and utilizing infrastructure that is built into the streetscape, such as fire hydrants.

Recommended mitigation and monitoring measures to address potential construction related impacts are listed below. The following Plans are recommended as part of the mitigation measures: Traffic Management and Control Plan, Haul Route Analysis and Truck Route Plan, Curbside Management Plan, Business Retention and Management Plan, Signage and Wayfinding Action Plan, Dust Management Plan, and Emergency Response and Incident Management Plan. Details on the plans are provided in **Appendix G**.

- Engage with local Business Improvement Areas, businesses, and other stakeholders to address area specific concerns, communicate timing of construction impacts, and identify mitigation opportunities in collaboration with these entities. Metrolinx will communicate clearly and regularly regarding

available supports, along with mitigation and monitoring measures to support businesses during construction. A business support program will be determined after the procurement phase, once a successful proponent has been selected;

- In areas where commercial uses front onto the corridor, such as in downtown Whitby and downtown Oshawa, a Curbside Management Plan that identifies how curbside operations will be altered during construction would allow businesses to understand how to successfully manage their day-to-day processes;
- Build into the Signage and Wayfinding Action Plan a section that outlines where parking will be directed in the absence of on-street parking spots;
- Identify commercial driveways that will be blocked or closed due to construction. Notify merchants that rely on those driveways to create alternative arrangements for loading, unloading, and parking that commercial driveway serve. Notice should be provided to establishments at least two weeks in advance of any interruptions;
- Provide adequate turning radii for heavy single unit trucks to access loading and unloading facilities in the rear of buildings. Where this is not possible, post signage indicating that it is unsafe for heavy single unit trucks to turn into facilities. This should be an item within the Signage and Wayfinding Action Plan;
- Where possible and safe, utilize construction fences that are transparent. Also place construction equipment in areas that do not obstruct the view of businesses or the light emitted from streetlights;
- Implement a Dust Management Plan to minimize the spread of dust;
- Create a Business Retention and Management Plan to support businesses that may be experiencing difficulties operating during the construction phase and may have reduced revenue as a result. This would allow for a strategy to be implemented to retain businesses along the corridor during construction, and potentially provide assistance where necessary. This will help establish a support system for businesses that have been negatively impacted by construction to curb vacancies and allow the character of communities to remain intact;
- Sidewalks are to remain unobstructed to allow for people with disabilities to use the sidewalk. Where this is not possible, provide a detour route that is appropriate for people with disabilities where possible; and,
- Maintain access to street infrastructure such as fire hydrants, and stage construction so that emergency vehicles such as ambulances and fire trucks can successfully navigate through the construction zone. Consult with City of Toronto, Durham Region, City of Pickering, Town of Ajax, Town of Whitby and City of Oshawa staff in the fire, police, ambulance, engineering, construction services, transportation services, and other applicable departments to integrate commercial uses into the Emergency Response and Incidence Management Plan.

Industrial

Industrial uses within the Study Area were identified in the Town of Whitby Route Segment, generally surrounding the Highway 412 interchange at Dundas Street East, and north of the Burns Street East and Hopkins Street intersection. The potential impacts for Industrial areas anticipated during construction include:

- Given that the planned industrial areas identified in Whitby are in close proximity to highway interchanges that include Highway 401 and 412, limited negative impacts are anticipated in terms of goods movement to and from industrial areas. These areas are not yet built out, but may be by 2029, when construction is expected to be completed;
- Given that industrial areas frequently accommodate heavy truck traffic, limited negative impacts are anticipated for industrial areas in terms of noise, dust and emissions; and,
- Industrial areas do not front onto the corridor where construction will take place. As such, limited negative impacts are anticipated in terms of accessing driveways, loading, and unloading areas or facilities.

Recommended mitigation and monitoring measures to address potential construction related impacts are listed below. The following Plans are recommended as part of the mitigation measures: Traffic Management and Control Plan, and a Haul Route Analysis and Truck Route Plan. Details on the plans are provided in **Appendix G**.

- Minimize access interruptions to industrial areas, particularly if the industrial areas identified at the Highway 412 interchange at Dundas Street east is developed by 2029; and,
- Maintain adequate turning radii for heavy single unit trucks to turn into industrial facilities. In particular, these measures will be applied to the Dundas Street East and Hopkins Street intersection.

Institutional

Institutional areas within the Study Area are primarily situated in the City of Toronto Route Segment and encompass the University of Toronto Scarborough Campus and the West Hill Collegiate Institute. Other institutional areas were identified within and surrounding downtown Whitby. The potential impacts for Institutional areas, beyond those identified in **Section 4.6.4** that are anticipated during construction include:

- Pedestrian infrastructure may be interrupted during construction, including bike lanes, pedestrian paths or walkways, sidewalks, pedestrian cross walks, among others;
- At the intersection of Dundas Street West and Cochrane Street, there is an institutional use that comprises the Fairview Lodge, which is a long-term care home. Residents/Staff and visitors of this facility may experience difficulty

accessing the transit stop outside of the facility due to narrower than normal sidewalks, and the placement of construction equipment and fences;

- People with disabilities accessing institutional uses may have difficulty navigating the pedestrian environment during construction due to the placement of equipment, fencing and narrower than normal sidewalks;
- The placement of construction equipment, fencing and signage may block streetlights, making walking and other pedestrian activities unsafe at night time;
- Access to entrances into parking lots and facilities may be reduced due to placement of construction equipment, fencing or signage;
- Institutional uses, like those identified within and surrounding downtown Whitby, may by negatively impacted by the removal of on-street parking to serve users;
- Heavy single unit trucks that are deliver to institutional areas may have difficulty navigating the corridor during construction, due to reduced lanes and turning radius; and,
- Institutional uses that front onto the corridor, like the University of Toronto Scarborough Campus, may experience negative impacts related to dust, emissions and noise resulting from construction.

Recommended mitigation and monitoring measures to address potential construction related impacts are listed below. The following Plans are recommended as part of the mitigation measures: Traffic Management and Control Plan, Haul Route Analysis and Truck Route Plan, Signage and Wayfinding Action Plan, Dust Management Plan, and Emergency Response and Incident Management Plan. Details on the plans are provided in Section 11.1.

- Construction equipment and fencing will be set up to avoid blocking sidewalks or pedestrian infrastructure. In cases where this is not an option, provide a pedestrian detour route that can safely accommodate people with disabilities and mobility restrictions;
- Provide adequate parking in areas where on-street parking is blocked or removed due to construction to accommodate users and employees.
- Provide an adequate turning radius for heavy single unit truck drivers to allow for successful deliveries;
- Integrate Institutional uses into the Dust Management Plan to identify a full list of measures to minimize the spread of dust and emissions that will be applied by the entity completing construction;
- Fences and wind screens will be utilized to help minimize the spread of dust;
- Truckloads carrying dust-producing material will be covered;

- Soil surfaces capable of producing dust will undergo wetting, covering, or paving in order to minimize the spread of dust;
- Traffic speeds within the construction zone will be reduced to minimize the spread of dust;
- Construction equipment and machinery will be in good working condition and undergo regular maintenance. Equipment will comply with federal and provincial regulations. Emissions and noise will be minimized, where possible; and,
- Prohibit construction equipment and machinery from idling for extended periods of time by posting signage throughout the construction site with guidelines to minimize emissions. This should be an item within the Signage and Wayfinding Action Plan.

Village

There are two locations within the Study Area that are classified as a Village designation: Pickering Village in the Town of Ajax, and the Almond Village in the Town of Whitby. The potential impacts for areas identified as Village uses that are anticipated during construction include:

- The placement of construction equipment, fencing and signage may reduce the visibility of businesses that front onto the corridor;
- Visual features and areas within Village areas may be designated for heritage value. Construction may damage or negatively affect these cultural heritage resources;
- The placement of construction equipment, fencing and signage may block streetlights, making walking and other pedestrian activities unsafe at night time;
- People with disabilities may have difficulty navigating the pedestrian environment during construction due to the placement of equipment, fencing and narrower than normal sidewalks.
- Road closures may restrict access to businesses within Village areas;
- Customers may be discouraged to enter the Study Area due to construction, which may negatively impact the ability to attract customers and generate revenue;
- Curbside operations, such as waste collection, loading and unloading, may be interrupted;
- Heavy truck units that are delivering to businesses within Village areas may experience difficulty turning into driveways or accessing loading or unloading facilities due to reduced turning radius resulting from reduced lanes;

- If an emergency such as a fire occurs, emergency vehicles may have difficulty accessing the site to carry out emergency procedures and utilizing infrastructure that is built into the streetscape such as fire hydrants; and,
- Businesses within Village that front onto the corridor may experience negative impacts related to dust, emissions and noise resulting from construction. Dust may dirty merchant and restaurant windows and create nuisance impacts for patios, creating an unattractive environment for customers.

Recommended mitigation and monitoring measures to address potential construction related impacts are listed below. The following Plans are recommended as part of the mitigation measures: Traffic Management and Control Plan, Haul Route Analysis and Truck Route Plan, Signage and Wayfinding Action Plan, Dust Management Plan, and Emergency Response and Incident Management Plan. Details on the plans are provided in Section 11.1.

- Construction equipment and fencing will be set up to avoid blocking sidewalks or pedestrian infrastructure. In cases where this is not an option, provide a pedestrian detour route that can accommodate people with disabilities and mobility restrictions and is well lit;
- Provide an adequate turning radius for heavy single unit trucks to allow for successful deliveries, loading and unloading;
- Consult with the City of Toronto, Durham Region, City of Pickering, Town of Ajax, Town of Whitby, and City of Oshawa to develop an Emergency Response and Incidence Management Plan. The plan will help maintain access for emergency response personnel and vehicles to enable timely emergency responses;
- Consider creating a compensation plan for merchants that would allocate funding for items such as window cleaning, and to support businesses that can demonstrate a decline in revenue of 30% or greater to help businesses stay afloat during construction; and
- Integrate Village uses into the Dust Management Plan to identify a full list of measures to minimize the spread of dust and emissions that will be applied by the entity completing construction;
- Fences and wind screens will be utilized to help minimize the spread of dust;
- Truckloads carrying dust-producing material will be covered;
- Soil surfaces capable of producing dust will undergo wetting, covering, or paving in order to minimize the spread of dust;
- Traffic speeds within the construction zone will be reduced to minimize the spread of dust and maintain a safe environment for pedestrians and cyclists;

- Construction equipment and machinery will be in good working condition and undergo regular maintenance. Equipment will comply with federal and provincial regulations. Emissions and noise will be minimized, where possible; and,
- Prohibit construction equipment and machinery from idling for extended periods of time by posting signage throughout the construction site with guidelines to minimize emissions.

Rural

The only rural standardized land use designation within the Study Area is within the Town of Ajax Route Segment, which is also part of the Greenbelt. Within the Rural land use, there are a handful of residences that front onto the corridor, as well as a market that sells fresh produce and an associated orchard. Potential negative impacts for rural residences during construction include reduced driveway access, temporary nuisance impacts for private vehicles backing out of driveways due to reduced lanes and associated traffic. Potential negative impacts to the rural residences, the market, and the orchard, include emissions and dust from construction equipment and heavy trucks. Given that the market and orchard deal with food products, without proper mitigation, emissions and dust may compromise the safety of the food.

The same mitigation and monitoring measures identified in **Residential & Multi-family Residential** apply to Rural uses to minimize potential negative impacts related to dust and emissions. In addition to those measures, further mitigation and monitoring measures that apply to the market and orchard include:

- Notify these establishments, at least two weeks prior to construction, that dust and emissions may impact the safety of outdoor operations for a period of time and identify the duration. These facilities will have to adjust operations to maintain food safety;
- Identify and communicate the proposed construction hours, and provide written notice if working hours will extend beyond regular construction hours; and,
- Site supervisors will prevent high impact activities from being completed in high wind conditions, as the market and orchard are sensitive uses that grow and handle food products.

Open Space & Other

Where Open Space and Other land uses are directly adjacent to the corridor, potential negative impacts include the damage of trees, grass, and vegetation due to operation, placement, and storage of construction equipment on site.

Identify where equipment, machinery and materials will be parked or stored when not in use. Locations that will minimize negative impacts to trees, grass and other vegetation should be selected, where possible. If grass, trees, or vegetation is damaged due to construction, restore the area to the condition observed before construction or better.

Take all necessary precautions to prevent trees from being damaged. If damage occurs due to construction, trees will be replaced. This could be achieved by completing a Tree Inventory for the corridor and tracking the health of the trees before and after the construction period.

4.6.5.2 Operations Impacts and Mitigation

Residential & Multi-family Residential

No negative impacts are anticipated during operations for residential uses, largely because the corridor already accommodates high traffic volumes and is an existing transit route. Traffic pattern changes to left-turns will be required at unsignalized side streets and driveways. Positive impacts include enhanced transit access to residential uses and improved service for users, as well as encouraging redevelopment opportunities to help establish transit supportive densities.

Mitigation and monitoring measures are not required during operations.

Centres & Mixed Use

Positive impacts include enhanced transit access to Centres and Mixed-Use areas and improved service for users, as well as encouraging redevelopment opportunities to help establish transit supportive densities. In addition, positive impacts include regional transit connectivity to Centres and Urban Growth Centres identified by the province outside of the Study Area. No negative impacts are anticipated during operations. Traffic pattern changes to left-turns will be required at unsignalized side streets and driveways.

Mitigation and monitoring measures are not required during operations.

Commercial

Minimal negative impacts are anticipated during the operational stage for commercial uses. Potential negative impacts include a lack of parking spaces to serve local businesses, given some on-street parking will be removed to accommodate the project. Potential positive impacts include enhanced transit access to support mobility to and from businesses, and a more attractive streetscape in particular areas.

On-street parking spaces that businesses require should be replaced or relocated to provide sufficient space for customers to park and access the businesses that front onto the corridor.

Industrial

During operations, it is anticipated that the project will not have a negative impact on the Study Area overall. Positive impacts to the Study Area include enhanced transit service and facilities to support employees travelling to and from industrial areas, which will result in time savings.

No mitigation and monitoring measures are required during the operational phase of the project.

Institutional

No negative impacts are anticipated during the operational phase of the project for institutional uses. Positive impacts include enhanced transit access to institutions within the Study Area that provides greater connectivity to the regional transit network and time savings.

No mitigation and monitoring measures are required during the operational phase.

Village

No negative impacts are anticipated for Village uses during the operational phase.

There are no negative impacts anticipated during the operational phase. Positive impacts during operations include enhanced transit access to Villages and potentially more foot traffic to support businesses in these areas.

Rural

No negative impacts anticipated during operations for Rural land uses.

Mitigation and monitoring measures not required during operations.

Open Space & Other

No negative impacts anticipated during operations for Open Space and Other land uses.

Mitigation and monitoring measures not required during operations.

4.6.6 Summary of Potential Impacts, Mitigation Measures and Monitoring

The potential impacts, mitigation measures and monitoring are summarized in **TABLE 4.19**.

TABLE 4.19. SUMMARY OF POTENTIAL IMPACTS, MITIGATION MEASURES AND MONITORING: SOCIO-ECONOMIC AND LAND USE

Environmental Component	Potential Impacts (Design/Construction/Operation)	Mitigation Measures	Monitoring
During Detail Design			
Community Resources	N/A	N/A	N/A
Local Businesses	N/A	N/A	N/A
Land Use	Construction activities are expected to affect all land use types	Implement a suite of flexible and responsive community support initiatives, including engagement, local procurement opportunities, construction mitigation and opportunities for local employment.	N/A
During Construction			
Community Resources	The potential impacts to demographics and community resources that are anticipated during the construction phase include: • Pedestrian and cycling infrastructure may be closed during construction for an extended period, potentially resulting in pedestrian and cycling infrastructure gaps; • Safety concerns when using pedestrian and cycling infrastructure such as bike lanes and sidewalks due to reduced lanes and parked construction equipment; • Driveways, sidewalks, cycling facilities and transit stops of community resources that front onto Ellesmere Road, Kingston Road, Dundas Street, Bond Street and King Street may have access interrupted during construction; • Access to community resources may be reduced; • In the case of an emergency, emergency services such as police or fire may have difficulty accessing community resources due to reduced lanes and road closures. Infrastructure built into the streetscape, such as fire hydrants, may also be difficult to access in the construction zone during an emergency; and • Potential nuisance impacts related to dust, emissions, and noise from operating construction equipment for community resources and users of pedestrian and cycling infrastructure.	• Determine if cycling infrastructure is safe to use during construction. If it is considered potentially unsafe, that facilities will be temporarily closed and cyclists will be re-routed, where possible, until the infrastructure is safe to use; • Determine whether the use of sidewalks and other pedestrian infrastructure is safe to use during construction. Areas that are considered unsafe will be temporarily closed. Detour routes that are considered safe and accessible will be provided where possible and in well-lit areas; • Community resources that front onto the corridor should be contacted to inform staff that access to facilities may be interrupted during project construction. Prior to project construction, the community facilities that will experience access issues will be identified; • Adjacent road closures and construction on adjacent crossings should be avoided; • Community resource operators should be notified at least two weeks in advance of any road closures that may impact them. The anticipated duration of the closure should also be specified; • A contact should be provided to accommodate questions and concerns from community resource staff regarding access to facilities during the construction period; and • Consult with staff from fire, police, ambulance, engineering, construction services, transportation services, and other applicable departments from City of Toronto, Durham Region, City of Pickering, Town of Ajax, Town of Whitby and City of Oshawa to develop an Emergency Response and Incidence Management Plan. Consultation with municipal staff will confirm that each jurisdictions rules and regulations are upheld.	• Implement a Signage and Wayfinding Action Plan that identifies appropriate signage, alternative access points and parking arrangements will be developed to maintain access to community resources, and other businesses and institutions, during project construction. The community resources that may experience access interruptions will be a priority.
Local Businesses	Potential impacts to each consolidated business category during construction include: • **Employment Area:** Arterial roads in the City of Toronto and Durham Region accommodate heavy truck traffic. Employment areas may experience temporary nuisance impacts resulting from longer than expected delivery times to and from facilities due to a reduction in traffic lanes. Truck traffic may also have difficulty turning onto roads where construction is taking place due to a reduced turning radius; • **Power Retail & Malls:** Most retail establishments within the Study Area are in the power retail or mall format, which are set back from the corridor. Potential nuisance impacts include delivery delays due to a reduction in traffic lanes. Some retail centre accesses may be	During construction, recommended mitigation measures by consolidated business classification include: • **Employment Area:** Provide enough space for heavy single unit trucks to make right and left-turns onto the route/arterial where construction is taking place. This can be accomplished by providing a minimum effective turning radius for heavy single unit trucks, especially on roads that connect to Highway 401 interchanges. If appropriate radii cannot be accommodated, appropriate detour routes must be provided for heavy single unit trucks. Consult with City of Toronto, Durham Region, City of Pickering, Town of Ajax, Town of Whitby and City of Oshawa to develop a Traffic Management and Control Plan that identifies appropriate routes for heavy truck traffic that is supported by a Haul Route Analysis;	

Environmental Component	Potential Impacts (Design/Construction/Operation)	Mitigation Measures	Monitoring
	interrupted during construction. Access restrictions may cause further negative impacts related to reduced revenue; • **Main Street Retail & Services:** Main street retail may experience greater negative impacts than Power Retail & Malls during construction. Impacts may include limited access to on-street parking, reduced business visibility, reduced access to storefronts, and public perception that businesses are not operational. Revenue may be impacted due to access restrictions. Impacts will be greatest to retail storefronts that front directly onto the corridor where construction will occur will have; • **Office:** Offices that directly abut the corridor may experience nuisance impacts related to longer than average travel times for employees; and • **Institutional:** Institutional establishments fronting onto the corridor may experience nuisance impacts related to longer than average travel times to get to and from the facilities due to a reduction in travel lanes. Further potential negative impacts include reduced visibility of the institutions and reduced access to driveways and parking lots, which may also impact revenue generation depending on the type of institution being examined.	• **Power Retail & Malls:** Keep entry points into malls and power retail centres along the corridor operational and unobstructed. Ahead of construction, intersections that may experience temporary closures or interruptions to operations should be identified, as well as the potential timing and duration of the interruptions. Property owners and managers of the mall and power retail facilities must be contacted and made aware of potential obstructions or closures to main entry points. Arrangements should be made with concerned property owners and managers to address potential issues due to limited access. Deliveries into these facilities may be impacted and visitors may be confused about how to access these businesses – both factors should be considered in the Traffic Management and Control Plan; • **Main Street Retail & Services:** Storefronts should remain visible by implementing transparent fencing in place of plywood where it is possible and safe to do so. Main street retail and services should be considered in the Signage and Wayfinding Action Plan, especially in areas that comprise concentrations of main street retail, such as Downtown Whitby and Downtown Oshawa. The Signage and Wayfinding Action Plan should determine how to best direct customers to where parking is available in the absence of on-street parking, and help identify which businesses are operational during the construction period; • **Office:** No mitigation or monitoring measures required; and • **Institutional:** The Signage and Wayfinding Action Plan must also cover institutions in Downtown Whitby and Downtown Oshawa, and other applicable areas. The Plan should communicate what facilities are operational and where to park if on-street parking is impacted.	
Land Use	Construction activities are expected to affect all land use types, including Residential & Multi-family Residential, Centres & Mixed Use, Commercial, Industrial, Institutional, Village, Rural, Open Space & Other areas. The potential impacts are listed as below • Emissions and dust from construction equipment and trucks; • Noise and vibration; • Detour routes through residential areas leading to negative impacts including excessive noise, emissions, truck traffic, dirt, and debris to local roads; • Access restrictions for emergency response • Access restrictions for local residents and businesses • Disruption to the flow of traffic • Reduced on-street parking spaces • Pedestrian infrastructure may be interrupted during construction • Curbside operations, such as waste collection, loading and unloading, may be interrupted • The damage of trees, grass, and vegetation due to operation, placement, and storage of construction equipment on site	Mitigation measures to address potential construction related impacts are listed below. • Create and implement Dust Management Plan to identify a full list of measures to minimize the spread of dust and emissions that will be applied by the entity completing construction; • Fences and wind screens will be utilized to help minimize the spread of dust. Truckloads carrying dust-producing material will be covered; • Soil surfaces capable of producing dust will undergo wetting, covering, or paving to minimize the spread of dust; • Traffic speeds within the construction zone will be reduced to minimize the spread of dust; • Construction work schedules and procedures will adapt to changing weather conditions when negative impacts are possible, such as wetting during high speed winds; • Construction equipment and machinery will be in good working condition and undergo regular maintenance, and will comply with federal and provincial regulations. Emissions and noise will be minimized where possible; • Prohibit construction equipment and machinery from idling for extended periods of time through posting signage throughout the construction site with guidelines to minimize emissions. This can be integrated into the Signage and Wayfinding Action Plan;	N/A

Environmental Component	Potential Impacts (Design/Construction/Operation)	Mitigation Measures	Monitoring
		• Comply with by-law provisions imposed by the local area municipalities and Durham Region, and permit exemptions where necessary; • Complete construction during permitted hours, generally between 6 AM and 8 PM or between sunrise and sunset. • Construction equipment will comply with noise regulations mandated by the province and local area municipalities; • Provide adequate turning radii for heavy single unit trucks to access loading and unloading facilities in the rear of buildings; • Through the Haul Route Analysis and Traffic Management and Control Plan, help establish that detour routes and haulage routes use main roads where possible; and • Road closures will be communicated prior to the road closure.	
During Operation			
Community Resources	The potential impacts to demographics and community resources that are anticipated during the operational phase of the include: • Given the high traffic volume and speed of arterial roads, cycling facilities may be unsafe without a separated bike lane, which is why separated facilities are proposed along the majority of the corridor; • As the corridor intensifies and accommodates additional population, there will be further demand created for community resources to uphold current service levels. Demand for services should be examined by each municipality as the corridor intensifies; • As the corridor intensifies and accommodates additional population, there will be further demand for open space and parks. Demand for open space and parks should be examined by each municipality as the corridor intensifies; • It is expected that the project will have a positive impact on the existing demographics and community resources as these areas will be served by higher order transit, providing an enhanced service by reducing travel times for users and providing more frequent service; and • Enhanced transit service is expected to encourage further transit ridership and will provide time savings for existing users. In addition, enhanced transit service will be provided to access destinations served by the broader transit network.	• The active transportation network will continue to develop to accommodate the incoming population as lands along the Durham-Scarborough BRT are redeveloped. As part of the planning approvals process, staff reviewing development applications should encourage connections to and further development of the active transportation network. This will help to expand and eliminate gaps that may exist in the surrounding network; • High traffic volumes coupled with high posted speeds in certain segments of the corridor suggest the need for separated cycling facilities to enhance safety. Physically separated cycling facilities have been included in the preliminary design in a context-sensitive manner consistent with active transportation plans in each municipality; • Staff reviewing development applications should create criteria that would trigger a full Community Services and Facilities Study. This would require applicants to submit a study as part of a complete development application. The study will identify potential impact on community resources that a development may have, and where expansions will need to occur to service the incoming population; • Given that each municipality has parkland dedication provisions in place, no mitigation and monitoring measures are required to uphold the service levels related to parkland and open space.	N/A
Local Businesses	All business types are expected to experience positive impacts from the project. Potential operational impacts for each consolidated business category include: • **Employment Area:** No negative impacts are anticipated during operations. Positive impacts include enhanced transit access for employees and visitors that use transit through reduced travel times and more frequent service; • **Power Retail & Malls:** No negative impacts are anticipated during operations. Potential positive impacts include the encouragement of site redevelopment through enhanced transit access, which will help establish transit supportive densities and mixed-use, complete communities. Further positive impacts include enhanced transit access for employees and customers that use transit by reducing travel times and providing access to more frequent service;	During operations, mitigation and monitoring measures by business classification include: • **Employment Area**: No mitigation or monitoring measures required; • **Power Retail & Malls:** No mitigation or monitoring measures required; • **Main Street Retail & Services:** Relocate on-street parking spaces that are to be removed by the project. Where possible spots should be maintained in close proximity to main street retail; • **Office:** No mitigation or monitoring measures required; and • **Institutional:** No mitigation or monitoring measures required.	N/A

Environmental Component	Potential Impacts (Design/Construction/Operation)	Mitigation Measures	Monitoring
	• **Main Street Retail & Services:** Potential negative impacts include decreased on-street parking spaces to accommodate visitors. Positive impacts include enhanced transit access for employees and customers that use transit by reducing travel times and providing access to more frequent service, as well as an improved streetscape to help attract pedestrian traffic; • **Office:** Offices abutting the corridor may experience positive impacts related to enhanced transit access to support employees, and an improved streetscape to benefit the environment of these offices. On-street parking is a minimal concern for offices as many offices in the Study Area have dedicated parking lots to serve them; and • **Institutional:** Institutional facilities fronting onto the corridor may experience positive impacts related to enhanced transit access to support employees and users, and an improved streetscape to benefit the environment of these institutions.		
Land Use	• Positive impacts to Centres & Mixed-Use Areas • Minimal negative impacts to Commercial uses • No negative impacts to Residential & Multi-family Residential, Industrial, Institutional, Village, Rural, Open Space & Other uses.	N/A	N/A

4.7 Infrastructure

4.7.1 Methodology

4.7.1.1 Utilities and Municipal Services

There are existing utilities within and across the Project that will require relocation in order to address conflicts with BRT infrastructure and accommodate roadway widening. Utilities found within the proposed BRT stop locations will generally be relocated to minimize potential disruption to transit during maintenance and repair activities. Future road disruptions for lifecycle repairs will be reduced, as part of the road reconstruction works associated with BRT, by renewing underground infrastructure along with BRT-related road construction.

4.7.1.2 Drainage and Stormwater Management

An impact assessment was undertaken to determine impacts to Drainage and Stormwater Management infrastructure within the Project. The design analysis has been based on the proposed profile and alignment of the DSBRT. The proposed work includes widening existing road to accommodate BRT infrastructure, leading to culvert extension and bridge widening. Along the DSBRT corridor, bus stops are proposed, which primarily consist of platforms and bus shelters only.

The impacts to Drainage and Hydrology Engineering design related to the proposed DSBRT include:

- Extending and widening existing culverts and bridges within the project limits;
- Realignment of the drainage channel in Lynde Creek Watershed along the north side of the DSBRT corridor around Halls Road; and
- Implementation of appropriate SWM practices.

4.7.2 Utilities and Municipal Services

Potential impacts to surface and sub-surface utilities may include service disruptions to residents and businesses during construction. Impacts due to utility relocations can potentially include access restrictions, road closures, sidewalk closures, traffic detours and delays. Depending on the proposed location of the relocated utilities, impacts to the public can be limited and minimized dependent upon available space within the road allowance. To minimize potential disruption due to utility relocations, construction staging will be considered during detail design.

Potential impacted utilities to be relocated include:

- Telecommunication;
- Hydro cables (overhead and underground);

- Street lights and street light poles;
- Traffic light and signal poles;
- Water mains and fire hydrants; and,
- Natural gas mains and service lines.

Relocation of surface and subsurface utilities has been identified in the preliminary design plans. Mitigation measures were taken to provide adequate clearances to utility infrastructure where possible in the preliminary design. See **Appendix A**. In Durham Region, a preferred 3 m utility buffer has been provided where possible to accommodate utility infrastructure. In Toronto, an assumed 2 m utility buffer has been provided generally behind the sidewalk.

Detailed utility relocation plans will be developed during detail design. During detail design, utility conflicts will be reviewed. The solutions proposed in the design will follow all applicable standards.

4.7.3 Drainage and Stormwater Management

4.7.3.1 Hydrology and Hydraulic Conditions

The design analysis has been based on the proposed profile and alignment of the DSBRT. The proposed work includes widening existing road to accommodate BRT infrastructure, leading to culvert extension and bridge widening. The hydraulic performance at each crossing is listed in **TABLE 4.20** and discussed below.

B-01 Highland Creek Bridge

No impact to the hydraulic opening was identified at the crossing structure B-01. No further assessment is needed.

RC-01 Highland Creek Culvert

No impact to the hydraulic opening was identified at the crossing structure RC-01. No further assessment is needed.

ST-01 Centennial Creek Storm Trunk

ST-01 is proposed to be extended by 12 m to accommodate to the road widening due to addition of active transportation facilities and bus stop platforms around the intersection of Meadowvale Road and Ellesmere Road. The overland flow path downstream of crossing ST-01 is through a walkway between private properties south of the Ellesmere Road. As the total traffic lanes including BRT lanes and general traffic lanes within the road segment contributing to crossing ST-01 is proposed to remain the same as existing, no major increase in impervious area is expected, and the on-road storage and overland flow path is not expected to be affected at this crossing location. As the road widening is not needed for this segment of corridor, the hydraulic impact due to the

extension of ST-01 is minimal. Hydrodynamic modelling would not be necessary for this crossing during detailed design.

C-01 Petticoat Creek Box Culvert

C-01 is a concrete box culvert that needs to be extended on both ends to accommodate the road widening. As shown in **TABLE 4.20**, the headwater level in proposed condition remains the same as existing headwater level, indicating the proposed culvert extension would not cause adverse impact on hydraulic condition at this crossing location.

RC-02 Petticoat Creek Road Culvert

RC-02 is a road culvert on a tributary of Petticoat Creek. No impact to the hydraulic conditions was identified at the crossing structure RC-02. No further assessment is needed.

RC-03, RC-04 and ST-02 Amberlea Creek Culverts

RC-03, RC-04, and ST-02 are road culverts assessed under other projects. Culvert extension work is currently underway. No further work is proposed on those crossings; therefore, the culvert extension was not further assessed.

C-02 Dunbarton Creek Culvert

A culvert extension is proposed to connect the existing culvert under Kinston Road into the upstream culvert under CN Railway through an underground concrete vault. A ditch inlet and short drainage pipe is also needed to connect the ditch north of Kington Road into the extended culvert. As the culvert under the Kingston Road connects to culvert under the CN Rail with no surface outlet, and the Kinston Road underpasses the CN Rail, the CN Rail embankment will act as a berm to contain the water ponding upstream of the crossing. In proposed condition, the existing high point around the upstream floodplain is to be maintained to prevent headwater from spilling into the underpass. Floodplain fill is proposed around crossing C-02 on Dunbarton Creek to construct the additional westbound lane of the BRT.

The upstream end of the culvert is located on the northeast side of the CN Railway. As shown in **TABLE 4.20**, the headwater level shows the water level at cross section upstream of CN Rail. The Regional flood elevation is higher than the spill elevation indicating the culvert under Kingston Road will be surcharged, but the road will not be overtopped. The upstream headwater level remains the same as existing and the Kingston Road is no longer overtopped during Regional flood event under proposed condition.

C-03 Pine Creek Culvert

C-03 is a culvert crossing Kingston Road on Pine Creek that is assessed under other projects. No further work is proposed around this structure; therefore, the hydraulic performance is not assessed further.

B-05 West Duffins Creek Bridget

B-05 is the bridge crossing on West Duffins Creek to be widened with extended piers and abutments. Comparing the hydraulic criteria under both existing and proposed condition, the bridge widening does not cause negative impacts to the hydraulic performance of the bridge crossing.

C-04 Miller's Creek Culvert

Culvert extension is not needed at crossing C-04. the hydraulic capacity was not further assessed.

C-05 Carruthers Creek Culvert

A Culvert extension is needed at crossing C-05. As the hydraulic opening of existing crossing structure is sufficient to convey the flow, the impacts of culvert extension is minimal. The headwater level does not increase under proposed condition, indicating upsizing the culvert to mitigate the impact of road widening is unnecessary.

RC-05 Lynde Creek Culvert Outlet

Culvert extension on the outlet end is needed at crossing RC-05 to accommodate the road widening. As the culvert outlet serves as an outfall of an existing underground storm sewer system, impacts on hydraulic performance is to be evaluated together with road drainage design in detail design.

RC 06 to RC-09 Lynde Creek Road Culverts

Crossing RC-06 needs to be extended by 10 m on both ends to accommodate the road widening. 300 m of upstream channel needs to be realigned together with the culvert extension. Results of hydraulic modelling show the headwater level remains the same as existing condition in 100-yr and Regulatory flood event. The increase in headwater level is less than 0.15 m for 25-yr and 50-yr flood events and the increase in water level in the upstream channel is limited to within the road allowance and does not encroach onto adjacent properties, indicating the hydraulic impacts of culvert extension is minimal. The creek realignment is further discussed in **Section 4.7.3.3**.

RC-07 and RC-08 are road culverts for roadside ditch crossing under the Highway 412 and ramp. No extension is needed to accommodate the road widening; therefore, no further evaluation is needed.

RC-09 is proposed to be relocated as it conflicts with the foundation of bus stop platform at the intersection of Dundas Street and Des Newman Boulevard.

C-06 Lynde Creek Structural Culvert

Culvert C-06 needs to be extended to accommodate the road widening. As the crossing is designed with Relief Flow for Regional flood event, the characteristics of Relief Flow needs to be investigated further. The culvert extension has minimal impacts on headwater level under proposed condition.

RC-10 Lynde Creek Road Culvert

Crossing RC-10 needs to be extended on the inlet end by 10 m to accommodate the road widening. The outlet end is located further south downstream of the commercial development and would not be impacted. The headwater level increases less than 0.05 m under proposed condition in 25-year, 50-year, and 100-year flood event. In addition, the headwater level remains the same in Regional flood event under proposed condition. While the road is overtopped during Regional flood event, the depth and velocity of Relief Flow conform with physical characteristics required by both MTO and MNDMNRF under existing and proposed condition.

B-07 Lynde Creek Bridge

The Lynde Creek Bridge at crossing B-07 is proposed to be replaced with a new bridge to expand the deck width and hydraulic opening and to accommodate the road widening. The expansion on bridge deck width would exacerbate the existing flooding and increases the upstream flood level in 25-year, 50-year, and 100-year flood events, and the hydraulic impact needs to be mitigated. A new bridge size was determined to minimize the increase in headwater level.

The design flow identified from an updated hydrology model that considered climate change impact for a design service life of 75 years were adopted for the hydraulic analysis. The hydraulic opening needed in proposed condition was evaluated without considering the downstream backwater effect to identify sizes needed to provide sufficient conveyance capacity. The results of hydraulic modelling show the headwater level remains the same in proposed condition with the new bridge size, indicating the hydraulic impact has been mitigated.

Notably, there is storm sewer outfalls located close to the water crossing structures that needs to be relocated. Design for relocation of storm sewer outfalls needs to be completed during detail design.

C-07 Pringle Creek Structural Culvert

Culvert C-07 is located on Pringle Creek where a 20 m culvert extension is proposed to accommodate the road widening. The level of protection on Pringle Creek has been identified to be 100-year by MNDMNRF and the culvert extension has minimal impacts on headwater level under proposed condition in 100-year flood. The Relief Flow in Regulatory Flood was not further evaluated. Culvert embedment should be incorporated during detailed design for the culvert extension to facilitate fish passage following requirements listed in MTO Highway Drainage Design Standards (HDDS) WC-12.

Notably, there is storm sewer outfalls located close to the water crossing structures that needs to be relocated. Design for relocation of storm sewer outfalls needs to be completed during detail design.

RC-11 and RC-12 Corbett Creek Culverts

Culvert extension is proposed on crossing RC-11 and RC 12, where the changes in headwater level is around 0.01 m under proposed condition. The impacts of the culvert extension are minimal. However, further investigation to mitigate the existing flooding issue is to be considered to protect the DSBRT corridor and minimize flooding risk.

RC-13 Goodman Creek Culvert

No extension is needed on crossing RC-13. Therefore, the crossing was not evaluated further.

B-09 and B-10 Oshawa Creek Bridges

Bridge replacements are proposed on crossing B-09 and B-10, where the hydraulic condition is improved as a larger opening is provided under proposed condition. Crossing B-09 is proposed to be replaced with a Single Span Bridge with similar dimensions. The hydraulic analysis results show that the headwater level does not increase in proposed condition. Crossing B-10 is proposed to be replaced with a single span bridge to remove the middle pier and reduce obstruction in the creek channel. The hydraulic analysis results show that the headwater level decreases in proposed condition comparing to the existing condition for 100-yr, 50-yr and 25-yr flood events, indicating the hydraulic condition is improved.

TABLE 4.20. SUMMARY OF PROPOSED WATERCOURSE CROSSING STRUCTURES WITHIN THE DSBRT CORRIDOR

	Crossing ID	Approx. Sta.	Locations	Proposed Structure					Proposed Headwater Level				Road Design		Meet Criteria					
				Length (m)	Slope (%)	Rise (mm)	Total Span (mm)	Type	Regional	100yr	50yr	25yr	C/L	Spill	Freeboard >=0.3m	HW/D <=1.5	MTO Freeboard	Spill v (m/s)	Spill Depth (m)	V-D Criteria
TRCA	B-01	13+400	Highland Creek - Milliken Branch	No impact																
	RC-01	14+600	Highland Creek	No impact																
	ST-01	17+340	Centennial Creek, Meadowvale Road	90	1.29%	2500		Circular	117.40	116.80	116.60	116.43	116.90	116.90	No	No	No	2.4	0.36	No
	B-03	50+050	Rouge River	No impact																
	C-01	50+890	Petticoat Creek	59	0.54%	2450	6150	Conc Box	97.95	93.24	92.95	92.71	97.00	97.50	No	Yes	Yes	1.11	0.63	No
	RC-02	51+420	Petticoat Creek	100		1500	1800	Conc Box	To be evaluated during detail design											
	RC-03	52+450	Amberlea Creek, Whites Rd N	71	1.49%	1500	1800	Conc Box	No further work											
	RC-04	52+760	Amberlea Creek, Whites Rd N	77	2.45%	1500	2600	Conc Box	No further work											
			Proposed added barrel	74	2.45%	1200		Circular	No further work											
	ST-02	53+040	Amberlea Creek, Fairport Rd	70	1.93%	1200		Conc Circular	No further work											
	C-02	53+500	Dunbarton Creek	128	2.54%	1800	3000	Conc Box	86.68	86.15	85.80	84.41	85.30	85.70	No	No	No	Surcharged, no spill.		
	C-03	54+580	Pine Creek	72	0.22%	2250	7100	Conc Box	No further work											
	B-05	60+150	West Duffins Creek	31	0.00%		64008	3-Span Bridge	85.16	82.05	81.80	81.55	85.10	-	No	-	No	-	-	-
	C-04	62+350	Miller's Creek, Chapman Dr	59	0.86%	3000	12000	2-Cell Conc Box	92.56	90.74	90.57	90.30	93.70	91.50	Yes	Yes	No	0.38	0.83	Yes
				59	0.86%	1600	4800	Conc Box	-	-	-	-	-	-	-	-	-	-	-	-
	C-05	64+900	Carruthers Creek	47	0.03%	1900	5500	Conc Box	89.77	86.59	86.45	86.33	87.30	87.30	No	Yes	No	0.17	2.5	No
CLOCA	RC-05	65+675	Audley Rd, Low Point	No info, to be evaluated during detail design																
	RC-06	70+350	Halls Road	53	0.95%	1500	1800	Conc Box	84.71	84.61	84.49	84.32	84.77	84.7	No	Yes	No	-	-	-
	C-06	70+620	216 m west of Hwy 412	38	1.61%	2350	12800	Structural Arch	84.87	83.99	83.82	83.62	86.80	84.20	Yes	Yes	Yes	1.09	0.75	No
	RC-07	70+950	Hwy 412 Road Ditch	No impact																
	RC-08	71+050	Hwy 412 Ramp	No impact																
	RC-09	71+200	Des Newman Blvd	71	0.25%			CSP	To be evaluated during detail design											
	RC-10	71+800	Lynde Creek, Storm Trunk	190	0.51%	1200		CSP	82.58	82.26	81.39	80.39	82.60	82.28	No	No	Yes	0.64	0.3	Yes
	B-07	72+150	Lynde Creek, McQuay Blvd	36	-		21200	Single Span Bridge	81.22	79.88	79.66	79.57	82.40	80.90	No	-	No	-	-	-
	ST-03	74+010	Ash Creek, Storm Trunk	-	-	2210	4572	Concrete	-	-	-	-	-	-	-	-	-	-	-	-
	C-07	74+610	Pringle Creek	35		2400	6100	Conc Box	-	86.59	86.33	86.03	86.47	-	-	Yes	No	-	-	-
				35		2400	9600	2-Cell Conc Box	-	-	-	-	-	-	-	-	-	-	-	-
	RC-11	76+610	Springwood St - Kathleen St	48	-0.30%	1500	1800	Conc Box	111.07	111.06	111.08	111.02	111.40	110.80	Yes	No	No	0.57	0.27	Yes
	RC-12	80+000	Corbett Creek, Thornton Rd	53	0.52%	2300		Circular	102.02	101.17	100.11	99.52	102.00	102.00	No	Yes	Yes	0.5	0.23	Yes
				53	0.38%	1900	2500	CSP Arch	-	-	-	-	-	-	-	-	-	-	-	-
	RC-13	80+715	Goodman Creek	No impact																
	B-10	91+650	Oshawa Creek - Bond St	20	-	2900	17000	Single Span Bridge	103.60	102.32	101.95	101.28	102.10	101.25	No	-	No	2.01	1.5	No
	B-09	81+390	Oshawa Creek - King St	19	-	3700	17600	Single Span Bridge	102.64	101.16	101.14	100.80	101.42	100.83	No	-	No	2.01	1.2	No

4.7.3.2 Stormwater Management

Impact Assessment for City of Toronto Segments

Runoff from the BRT corridor within Ellesmere Road and Kingston Road is proposed to be collected and conveyed by the existing storm sewers. The existing overland flow route and on-road storage is designed to be maintained, where possible, or compensated if the existing capacity could not be maintained during detail design. **TABLE 4.21** lists the impervious ratio in proposed condition based on proposed typical cross sections for the BRT corridor.

TABLE 4.21. PROPOSED SUBCATCHMENT (SC) DETAILS IN TORONTO

SC ID	Road Segment			Prop Imperviousness (%)	Subwatershed	Total Site Area (ha)
	Start Chain	End Chain	Length (m)			
1	10+000	11+700	1700	78%	West Highland	7.1
2	11+700	12+200	500	78%	East Highland	2.1
3	12+200	13+900	1700	78%	West Highland	6.4
4	13+900	15+300	1400	78%	Main Highland	5.5
5	15+300	17+700	2400	60%	Centennial	9.4
6	17+700	18+200	500	61%	Waterfront	2.0

Detailed stormwater management plans and stormwater management reports are to be developed during detailed design to verify the capacity of existing storm systems to accommodate runoff generated from roadway in proposed condition. Notably, substantial increase in imperviousness occurs due to the road widening, indicating stormwater management facilities are to be designed to mitigate the water quality and quantity impacts from the project. As the stormwater is to be discharged to watercourses through municipal storm sewer system maintained and operated by the City of Toronto, additional consultation with City of Toronto is needed during detail design to clarify water quality and quantity control targets.

Impact Assessment for Durham Region Segments

The existing storm sewer systems will continue to collect and convey the runoff generated from the BRT corridor. The existing overland flow route and on-road storage is designed to be maintained, where possible, or compensated if the existing capacity could not be maintained during detail design. **TABLE 4.22** lists the impervious ratio in proposed conditions based on proposed cross sections for the BRT corridor.

TABLE 4.22. PROPOSED SUBCATCHMENT (SC) DETAILS IN DURHAM REGION

SC ID	Road Segment			Subwatershed	Proposed Imperviousness (%)	Increase in Impervious Area (ha)	Extended Detention Storage (m^3)
	Start Chain	End Chain	Length (m)				
PIK-1	50+273	52+100	1827	Petticoat Creek	79%	0.76	191
PIK-2	52+100	53+070	970	Amberlea Creek	79%	0.47	118

SC ID	Road Segment			Subwatershed	Proposed Imperviousness (%)	Increase in Impervious Area (ha)	Extended Detention Storage (m^3)
	Start Chain	End Chain	Length (m)				
PIK-3	53+070	53+900	830	Dunbarton Creek	79%	0.33	82
PIK-4	53+900	54+200	300	Hwy 401	79%	0.12	Exst SWM
PIK-5	54+200	55+900	1700	Pine Creek	79%	0.17	42
PIK-6	55+900	57+730	1830	Duffins Creek	79%	0	0
AJX-1	60+000	61+200	1200	Duffins Creek	79%	0.90	226
AJX-2	61+200	62+680	1480	Miller Creek	74%	0	36
AJX-3	62+680	63+200	520	Miller Creek	79%	0	146
AJX-4	63+200	64+000	800	Carruthers Creek	79%	0	Exst SWM
AJX-5	64+000	65+400	1400	Carruthers Creek	79%	0	Exst SWM
AJX-6	65+400	66+100	700	Lynde – Kinsale	79%	0.50	124
AJX-7	66+100	66+500	400	Lynde – Kinsale	79%	0.32	80
WHT-1	70+000	70+400	400	Lynde – Kinsale	79%	0.31	78
WHT-2	70+400	70+800	400	Lynde – Kinsale	79%	0.14	35
WHT-3	70+800	71+500	700	Lynde – Kinsale	79%	0.18	Exst SWM
WHT-4	71+500	72+000	500	Lynde RC10	79%	0.21	54
WHT-5	72+000	73+500	1500	Lynde B07	79%	0.21	52
WHT-6	73+500	74+300	800	Lynde Creek	74%	0.20	51
WHT-7	74+300	74+900	600	Pringle C07	74%	0.10	26
WHT-8	74+900	76+400	1500	Corbett Creek	70%	0	0
WHT-9	76+400	77+000	600	Corbett RC-11	79%	0.68	171
WHT-10	77+000	77+500	500	Corbett RC12	79%	0.23	57
OSH-1	80+000	80+400	400	Corbett RC12	79%	0.20	50
OSH-2	80+400	81+400	1000	Goodman Creek	83%	0	0
OSH-3	90+700	91+800	1100	Oshawa Creek	83%	0	0
OSH-3	81+400	82+600	1200	Oshawa Creek	83%	0	0
OSH-4	82+600	82+860	260	Harmony Creek	83%	0	0
OSH-4	91+800	92+140	340	Harmony Creek	83%	0	0

Stormwater management plans and stormwater management reports are to be developed during detailed design to verify the capacity of existing storm systems to accommodate runoff generated from roadway in proposed condition. Notably, a rural segment of the existing road in subcatchment 7 is proposed to be urbanized. A new storm sewer system is to be designed to intercept the Minor System flow. Curb cut could be provided where possible to accommodate overland flow route for Major System flow. The storm system is to be sized during detail design.

Substantial increase in imperviousness is identified in some of the road segments except subcatchments 7,9, 12, 13, and 14, where only minor road widening around the intersection is proposed. Existing stormwater management facilities are present in subcatchment 6, which could be retrofitted to mitigate the impacts from this project work.

Stormwater management facilities are to be designed to provide water quantity control and water quality treatment for the BRT corridor in proposed conditions. Potential stormwater management mitigation measures are discussed as below.

Stormwater Management Mitigation

To mitigate runoff increase caused by increase in imperviousness identified in the impact assessment above, stormwater management practices (SWMP) are recommended for Highway/Roads corridors and listed as below. **TABLE 4.23** listed the physical constraints and applicability for SWM Types.

- Engineered stormwater tree systems.

In cities, trees can play an important role in stormwater management by reducing the amount of runoff that enters stormwater and combined sewer systems. Trees act as mini-reservoirs to control stormwater at the source. With a suspended pavement or structural cell system, the suspension system supports the weight and forces of the pavement above and allows the soil below to remain uncompacted, accommodating tree roots and filtering and managing stormwater runoff. By combining on-site stormwater management with expanded rooting volumes, suspended pavement and structural cells provide an opportunity to grow large, healthy trees and restore ecological function.

- Pervious technologies.

Pervious pipe systems are perforated along their length allowing exfiltration of water through the pipe wall as it is conveyed downstream. The pipe itself is similar to that used for tile drainage on agricultural lands and is available with either a smooth-walled or corrugated interior.

- Enhanced ditches/swales.

Grassed swales have historically been associated with rural drainage and have been constructed primarily for stormwater conveyance. More recently, stormwater management objectives have changed, and grassed swales are now being promoted to filter and detain stormwater runoff. Swale drainage can be a useful technique in areas of low grade, as long as the distance that the flow is to be conveyed is not too long.

- Oil/grit separators.

Oil/grit separators (OGS) are used to trap and retain oil and/or sediment in detention chambers, usually located below ground. They operate based on the principles of gravity-based sedimentation for the grit, and phase separation for the oil. There is minimal attenuation of flow in oil/grit separators since they are not designed with extended detention storage.

TABLE 4.23. PHYSICAL CONSTRAINTS FOR SWMP TYPES

SWMP	Topography	Soils	Bedrock	Groundwater	Drainage Area
Engineered stormwater tree systems	None	None	None	None	0.5-2 ha
Grassed Swales	<5%	None	None	None	<2 ha
Pervious Pipes	None	Loam (min. infiltration rate≥ 15 mm/hr)	>1 m below bottom	>1 m below bottom	None
Oil/Grit Separators	None	None	None	None	<2 ha

Stormwater management mitigation design also need to consider the environmental setting into which their drainage system will be placed. Salt vulnerable areas need to be identified and the potential for salt impacted drainage to affect these vulnerable areas must be assessed. Special design modifications to traditional stormwater management measures may be warranted to protect these salt vulnerable areas. Measures may include clay or geosynthetic liners in conveyance ditches and ponds, infiltration ponds where appropriate or use of storm sewers to transport drainage past vulnerable areas.

4.7.3.3 Creek Realignment

A small tributary of Lynde Creek between Lake Ridge Road and Halls Road upstream of crossing RC-06 is proposed to be realigned as the footprint of widened road extends over the existing creek corridor. The creek has been identified as an intermittent or ephemeral feature and support indirect fish habitat only with warmwater thermal regime. The mitigation measures recommended include:

- Replicate functions by lot level conveyance measures (e.g. vegetated swales) connected to the natural heritage system, as feasible and/or Low Impact Development (LID) stormwater options (refer to TRCA's Water Management Guidelines for details);
- Replicate on-site flows and outlet flows at the top end of vegetated swales, bioswales, etc. to maintain feature functions.

A grass lined drainage channel that runs parallel to Dundas Street is proposed for the creek realignment. **TABLE 4.24** listed the preliminary sizing of the drainage channel. The sizing will be refined during detail design.

TABLE 4.24. PRELIMINARY SIZING OF DRAINAGE CHANNEL FOR CREEK REALIGNMENT

Design Flow (m^3/s)	Start Chain	End Chain	Depth (m)	Longitudinal Slope	Side Slope - LT	Side Slope - RT	Bottom Width (m)	Flow Depth (m)	Velocity (m/s)
4.2	70+040	70+200	1.5	-2.9%	3:1	4:1	1	0.69	1.8
4.2	70+200	70+350	1.5	-0.65%	3:1	4:1	1	0.95	1.03

As shown in the **TABLE 4.24**, 100-year flood flow for crossing RC-06 has been adopted for the preliminary sizing of the drainage channel because the drainage channel is located immediately upstream of the RC-06. The drainage channel is proposed to run parallel to the Dundas Street with longitudinal slope similar to the road profile. The flow depth and velocity indicate sufficient freeboard has been provided and there is no concern of erosion or sedimentation with 100-year flood flow.

A ditch realignment is needed in the northeast quadrant of Dundas Street West and Halls Road North. The ditch realignment will be designed and sized during detail design.

4.7.3.4 Temporary Drainage and Erosion and Sediment Control During Construction

Erosion Risk Assessment (ERA) and Erosion and Sediment Control (ESC) measures are essential to mitigate the negative impacts during construction. The ESC measures are to be developed during detail design stage following the latest TRCA, CLOCA, City of Toronto and Region of Durham guidelines. Impacts on the surrounding environment related to the construction are to be mitigated by proper ESC measures. It is recommended that a multi-barrier approach is undertaken during construction.

All ESC measures are to be inspected and monitored properly following TRCA and City of Toronto improved inspection, monitoring, and maintenance protocols to ensure ESC plan enforcement. All damaged ESC measures shall be repaired and/or replaced as required in a timely manner to the satisfaction of regulatory agencies. Proper record needs to be kept for field inspection, maintenance, and reporting activities.

Temporary drainage shall be provided during construction to manage flood risk. Temporary drainage and dewatering system will be designed at later stages when details of construction methods such as duration and temporary site grading are available. The best practices below shall be followed during construction:

- The Contractor shall monitor weather forecasts and schedule operations such that no in-water work occurs during rainfall events;
- Equipment and/or materials not being used will be stored far enough from the watercourse and outside the floodplain; and,
- At the end of each day, the Contractor shall remove all equipment and materials from the watercourse prior to leaving the site if feasible.

Design flow, volume and location of discharge from dewatering system will be determined when more information becomes available. The applicability of Permit to Take Water or Environmental Activity and Section Registry will be evaluated prior to construction.

4.7.4 Summary of Potential Impacts, Mitigation Measures and Monitoring

The potential impacts, mitigation measures and monitoring are summarized in **TABLE 4.25**.

TABLE 4.25. SUMMARY OF POTENTIAL IMPACTS, MITIGATION MEASURES AND MONITORING: STORMWATER MANAGEMENT, MUNICIPAL SERVICES AND UTILITIES

Environmental Component	Potential Impacts (Design/Construction/Operation)	Mitigation Measures	Monitoring
During Detail Design			
Watercourse Crossings	Extension/widening of 13 existing watercourse crossing structures, including C-01, C-02, C-05, C-06, C-07, B-05, ST-01, ST-03, RC-05, RC-06, RC-10, RC-11, and RC-12. Replacement of 3 existing bridges, including B-07, B-09 and B-10. 300 m of a tributary of Lynde Creek between Lake Ridge Road and Halls Road is considered for realignment.	Conduct hydraulic analysis following *Natural Hazards Policies or the Technical Guide, River and Stream Systems; Flooding Hazard Limit* (2002) to ensure that all following flood hazard objectives are met: • Ensure that flood risk does not increase as a result of the proposed crossing for all design storm events up to, and including, the Regulatory event; • Safely convey the applicable design storm as per municipal, regional, and/or Ministry of Transportation guidelines considering implications of future land use on flooding; • Establish the requirements for crossing size (i.e., overtopping of the Regulatory event) while considering ingress/egress within the surrounding area in consultation with local municipal emergency managers; • TRCA's Crossing Guideline for Valley and Stream Corridors (2015) will be considered in setting stream crossing objectives for watercourses under TRCA jurisdiction during the detail design phase; and • Coordinate with TRCA to consider the proposed works related to flood control around Duffins Creek Bridge during detail design. During detail design, Notably, the hydraulic condition could be further assessed using the 2D model obtained from the TRCA during detail design to further refine the design, the proposed grading plan, and fill volume within the floodplain. • Sizing of proposed drainage channel will be refined during detail design.	N/A N/A
Floodplain Management/ Flooding Hazards	Extension/widening of 13 existing watercourse crossing structures, including C-01, C-02, C-05, C-06, C-07, B-05, ST-01, ST-03, RC-05, RC-06, RC-10, RC-11, and RC-12. Replacement of 3 existing bridges, including B-07, B-09 and B-10.	For all defined watercourses (floodplains), detailed hydraulic assessment using the HEC-RAS model is to be completed to update floodline mapping to standards of TRCA and CLOCA and determined appropriate design storm and peak flow rate associated with the watercourse at the proposed crossing location based on future land use conditions. Proposed crossing structure to convey the appropriate peak flow rate without increasing flood elevations for the 2 to 100 year and Regional storm events will be sized. Flood hazard at the preferred crossing location using existing floodplain mapping and modelling is to be confirmed. Models are to be updated as necessary to reflect more detailed topographical and flow data. Notably, the hydraulic condition could be further assessed using the 2D model obtained from the TRCA during detail design to further refine the design, the proposed grading plan, and fill volume within the floodplain. The hydraulic analysis will be refined based on the detail design to ensure flooding objectives are med with regard to future land use changes. During detail design, an updated floodplain map will be submitted to TRCA upon final acceptance of the modelling and floodplain mapping. During detail design, TRCA will continue to be consulted to consider mitigation regarding the platform within the regulatory area.	N/A

Environmental Component	Potential Impacts (Design/Construction/Operation)	Mitigation Measures	Monitoring
Municipal storm sewer system	Alteration to the local drainage system including catchbasin and catchbasin lead relocation, alteration of overland flow route, relocation of municipal storm sewer outfall.	Stormwater sewer systems are to be designed following guidelines and standards developed by local municipalities.	N/A
Stormwater management	Increase to impervious areas within the following corridor segment: • Ellesmere Road from Grangeway Avenue to Military Trail in Scarborough; • Kingston Road from Ellesmere Road to Raspberry Road in Scarborough; • Kingston Road from Altona Road to Rotherglen Road in Pickering and Ajax; • Dundas Street from Garden Street to Garrard Road leading to increase in peak runoff flow rate, increase in annual runoff volume generated from the project site, and increase in contaminants loading discharged to the receiving waterbodies.	Conduct complete review of existing Toronto Water's drainage and SWM system information to verify the wet weather flow management design criteria could be satisfied. Conduct an analysis of available drainage and SWM capacity for road segments where widening is needed. The local stormwater management guidelines are to be followed to ensure the maximum allowable discharge flow rate, annual runoff volume targets, as well as water quality control targets set out by local stormwater management guidelines and requirements of stormwater quantity and quality controls are met. Stormwater quality control strategies to propose site specific stormwater management measures is to be refined, where needed, following guidelines developed by MECP and Conservation Authorities. Stormwater management reports for review and approval by local municipalities is to be prepared as required.	N/A
Permit to Take Water (PTTW) and Environmental Activity & Sector Registry (EASR)	Construction dewatering for the construction of foundations for structures.	The applicability of Permit to Take Water or Environmental Activity and Section Registry will be evaluated prior to construction.	N/A
Erosion and Sediment Control	Removal of vegetation, stripping of topsoil, and alterations to topography and drainage patterns leading to release of sediment laden runoff and dust from constructions sites to the natural environment.	Temporary drainage and ESC measures adhering to guidelines developed by Conservation Authorities and local municipalities are to be designed. An ERA and ESC plans are to be completed following *Erosion and Sediment Control Guide for Urban Construction* (2019) developed by TRCA. An ESC inspection program is to be developed following TRCA's *Erosion and Sediment Control Guide for Urban Construction* (TRCA, 2019).	N/A
Utilities	Conflicts between existing utilities and the DSBRT design	Detailed utility relocation plans will be developed during detail design and follow all applicable standards. Coordinate the proposed utilities relocation design with the applicable municipalities, transit agencies and potentially affected private utility owners for example through Metrolinx preconstruction utilities service group. Potential utility conflicts shall be identified in consultation with each utility owner as part of detail design to develop applicable protection and/or relocation strategies prior to construction. Impacts to municipal servicing shall be consulted with the applicable municipality and required permits shall be obtained prior to construction.	N/A
During Construction			
Erosion and Sediment Control	Removal of vegetation, stripping of topsoil and alterations to topography and drainage patterns leading to release of sediment laden runoff and dust from constructions sites to the natural environment.	Implement and adhere to the requirements of the ESC Plan including the ESC inspection program.	The condition and functionality of ESC measures on the site are to be regularly inspected and documentation on inspection activities are to be maintained up-to-date.
Permit to Take Water (PTTW) and Environmental Activity & Sector Registry (EASR)	Construction dewatering for extension/replacement of existing watercourse crossing structures.	Implement and adhere to the requirements of any PTTWs and/or EASR.	
During Operation			
Stormwater management and drainage	N/A	N/A	N/A

4.8 Air Quality

An AQIA was undertaken to identify the impacts and mitigation measures of the Project within the 300 m Study Area (Air Quality) (see **Appendix H**). The methodology for the AQIA is summarized in **Section 4.8.1**, and the potential impacts, mitigation measures and monitoring requirements are provided in **Section 4.8.2** and **4.8.3**.

4.8.1 Methodology

To assess the impact of the Project on air quality within the DSBRT corridor, the net change in pollutant concentrations due to the proposed BRT in the transportation corridor was calculated for the reference year 2041 and compared against applicable criteria and standards as listed in **Section 3.8**. The increase in emissions was compared with the emissions incurred on proposed corridor "now" and in the future reference year without the Project to evaluate the significance of the emissions increase caused by the Project.

The potential air quality impacts associated with the Project were assessed by predicting air contaminant concentrations under three scenarios: Existing Conditions (2019), Future No-Build (without the proposed BRT in 2041), and Future Build (with the proposed BRT in 2041). Descriptions and assumptions used in each of the assessment scenarios are detailed in **Section 4.8.1.1**.

As discussed in **Section 3.8**, 108 sensitive receptors were identified to represent the change in the DSBRT corridor for the Existing Conditions, Future No-Build, and Future Build scenarios. Mitigation of air quality impacts resulting from the construction and operation phases of the Project is identified following guiding documents listed as below:

- Management Approaches for Industrial Fugitive Dust Sources Technical Bulletin, MECP 2017; and,
- Best Practices for the Reduction of Air Emissions from Construction and Demolition Activities, Cheminfo Services Inc., 2005.

4.8.1.1 Description of Assessment Scenarios

Existing Conditions (2019)

Dispersion modelling of the existing conditions was performed with CAL3QHCR. Due to pandemic restrictions related to COVID-19, traffic conditions in 2020 and 2021 were not considered representative. Hence, the most recent period prior to the beginning of pandemic, i.e., traffic conditions in 2019 have been used as the existing conditions for this assessment.

Future No-Build (2041)

The Future No-Build (2041) scenario assumes that traffic volumes along the corridor will increase with population growth in the area. No changes to existing transportation infrastructure were assumed. However, improvements in vehicular combustion standards are expected. Therefore, an emissions inventory was developed using the methods outlined in **Section 3.8** to account for this scenario with these considerations.

Future Build (2041)

The Future Build (2041) scenario is the same as the above future scenario but include the addition of the proposed BRT. In this scenario, buses are restricted to the corridor. It was assumed that the future bus fleet on the proposed BRT would be diesel fueled as this represents a worst-case scenario. An emissions inventory was developed using the methods outlined in **Section 3.8** for the Future Build scenario with the proposed BRT.

This scenario did not consider bus station locations where buses will briefly idle to allow passengers to board/depart buses, meaning idling bus emissions were not considered in this assessment. It is assumed all stations will operate as regular bus street stops with passing lanes for express service; consequently, bus idling is not anticipated as they will only drop-off and pick-up passengers. In addition, during peak hours there will be approximately one bus every two minutes travelling through each of the stations; therefore, buses will stop for very short periods to allow passengers to board and exit. Hence, the emissions from bus idling have not been included in the analysis.

4.8.2 Construction Impacts and Mitigation

4.8.2.1 Construction Impacts

Air quality impact from construction activity is expected to be temporary and unlikely to have long-lasting effects on the DSBRT corridor, and therefore discussed qualitatively in this section. The primary air quality concern from construction activities is dust generation due to material processing and combustion emissions from the operations of heavy construction equipment and vehicles.

Sources of Dust and Air Emissions

The construction activities associated with the Project include the construction of bus stop, platforms, bus lanes and walkways. Major air emissions associated with construction include fugitive dust and construction vehicles and equipment tailpipe emissions. The sources are summarized below.

Sources of Construction Dust (PM_{10} and $PM_{2.5}$) include:

- Road Surfaces: Dust from roads and access areas generated by haulage trucks and other mobile machinery movements during dry and windy conditions;
- Site Preparation: Bulk earthwork operations, such as excavation, rock breaking and clearing of vegetation i.e., disturbance of any dry material;

- Fabrication Processes: Emissions from dry work on concrete such as blasting, crushing, jackhammering, grinding, boring holes, sandblasting, polishing and sawing;
- Material Handling and Transfer Operations: Loading and unloading of construction materials to and from trucks;
- Storage Piles: Stockpiling of materials including material placement and removal;
- Windy Conditions and Exposed Surfaces: Wind erosion of stockpiles and dried mud tracking roads and other exposed and disturbed areas; and,
- Demolition and Deconstruction: Demolition of concrete and masonry facilities.

Sources of air emissions from construction equipment/vehicle include:

- Diesel-powered construction equipment exhaust;
- On-site diesel generators exhaust; and,
- Construction vehicles exhaust.

Activities involving the mobilization and handling of soils, or materials with contaminant constituents require specific mitigation measures to ensure the impact to ambient air quality and human health is controlled.

Potential impacts can also be driven by atmospheric conditions as weather plays a significant role in dust generation during construction activities. Wind and dry conditions (i.e., low precipitation or low moisture content materials) contribute to the generation of dust during construction activities which can migrate off-site and affect overall air quality beyond the Study Area (Air Quality). In addition, during the warmer months of the year the heat and sunlight can react with gases and fine particles in the air around the Project which may contribute to the local air quality background concentrations.

Wet Weather Conditions

Although wet weather conditions may serve to suppress dust generation during construction, the associated increased potential for erosion of soils during wet conditions create conditions that contribute to dust generating potential once dry conditions return. For example, increased transport of mud onto streets or, creation of ruts that increase the surface area of disturbed areas thus resulting in greater dust generation potential under dry conditions.

Exhaust Emissions from Construction Equipment

Air quality may be potentially impacted by exhaust emissions from excavation equipment and haulage trucks; and exhaust emissions from stationary combustion equipment, including generators. Such exhaust emissions are typical criteria air contaminants (CACs) that are combustion by-products, i.e., diesel particulate matter (DPM), nitrogen oxides (NOx), sulphur oxides (SOx) and carbon monoxide (CO).

Emissions resulting from combustions of diesel fuel can also include volatile organic compounds (VOCs) and polycyclic aromatic hydrocarbons (PAHs) which are expected to be in relatively negligible amounts. It should be noted that these listed emissions are of temporary nature and the sources are removed once construction is complete. Hence, the effects of these emissions are localized in nature and it is unlikely that such activities will add to the local air quality burden.

4.8.2.2 Mitigation Measures and Monitoring Activities

Based on the ECCC publication "*Best Practices for the Reduction of Air Emissions from Construction and Demolition Activities*", (Cheminfo Services Inc., 2005) and the MECP's *Management Approaches for Industrial Fugitive Dust Sources Technical Bulletin* (MECP, 2017), mitigation measures will be considered for the development of an Air Quality Management Plan (AQMP) and be implemented during construction activities to reduce any adverse air quality impact that may occur. Mitigation of road dust, as recommended in the ECCC document, includes the use of wind barriers (i.e., solid barriers, or trees and shrubs), water spraying and/or non-chloride dust suppressants, equipment washing, and limiting the exposed area which may be a source of dust.

The appendix of the AQMP shall include an Air Quality Monitoring Plan. Details about monitoring procedures and requirements during construction phase will be provided in the plan. The planning and siting of the air quality monitoring stations and meteorological tower will be chosen in accordance with "The Operations Manual for Air Quality monitoring in Ontario", published by the Ontario Ministry of the Environment, Conservation and Parks (MECP, 2019).

Prior to initiating ambient air quality monitoring activities, the AQMP and Air Quality Monitoring Plan will be submitted to Metrolinx for approval and submitted to the MECP for review and comment. The proposed air monitoring stations can consider to include equipment to monitor and sample for contaminants which ambient levels already exceed their respective AAQCs/CAAQS. This may include $PM_{2.5}$, NO_2, benzene, and benzo(a)pyrene.

The monitoring program should measure, at a minimum, real-time data for particulate matter i.e. $PM_{2.5}$ and PM_{10}, including meteorological parameters as per the guidance provided in the "Ontario Ministry of Transportation document, Environmental Guide for Assessing and Mitigating the Air Quality Impacts and Greenhouse Gas Emissions of Provincial Transportation Projects" (MTO, 2020).

The monitoring program will establish the baseline air quality conditions at AQIA Study Area prior to the commencement of the construction activities. In consultation with Metrolinx, the number of air quality monitors and specific duration, which at a minimum, three (3) months of baseline monitoring program will be established at the AQIA Study Area.

Upon completion of baseline monitoring for the specified duration, the 24-hour averaged period data will be compared against the ambient air quality background data from the ECCC's NAPS Program monitoring stations in close proximity to the Project for the

specified monitoring duration period. This evaluation will be done for verification of data quality and consistency with what is expected at the Project corridor, and to check if there is enough measured data to show weekly and daily variabilities in particulate concentrations.

Prior to construction, specific construction plans will be developed for certain work zones that involve sensitive receptors where AAQC/standard exceedances are expected. The construction plans will focus on emission mitigation strategies for minimizing the air quality impacts at these specific receptor locations.

During the demolition and construction phases, air quality monitoring will be performed by using a combination of daily handheld metering and autonomous air quality monitoring devices.

An air quality digital web-platform dashboard, specific to the Project, should also be developed specifically for the implementation of the monitoring component of the AQMP. The dashboard should at a minimum provide visual representation and assessment of monitoring data on a daily basis from multiple data points, including graphical trends using historical PM measurement data as the Project progresses. Trigger, Action and Threshold Air Quality Level will be developed to alert site supervisor, environmental manager, air quality specialist and Metrolinx if concentrations of any monitored contaminant exceed these levels. Reporting should follow the approved AQMP protocol and include the following information at a minimum:

1) daily air quality monitored results;
2) events in which there were elevated air quality concentrations of measured parameters that exceed the criteria; and,
3) follow-up activities and mitigation measures implemented as a result of elevated air quality parameters.

The digital platform should be capable of generating these real-time alerts to specific stakeholders through e-mail notifications.

Potential construction air quality impacts, mitigation measures, and monitoring requirements are summarized in.**TABLE 4.28**

4.8.3 Operations Impacts and Mitigation

4.8.3.1 Model Predicted Air Contaminants Concentrations

Comparison of Existing Conditions (2019) to Future Scenarios (2041)

Model-predicted concentrations for eleven (11) contaminants, under three (3) scenarios at sensitive receptors are presented in **Appendix H**. The percent change in contaminant concentrations for the Future No-Build and Future Build scenarios relative to Existing Conditions is also presented. The results predicted concentrations of PM_{10} and $PM_{2.5}$ to decrease under the future scenarios relative to Existing Conditions.

Similarly, NO_2, CO, 1,3-butadiene and benzo(a)pyrene concentrations also decrease for the Future Build and Future No-Build scenarios relative to Existing Conditions. This is a result of the decrease in emission factors for every type of vehicle (passenger cars, light-duty trucks, medium duty trucks and heavy trucks). The decrease in emission factors in 2041 results in an overall decrease in contaminant concentrations at all sensitive receptor locations. The decrease in emission factors is due to the assumptions regarding the future improvements to vehicle combustion and exhaust control technology.

There is a decrease in acrolein concentrations for the future scenarios relative to Existing Conditions which is also a direct result in an overall decrease in vehicle emission factors due to assumptions regarding the improvements in technology.

The maximum (or percentile) predicted cumulative concentrations for SO_2, acetaldehyde, benzene and formaldehyde show insignificant changes i.e., less than 10% overall, for the Future Build and Future No-Build scenarios relative to Existing Conditions. As previously mentioned, insignificant changes can be expected as a result of the improvements to engine technologies, as well as improved fuel standards.

Comparison of Future No-Build and Future Build Scenarios

When assessing the merits of the Project compared to Future No-Build scenario, it is the incremental change in total model-predicted concentrations between the two future cases that is the true measure of the future impact of the Project. The same background concentrations are added to the modelled concentrations for both the Future Build and Future No-Build scenarios. Therefore, when assessing the incremental change in the combined concentrations, the background concentration can essentially be taken out of consideration.

From this analysis, it appears that for most contaminants and averaging periods, model-predicted concentrations are shown to stay relatively similar between the future scenarios at the receptor locations. The percentage change in the predicted concentration for the Future Build scenario relative to the Future No-Build scenario for all modelled contaminants is insignificant (less than 10% at sensitive receptors), except for 1-hour maximum NO_2 and 24-hour maximum PM_{10} concentrations.

The increase in predicted 1-hour maximum NO_2 and 24-hour PM_{10} concentrations from Future No Build to Future Build show an increase of greater than 10% and higher. This increase is a result of the volume of bus traffic on the proposed BRT infrastructure which results in higher emissions of combustion of fuel and (resuspension) of road dust based on U.S. EPA emission factors. The 1-hour NO_2 concentration increased by 10.6%, while the 24-hour PM_{10} concentration increased by 11.3 % from the No-Build to Build scenarios, both at receptor R58 near Intersection of Kingston Road and Church Street. The increase in concentrations is due to the increase in traffic volume and traffic delay in the Future Build Scenario.

Comparing to the Air Quality Criteria/Standards, in the 2041 Build Scenario, the predicted maximum 1-hour and annual NO_2 average is 119% and 146% of the Air

Quality Criteria/Standards respectively. The maximum predicted annual $PM_{2.5}$ level is 105% of the criteria. The predicted maximum annual benzene level is 108% of the criteria. The predicted maximum 24-hour and annual benzo(a)pyrene is level 356% and 1199% of the criteria. However, the ambient contaminants levels of all exceedances, except 1-hour NO_2, exceeded the criteria already, even in the No-Build Scenario.

The maximum POIs of most contaminants are located near traffic intersections. It is because motor vehicles emit air contaminant at the highest rates when they are operating at low speeds or idling in queues. For this reason, the potential for adverse air quality impacts is greatest at intersections where traffic is most congested.

4.8.3.2 Emission Inventory

An emission inventory for criteria pollutants and GHG for different scenarios is compiled and presented **TABLE 4.26**.

TABLE 4.26. AIR QUALITY EMISSION INVENTORY FOR ALL SCENARIOS (TONNES PER YEAR)

Contaminant	2019 Existing	2041 No Build	2041 Build
PM_{10}	107	112	151
$PM_{2.5}$	28	26	35
CO	773	306	306
NO_x	102	21	31
SO_2	2.0	1.4	1.4
1,3-Butadiene	6.3E-02	2.2E-04	6.3E-04
Acetaldehyde	0.26	0.07	0.18
Acrolein	0.03	0.01	0.01
Benzene	0.95	0.41	0.41
Formaldehyde	0.44	0.17	0.28
BaP	2.4E-03	4.7E-04	4.6E-04
CH_4	1.9	1.0	1.6
N_2O	0.6	0.4	0.5
Atmospheric CO_2	103,183	73,367	80,394
CO_2e	103,409	73,523	80,576
CO_2e (Mega Tonnes)	0.1	0.07	0.08

4.8.3.3 Greenhouse Gases

GHGs emissions were calculated using the CO_2e emission factors, which were generated in MOVES and annual VKT for each vehicle type and road segment. The total annual quantities of CO_2e released (in tonnes) for each assessment scenario and percent change between scenarios are summarized in **TABLE 4.27**.

TABLE 4.27. PROJECTED ANNUAL CO_2e EMISSIONS IN FUTURE SCENARIOS

Assessment Scenario	Total CO_2e Emissions (tonnes/year)	% Change from Existing Conditions	% Change from Future No-Build
Existing Conditions	103,409	-	-
Future No-Build	73,523	-29%	-
Future Build	80,576	-22%	-10%

4.8.3.4 Mitigation Measures and Monitoring Activities

For the operation phase, there are many fuel and technology pathways available to reduce tailpipe emissions of the proposed BRT buses. Switching from diesel to alternative fuels such as natural gas or dimethyl ether can reduce tailpipe emissions. Furthermore, alternate option exists such as blending of biological-based fuels i.e., biodiesel or hydrogenation-derived renewable diesel with conventional petroleum-based diesel. Moreover, upgrading transit buses from conventional internal combustion engine technology to hybrid or electric technology can improve fuel economy or eliminate tailpipe emissions altogether. These pathways would simultaneously reduce air pollution as well as GHG emissions.

Operational phase best management practices should also include regular engine maintenance and inspection as well as minimizing bus idling time. The MTO's "*Environmental Standards and Practices for Provincial Transportation Facilities*" and TTC's Green Bus Program provide more BRT operation phase mitigation measures.

In November 2017, the TTC Board approved the TTC's Green Bus Technology Plan. Some sub-programs in the plan that are relevant to this Project are:

1. Clean diesel bus procurement;
2. HEV bus procurement;
3. eBus procurements;
4. Electrification infrastructure; and,
5. Associated business transformation program.

Specific NO_2 operations mitigation measures for the Project include:

- Introducing electric (zero emission) or diesel-electric hybrid (low emission) transit buses in the bus fleet;
- Using advanced active emissions control technology system such as Selective Catalytic Reduction (SCR) in diesel-powered buses. SCR can reduce NOx emissions up to 90 percent while simultaneously reducing hydrocarbon (HC) and CO emissions by 50-90 percent, and PM emissions by 30-50 percent. (Diesel Technology Forum n.d.); and,

- Using clean diesel fuel.

Specific NO_2 operations mitigation measures for other on-road vehicles include encouraging:

- Carpooling/ridesharing, remote work, using public transportation. These transportation planning strategies will reduce number of vehicles on the road and traffic congestion. Air contaminant emitted from motor vehicles at the highest rates when they are operating at low speeds or idling in queues, reducing traffic congestion is one of the effective strategies in air pollution control through transportation planning;
- Diesel Retrofit – Diesel trucks with older engine replaced with a new diesel engine that meets the most current emissions criteria; and,
- Replacing older model vehicles with newer zero emission or low emission vehicles.

4.8.4 Summary of Potential Impacts, Mitigation Measures and Monitoring

The potential impacts, mitigation measures and monitoring are summarized in **TABLE 4.28**.

TABLE 4.28. SUMMARY OF POTENTIAL IMPACTS, MITIGATION MEASURES AND MONITORING: AIR QUALITY

Environmental Component	Potential Impacts (Design/Construction/Operation)	Mitigation Measures	Monitoring
During Detail Design			
Air Quality	No impacts anticipated	N/A	N/A
During Construction			
Temporary Air Quality Deterioration in the Vicinity of the Project's Construction Site	Construction activities may generate dust due to material processing and tailpipe emissions from construction equipment and vehicles	A Construction Phase Air Quality Management Plan (AQMP) should be developed and provide site staff with air quality mitigation measures for the Project. The ECCC publication "*Best Practices for the Reduction of Air Emissions from Construction and Demolition Activities*" (Cheminfo Services Inc., 2005) and the MECP's Management Approaches for Industrial Fugitive Dust Sources Technical Bulletin (MECP, 2017).should be used as the guides when developing the AQMP. Prior to initiating ambient air quality monitoring activities, the AQMP and Air Quality Monitoring Plan will be submitted to Metrolinx for approval and submitted to the MECP for review and comment. The air quality mitigation measures outlined in the AQMP should include but not limited to: • Seeding, paving, covering, wetting disturbed soil surfaces; • Using wind screens or fences; • Covering truckloads of dust-producing material; • Reducing traffic speeds especially on unpaved surfaces. • Using of vehicle wheel and body washing facilities at the exit points of the site; • Reducing aggregate/sand drop height; • Only allowing wet cutting of concrete block, concrete, and/or asphalt surfaces; • Stop work activities temporarily during high wind conditions; • Following mitigation measures provided in Environment Canada's Best Practices for the Reduction of Air Emissions from Construction and Demolition Activities and the Ministry of the Environment, Conservation and Parks' Technical Bulletin Management Approaches for Industrial Fugitive Dust Sources; and • Following mitigation measures from Environment Canada's Best Practices for the Reduction of Air Emissions from Construction and Demolition Activities (Cheminfo Services Inc., 2005).	Construction air quality monitoring activities will be conducted in accordance with the AQMP and Air Quality Monitoring Plan requirements, which may include: • Establish the baseline air quality conditions at AQIA Study Area prior to the commencement of the construction activities. At a minimum, three (3) months of baseline monitoring program will be established at the AQIA Study Area; • Installing on-site meteorological and air quality (dust) monitoring station to monitor real-time conditions; • The siting of the air quality monitoring stations and meteorological tower should be chosen in accordance with "The Operations Manual for Air Quality monitoring in Ontario"(MECP 2019); • Define Trigger, Action and Threshold Dust Level and develop Actions Plan to respond to these elevated dust conditions; • Develop an Air Quality Incident, Complaint and Response Protocol; and • Report daily monitoring results, weather conditions, incidents, and mitigation activities.

	Tailpipes Emissions from Construction Equipment and Vehicles	Prior to construction, specific construction plans will be developed for certain work zones that involve sensitive receptors where AAQC/standard exceedances are expected. The construction plans will focus on emission mitigation strategies for minimizing the air quality impacts at these specific receptor locations.
		The following air quality control mitigations for construction equipment and vehicles should be considered for this project:
		• Construction equipment and vehicles must be complied with Canada most stringent emissions standards;
		• Construction equipment and vehicles should be properly maintained and repaired to minimize exhaust emissions;
		• Excessive idling of vehicles and equipment (greater than five minutes) should be minimized and/or strictly adhering to following municipal by-law on idling policies;
		• Using alternative-fuel or electric equipment where feasible;
		• Using solar panel to supply electricity instead of on-site diesel generators;
		• Develop and implement a construction Traffic Management Plans (TMPs). Examples of traffic management techniques may include the following:
		  ○ using traffic control officers and flaggers;
		  ○ using temporary signage and variable message displays;
		  ○ notifying the public of construction-related traffic congestion;
			During the demolition and construction phases, air quality monitoring will be performed by using a combination of daily handheld metering and autonomous air quality monitoring devices.
			An air quality digital web-platform dashboard, specific to the Project, should also be developed specifically for the implementation of the monitoring component of the AQMP.

Environmental Component	Potential Impacts (Design/Construction/Operation)	Mitigation Measures	Monitoring
		○ designating construction staging areas and worker parking areas; and ○ designating construction truck routes.	
During Operation			
Potential Reduction of Air Quality in the vicinity of the DSBRT Corridor	Tailpipes NO_2 Emissions from BRT and Other Vehicles	Specific Operation NO_2 Mitigation Measures include: For BRT Vehicles • Introducing electric (zero emission) or diesel-electric hybrid (low emission) transit buses in the bus fleet; • Using advanced active emissions control technology system such as Selective Catalytic Reduction (SCR) in diesel-powered buses; and • Using clean diesel fuel. For Other On-road Vehicles: • Encourage carpooling/ridesharing, remote work, using public transportation; • Diesel Retrofit – Diesel trucks with older engine replaced with a new diesel engine that meets the most current emissions criteria; and • Replace older model vehicles with newer zero emission or low emission vehicles.	N/A
	Tailpipe PM_{10} and $PM_{2.5}$ from BRT and other vehicles.	Specific Operations Particulate Matter (PM_{10} and $PM_{2.5}$) Mitigation Measures include: For BRT and Other Diesel Powered Vehicles. • Conducting routine preventive maintenance of diesel engines to minimize emissions; • Installing engine exhaust filters; • Installing diesel oxidation catalysts; and • Using clean diesel fuel.	N/A
	Tailpipes Emissions from BRT and Other Vehicles	General BRT Tailpipes Emissions Mitigation Measures: The tailpipe emissions may be reduced by best management practices, which include: • Switching from diesel to alternative fuels such as natural gas or dimethyl ether; • Blending of biological-based fuels i.e., biodiesel or hydrogenation-derived renewable diesel with conventional petroleum-based diesel; • Upgrading transit buses from conventional internal combustion engine technology to hybrid or electric technology can improve fuel economy or eliminate tailpipe emissions altogether; and • Conducting regular engine maintenance and inspection as well as minimizing bus idling time; TTC Board approved the TTC's Green Bus Technology Plan in 2017. Some sub-programs in the plan that are relevant to this Project include: • Clean diesel bus procurement; • HEV bus procurement; • eBus procurements; • Electrification infrastructure; and • Associated business transformation program. Mitigation Measures for Other On-road Vehicles include: • Encouraging carpooling/ridesharing, remote work and using public transportation; • Using electric, hybrid and alternative-fuel vehicles; • Replacing older model vehicles with newer zero emission or low emission vehicles; • Minimizing vehicle idling time; and • Conducting regular engine maintenance and inspection.	N/A

4.9 Noise and Vibration

A NVIA was undertaken to identify the potential impacts and mitigation measures of the Project within the Study Area (see **Appendix I**). The methodology for evaluating the construction and operational impacts is summarized in **Section 4.9.1.** The impacts and mitigation measures are provided in **Section 4.9.2** and **4.9.3**.

4.9.1 Methodology

The potential noise and vibration impacts associated with the Project were assessed by predicting noise and vibration conditions at the nearest NSAs under two operating scenarios: future conditions (Year 2041) without the Project (Future No-Build), and future conditions (Year 2041) once the Project is implemented (Future Build).

4.9.1.1 Future No-Build (Year 2041)

In order to assess the impacts associated with full operations on the DSBRT for the future horizon year of 2041, conditions must first be established for the same year in the absence of the DSBRT. This scenario, termed the Future No-Build or future ambient scenario, provides a baseline condition for assessing the potential impacts associated with the Project. Projected traffic volumes for the Future No-Build scenario were provided by Parsons and modelled in the same manner as the existing traffic scenario to describe a future ambient condition at the NSAs. This represents the future condition that the NSAs would otherwise be exposed to if the Project were not to proceed, accounting only for traffic increases associated with population growth and no changes to existing transportation infrastructure.

4.9.1.2 Future Build (Year 2041)

The Future Build scenario represents future conditions in the same year as the Future No-Build year, but inclusive of the DSBRT. The traffic data for Future Build scenario indicates that 20 buses per hour per direction will be using the dedicated ROW, resulting in fewer cars utilizing the roadways. The BRT will operate 12 buses per hour per direction (5-minute service), and that the additional 8 buses per hour per direction is to account for additional local bus service or future BRT growth for a conservative assessment. A copy of the traffic data used in the assessment is provided in **Appendix I**.

4.9.2 Noise Assessment

4.9.2.1 Construction Impacts and Mitigation

Impact Assessment

Construction activities for the DSBRT includes construction of Bus Stops and Runningways (i.e., BRT lanes throughout the corridor). An assessment of construction noise is conducted to identify potential noise monitoring locations as well as providing recommendations and applicable mitigation measures. The Zone of Influence (ZOI)

boundary or setback distances for a specific construction activity is defined and shown in **TABLE 4.29**. Construction noise level monitoring is required for the most sensitive receivers/buildings (i.e., closest buildings to the construction area) falling inside the construction ZOI.

TABLE 4.29. ZONE OF INFLUENCE (ZOI) FOR CONSTRUCTION ACTIVITIES

Construction Activity	Combined Sound level Prohibited Limits (dBA) at Setback distance or boundary of ZOI		Zone of Influence (ZOI) or Setback Distance (m)	
	Day	Night	Day	Night
Bus Stop - Removal Construction	80	70	61.5	195
Bus Stop - New Construction	80	70	77	245
Runningway - Removal Construction	80	70	42	133
Runningway - New Construction	80	70	85	277

Zone of Influence (ZOI) plans including thirty-nine (39) identified Representative Noise Sensitive Receivers requiring sound level monitoring for daytime construction are shown in **Appendix I**. The ZOI for daytime construction of BRT lanes to provide an example of a runningway ZOI is illustrated in **Appendix I**. The other runningways ZOIs were not shown since they would not alter the selection of Representative Noise Sensitive Receivers. The list of 39 representative buildings that fall in the ZOI and require noise monitoring during construction activities are presented in **TABLE 4.30**.

TABLE 4.30. LIST OF BUILDINGS REQUIRING NOISE MONITORING DURING CONSTRUCTION ACTIVITIES

Receiver ID	Building Type	Address
1	Residential-House	67 Parkington Cres, Toronto, M1H 2T9
2	Residential-House	34 Pendle Hill Crt, Toronto, M1H 2L9
3	Residential-Town House	#Unit 11,2055 Ellesmere Rd, Scarborough, M1H 2W6
4	Residential-Town House	33 Gander Dr, Toronto, M1G 2W3
5	Residential-Town House	371 Orton Park Rd, Scarborough, M1G 3V1
6	Residential-Town House	Townhouse owned by City of Toronto close to Scarborough Health Network - Centenary hospital 2867 Ellesmere Rd, Scarborough, ON M1E 4B9
7	Day Care	Day Care-1255 Military Trail, Toronto (ON), M1C 1A3, Canada
8	Residential-House	148 Conlins Rd, Toronto, M1C 1C5
9	Residential-House	107 Watson St, Toronto, M1C 1E2
10	Residential - Heritage Known BHR	3864 Ellesmere Rd, Toronto, M1C 1J1
11	Residential-House	4083 Ellesmere Rd, Toronto, M1C 1J3

Receiver ID	Building Type	Address
12		341 Kingston Rd, Pickering, L1V 1A1
13	Residential-Townhouse	575 Steeple Hill, Pickering, L1V 7E4
14	Residential-House	770 Kingston Rd, Pickering, L1V 1A8
15	Residential-House	878 Kingston Rd, Pickering, L1V 1A8
16	Residential-House	1723 Dunchurch St, Pickering, L1V 1T9
17	Commercial-Medical centre (LifeLab)	1735 Walnut Lane, Pickering, L1V 6Z8
18	Residential-House	1230 Charlotte Cir, Pickering, L1V 3P8
19	Residential-House	1360 Glenanna Rd, Pickering, L1V 2T5
20	Residential-House	1945 Denmar Rd, Pickering, L1V 3E2
21	Residential-House	1874 Kingston Rd, Pickering, L1V 1C8
22	Residential-House	592 Kingston Rd W, Ajax, L1T 3A2
23	Residential-House	10 Fearn Cres, Ajax, L1S 5L6
24	Residential-House	36 Woodward Cres, Ajax, L1S 5T4
25	Residential-House	30 Tams Dr, Ajax, L1Z 1A2
26	Residential-House	1 Galea Dr, Ajax, L1Z 0J7
27	Residential-House	1610 Dundas St W, Whitby, L1P 1Y8
28	Residential-House	1180 Dundas St W, Whitby, L1P 1Y5
29	Residential-House	22 Bluebell Cres, Whitby, L1P 1L1
30	Residential-House	723 Dundas Street West, Whitby
31	Residential-House	506 Dundas St W, Whitby, L1N 2M9
32	Vacant land	604 Dundas Street East, Whitby
33	Residential-House	991 Dundas St E, Whitby, L1N 2K1
34	Residential-House	1535 Dundas St E, Whitby, L1N 2K6
35	Residential-Apartment Building with OLA's	101 Kathleen St, Whitby, L1N 6P8
36	Residential-House	787 King St W, Oshawa, L1J 2L2
37	Residential-House	717 Featherwood Crt, Oshawa, L1J 8H1
38	Residential-House	36 Fernhill Blvd, Oshawa, L1J 5H9
39	Residential-Apartment	44 Bond St W, Oshawa, L1G 6R2

The sound level limits recommended by the MECP for construction noise have been developed on a per-unit basis rather than a cumulative basis. As such, noise levels of individual pieces of construction equipment shall be in compliance with the NPC-115 and NPC-118 limits. It is assumed that the equipment supplier will ensure that all equipment meets the applicable NPC-115 and NPC-118 limits.

Mitigation Measures and Monitoring

The implementation of the following measures will help to mitigate potential noise impacts during construction:

- A Noise and Vibration Management Plan (NVMP) to be prepared prior to construction. NVMP will include specific mitigation measures related to laydown areas (once they are determined);
- Noise level monitoring shall be undertaken at identified Representative Noise Sensitive Receivers to appropriately identify and mitigate any exceedances for noise levels to comply with construction noise criteria set in **TABLE 3.30**;
- Temporary noise mitigation measures shall be investigated and necessary noise mitigation measures in the form of physical noise barriers, mufflers on equipment, etc. shall be implemented if monitoring results show noise levels during construction activities exceed the criteria;
- Noise levels shall be monitored to verify mitigation measures(s) effectiveness, if any. Limit construction work to the time periods allowed by the municipalities' noise by-laws, as summarized in **Section 3.9.1.1**;
- Should there be a need to complete work outside of the hours allowed in the applicable noise by-laws, the Contractor is to seek any required exemptions and permits directly from the applicable jurisdiction, in advance of any work performed outside of the allowable time periods. If an exemption cannot be obtained, then construction will proceed in accordance with the requirements of the noise by-laws;
- The Contractor is expected to comply with all applicable requirements of the contract and local noise by-laws. Enforcement of noise control by-laws is the responsibility of the Municipality for all work;
- Contracts shall include explicit indication that all construction equipment used on the project is to meet the sound level criteria from NPC-115 and NPC-118, and be well maintained and operating with effective muffling devices that are in good working order;
- The separation distance between construction staging areas and nearby sensitive receivers is to be maximized to the extent possible to reduce noise impacts;
- Any temporary roads for construction vehicle access are to be well maintained and free of pot-holes and ruts to avoid excessive noise from heavy vehicles travelling on uneven surfaces;
- Should any complaints be reported from the public due to construction noise, the Owner will be notified, and the incident will be investigated. A complaints protocol is to be established for receiving, investigating and addressing construction noise complaints from the public, including a plan for how the public is to be notified of their options for logging a complaint;

- A noise complaint will trigger an investigation to verify whether the noise mitigation has been implemented, including verification of construction equipment sound levels per NPC-115 and NPC-118; and,
- In the presence of persistent complaints and subject to the results of a field investigation, alternative noise control measures may be required, where reasonably available. In selecting appropriate noise control and mitigation measures, consideration will be given to the technical, administrative and economic feasibility of the various alternatives.

4.9.2.2 Operations Impacts and Mitigation

Impact Assessment

The noise modelling of the transportation sources was completed using TNM version 2.5 and the full results are summarized in **Appendix I**. This assessment includes all existing noise barriers (berms and fences) constructed as part of subdivision plan approvals, as well as any naturally occurring berms and embankments. The sound level predictions as a result of DSBRT operations indicate that some of the Future Build sound levels are projected to be above the MTO absolute sound level threshold of 65 dBA at the representative receiver locations where MTO Noise Guide applies. However, the incremental impacts are below the MTO threshold of +5 dBA at all locations within the study area.

Similarly, the sound level predictions as a result of DSBRT operations indicate that some of the Future Build sound levels are projected to be above the Region of Durham absolute sound level threshold of 60 dBA at the representative receiver locations within the Region of Durham boundaries. However, the incremental impacts are below the Durham Region threshold of +5 dBA at most locations within the study area except for three PORs (i.e., POR23, POR45, and POR46). The noticeable incremental impacts were caused either due to demolishing existing noise walls for road expansion purposes at the affected receivers (i.e., POR45 and POR46) or new road alignment/profile which brings the traffic noticeably closer to the receiver (i.e., POR23).

Very little variability in impact differences is expected between the receivers due to the similarities in exposure conditions. For a number of receivers, the noise impacts are predicted to marginally decrease as buses that are currently travelling along Ellesmere Road and Highway 2 are expected to shift operations to the dedicated ROW in median, thus moving farther away and resulting in less audible operations. However, in certain areas the DSBRT dedicated ROW shifts closer to the edge of the ROW and therefore may have potential noise impact at the nearest noise sensitive areas.

Bus stations are not expected to have associated garages, or layover, or overnight stationary activities and as such were not treated as stationary sources. Stations were not assessed against NPC-300 as significant stationary sources are not expected to be present at the stations within this study area.

Where the predicted Future Build sound levels at some PORs are above the MTO or Region of Durham's threshold of 65 dBA or 60 dBA, respectively, an assessment of noise mitigation was completed. A copy of the reviewed noise barriers (i.e., the barriers that were introduced in the model for the purpose of evaluating the noise mitigation effectiveness) along with the existing noise barriers is attached in **Appendix I**.

Mitigation

The primary sources of noise are the vehicular traffic along Ellesmere Road and Highway 2, and major arterial roads carrying traffic. By comparison, the DSBRT will represent only a fraction of the total road traffic and not be a significant contributor to overall traffic volumes.

There are a large number of POR locations where the predicted Future Build sound levels are in exceedance of the MTO Noise Guide or Region of Durham's Noise Policy, depending on the POR locations. Therefore, review and investigation of new noise barriers were conducted at the OLA locations where there is an exceedance. To be consistent with Durham Region's Noise Policy, a maximum height of 3.0 m high noise barrier was modelled along the proposed road ROW near the OLA receivers where the sound levels are predicted to be above the applicable criteria.

At some POR locations, the reviewed noise barrier will not provide 5 dBA or 6 dBA sound level reduction and therefore it is not recommended that a noise barrier be built at these locations. However, at other POR locations, a 2.0 m to 3.0 m higher noise barrier is predicted to provide a minimum of 5 dBA or 6 dBA sound level reduction.

A series of noise barrier heights ranging between 2.0 to 3.0 m high along the fenceline of residences would need to be constructed on the road ROW to ensure the sound levels within the NSAs meet the applicable criteria within this study area. The technical, economic, and administrative feasibility of implementing noise barriers at these locations will be reviewed in accordance with MTO's Environmental Guide for Noise (MTO, 2006a) during Detailed Design. The locations for implementing the noise barriers in Toronto and Durham will be confirmed through discussions with the respective municipalities. A copy of the plan illustrating the proposed noise barriers is provided in **Appendix I**.

4.9.3 Vibration Assessment

4.9.3.1 Construction Impacts and Mitigation

Impact Assessment

Construction activities can cause vibration impacts depending on the type of equipment being used. FTA (FTA, 2018) provides the vibration levels of typical construction equipment at a specified distance of 25 ft from the equipment which are shown in **TABLE 4.31**. In order to operate individual equipment without exceeding the threshold of vibration level that can cause structural damages on buildings, setback distances (the distance that ensures the operation of construction equipment would meet the vibration

criteria) are calculated based on the procedure explained in the US FTA (FTA, 2018) and also described in **Appendix I**. The results of the assessment for typical construction equipment are provided in **TABLE 4.31**.

TABLE 4.31. MINIMUM SETBACK DISTANCES FOR CONSTRUCTION EQUIPMENT (FTA, 2018)

Equipment Type	PPVref (at 25ft)		Criteria	Setback
	(in/s)	(mm/s)	(mm/s)	(m)
Pile Driver (impact)	1.52 / 0.64	38.6 / 16.4	5.1	30 / 17
Pile Driver (sonic)	0.73 / 0.17	18.6 / 4.3	5.1	18 / 7
Vibratory Roller	0.210	5.3	5.1	8
Small Bulldozer	0.003	0.1	5.1	1
Large Bulldozer	0.089	2.3	5.1	4
Loaded Trucks	0.076	1.9	5.1	4
Jackhammer	0.035	0.9	5.1	2

As shown in **TABLE 4.31**, pile drivers are to be operated at larger distance from buildings due to their relatively higher operating vibration levels. Bridge and culvert construction activities require the use of pile drivers. Therefore, as an example, the setback distances depicted in the form of Zone of Influences (ZOI) are presented for such construction activities. The locations where the bridge and culvert works are planned have been shown in **Appendix I**. Accordingly, ZOIs were identified based on the required setback distance calculated for the pile driver (impact) activities given in the **TABLE 4.31**. ZOI are shown as circles of 30 m radius in the **Appendix I** accordingly. The buildings shown in **TABLE 4.32** are anticipated to fall within the identified ZOI, hence vibration monitoring during Pile Driving is required to appropriately identify and mitigate any exceedances of the vibration damage criteria of 5.1 mm/sec is not exceeded to avoid any damage to the building structures within ZOI.

TABLE 4.32. LIST OF BUILDINGS REQUIRING VIBRATION MONITORING DURING BRIDGE AND CULVERT CONSTRUCTION ACTIVITIES (I.E., PILE DRIVING)

Building Name	Building Address
Gas Station	951 Dundas Street W, Whitby, ON
Autoshop/Service	701 Dundas Street E, Whitby, ON
Residential buildings	105 Dovedale Drive, Whitby, ON
Car dealer ship	140 Bond Street W and Arena Street, Oshawa, ON
Public parking	110 King Street W, Oshawa, ON
Car wash	116 Bond Street W, Oshawa, ON
Commercial buildings	145 King Street W, , Oshawa, ON

Mitigation Measures and Monitoring

The buildings that were listed in **TABLE 4.32** are the potential impacted locations due to construction vibration. The implementation of the following measures will help to monitor and mitigate potential vibration impacts during construction:

- A Noise and Vibration Management Plan (NVMP) to be prepared prior to construction. NVMP will include specific mitigation measures related to laydown areas (once they are determined);
- Pre-construction consultation with property owners;
- Pre-construction measurement of the background vibration within the ZOI according to the applicable by-laws (e.g., City of Toronto By-Law No. 514-2008);
- Contractor shall be responsible for pre-construction inspection (e.g., photography of building foundation) of the impacted buildings inside the ZOI according to the applicable by-laws;
- Contractor shall be responsible for any damage caused by construction vibration;
- A monitoring program to measure vibration during construction activities (close to the affected buildings) will be developed and implemented to appropriately identify and mitigate to be in compliance with City of Toronto By-Law No. 514-2008 (City of Toronto, 2008), and applicable vibration criteria listed in **TABLE 3.35** to identify the need for mitigation measures if required;
- Monitoring will be undertaken to verify mitigation measure(s) effectiveness;
- For work that is to occur outside of regular hours, the Contractor will be responsible for identifying the implications of the vibration generated, and to make construction work plans available for review and coordinate with appropriate municipalities/region and MTO as required near MTO right-of-way;
- Construction equipment with potential to cause off-site vibrations should be operated as far away from vibration-sensitive sites as possible;
- Where possible, activities that have potential to cause off-site vibrations should be phased such that as few as possible are occurring simultaneously;
- Construction activities that have potential to cause off-site vibration during the night-time hours should be avoided;
- A complaints protocol is to be established for this Project for receiving, investigating and addressing construction vibration complaints received from the public;
- The Contract documents shall contain a provision that any initial vibration complaint will trigger verification that any general vibration control measures agreed to are in effect;
- In the presence of persistent vibration complaints, the Metrolinx and its Contractor shall consider implementing a measurement program to evaluate the vibration impacts; and,

- In the presence of persistent complaints and subject to the results of a field investigation, alternative vibration control measures may be required, where reasonably available. In selecting appropriate vibration control measures, consideration will be given to the technical, administrative and economic feasibility of the various alternatives.

4.9.3.2 Operations Impacts and Mitigation

There are no quantitative limits or methods of assessment for the assessment of vibration during project operation defined in the Metrolinx Guide or in other provincial and federal guidelines. However, the U.S. Federal Transit Administration publication, Transit Noise and Vibration Impact Assessment Manual (2018), notes that “Because the rubber tires and suspension systems on buses provide vibration isolation, it is unusual for buses to cause ground-borne vibration or noise problems.” In addition, within the context of environmental assessments in the province of Ontario, vibration impact assessments for rubber-tired vehicle projects have historically not been completed. In consideration of the above, a quantitative vibration assessment from operation of the Bus Rapid Transit was not completed.

With respect to ground-borne vibration or noise problems, it is uncommon for rubber-tired vehicles to be a source of concern. The US Federal Transit Administration notes that “For most issues with bus-related vibration, such as rattling of windows, the cause is almost always airborne noise and directly related to running surface conditions such as potholes, bumps, expansion joined, or other discontinuities in the road surface (usually resolved by smoothing the discontinuities).” The quality of the road surface condition upon commencement of operation is not controlled by the project or its design. Rather, the condition will be dependent on the quality of workmanship of the contractor. Finally, ongoing maintenance of the road surface would be within the purview of Durham Region and City of Toronto.

4.9.4 Summary of Potential Impacts, Mitigation Measures and Monitoring

The potential impacts, mitigation measures and monitoring are summarized in **TABLE 4.33**.

TABLE 4.33. SUMMARY OF POTENTIAL IMPACTS, MITIGATION MEASURES AND MONITORING: NOISE AND VIBRATION

Environmental Component	Potential Impacts (Design/Construction/Operation)	Mitigation Measures	Monitoring
During Detail Design			
Noise	N/A	N/A	N/A
Vibration	N/A	N/A	N/A
During Construction			
Noise	• 39 locations (i.e., noise sensitive receivers) could potentially be impacted by construction noise; and • The severity of construction noise at the identified locations of concerns are mainly dependent on: ○ The number and type of equipment being simultaneously used. ○ The duration construction equipment will be utilized during the day (i.e., usage factor). ○ To be conservative, the current report assumes all relevant construction equipment are working simultaneously and are fully utilized (i.e., usage factor of 1) during the construction period.	The implementation of the following measures will help to mitigate potential noise impacts during construction: • A Noise and Vibration Management Plan (NVMP) to be prepared prior to construction. NVMP will include specific mitigation measures related to laydown areas (once they are determined); • Temporary noise mitigation measures shall be investigated and necessary noise mitigation measures in the form of physical noise barriers, mufflers on equipment, etc. shall be implemented if monitoring results show noise levels during construction activities exceed the criteria; • Limit construction work to the time periods allowed by the municipalities' noise by-laws as summarized in **Section 3.9.1.1**; • Should there be a need to complete work outside of the hours allowed in the applicable noise by-laws, the Contractor is to seek any required exemptions and permits directly from the applicable jurisdiction, in advance of any work performed outside of the allowable time periods. If an exemption cannot be obtained, then construction will proceed in accordance with the requirements of the noise by-laws; • The Contractor is expected to comply with all applicable requirements of the contract and local noise by-laws. Enforcement of noise control by-laws is the responsibility of the Municipality for all work; • Contracts shall include explicit indication that all construction equipment used on the project is to meet the sound level criteria from NPC-115 and NPC-118 and be well maintained and operating with effective muffling devices that are in good working order; • The separation distance between construction staging areas and nearby sensitive receivers is to be maximized to the extent possible to reduce noise impacts; • Any temporary roads for construction vehicle access are to be well maintained and free of potholes and ruts to avoid excessive noise from heavy vehicles travelling on uneven surfaces; and • Should any complaints be reported from the public due to construction noise, the Owner will be notified, and the incident will be investigated. A complaints protocol is to be established for receiving, investigating and addressing construction noise complaints from the public, including a plan for how the public is to be notified of their options for logging a complaint.	The implementation of the following measures will help to monitor potential noise impacts during construction: • Noise level monitoring shall be undertaken at identified Representative Noise Sensitive Receivers to appropriately identify and mitigate any exceedances for noise levels to comply with construction noise criteria set in **TABLE 3.36**; • Noise levels shall be monitored to verify mitigation measures(s) effectiveness, if any; • In the presence of persistent complaints and subject to the results of a field investigation, alternative noise control measures may be required, where reasonably available. In selecting appropriate noise control and mitigation measures, consideration will be given to the technical, administrative and economic feasibility of the various alternatives; and • A noise complaint will trigger an investigation to verify whether the noise mitigation has been implemented, including verification of construction equipment sound levels per NPC-115 and NPC-118.
Vibration	• Seven (7) buildings as listed in **TABLE 4.32** could potentially be impacted (i.e., possible structural damage) by the construction vibration (i.e., during bridge and culvert work). • The construction vibration could cause annoyance and trigger complaint from the communities.	The implementation of the following measures will help to mitigate potential vibration impacts during construction: • A Noise and Vibration Management Plan (NVMP) during Detail Design is to be prepared prior to construction. NVMP will include specific mitigation measures related to laydown areas (once they are determined);	The implementation of the following measures will help to monitor potential vibration impacts during construction: • Pre-construction consultation with property owners;

Environmental Component	Potential Impacts (Design/Construction/Operation)	Mitigation Measures	Monitoring
		• For work that is to occur outside of regular hours, the Contractor will be responsible for identifying the implications of the vibration generated, and to make construction work plans available for review and coordinate with appropriate municipalities/region and MTO as required near MTO right-of-way; • Construction equipment with potential to cause off-site vibrations should be operated as far away from vibration-sensitive sites as possible; • Where possible, activities that have potential to cause off-site vibrations should be phased such that as few as possible are occurring simultaneously; • Update Zone of Influence mapping and predictions based upon refined site staging, equipment, construction areas, and building locations prior to the commencement of construction; • Contractor shall be responsible for any damage caused by construction vibration; • Operate construction equipment on lower vibration settings, where possible; • Construction activities that have potential to cause off-site vibration during the night-time hours should be avoided; and • A complaints protocol is to be established for this Project for receiving, investigating and addressing construction vibration complaints received from the public.	• Pre-construction measurement of the background vibration within the ZOI according to the applicable By-laws (e.g., City of Toronto By-law No. 514-2008 (City of Toronto, 2008)); • Contractor shall be responsible for pre-construction inspection (e.g., photography of building foundation) of the impacted buildings inside the ZOI according to the applicable By-laws; • A monitoring program to measure vibration during construction activities (close to the affected buildings) shall be developed and implemented to appropriately identify and mitigate any exceedances and be in compliance with City of Toronto By-law No. 514-2008, and applicable vibration criteria listed in TABLE 3.41 to identify the need for mitigation measures if required; and • Monitoring will be undertaken to verify mitigation measure(s) effectiveness.
During Operation			
Noise	Future operational noise	Review and confirm design for noise barriers identified to be constructed within ROW of the 17 identified PORs.	• The effectiveness of the proposed noise barriers in reducing sound levels below the assessment criteria has been confirmed via the CadnaA modelling. The mitigation effectiveness could also be confirmed via field measurements.
Vibration	No impacts are anticipated due to the nature of BRT (rubber-tired transit) projects.	N/A	N/A

5. Climate Change and Sustainability Considerations

Climate change refers to any significant change in weather patterns for an extended period, whether due to natural variability or as a result of human activity. The phenomenon is most often characterized by major variation in the mean and variability of surface variables such as temperature, precipitation, and wind over time. Climate change in the GTHA is generally expected to bring increase in temperature, precipitation, drought, wind gust events, and freezing rain frequency (Metrolinx 2017).

It is the scientific consensus that greenhouse gas (GHG) emissions, primarily from fossil fuel use and land use changes are trapping extra heat in the atmosphere, leading to global warming, as well as more local and regional events, such as heat waves, droughts and increased storm events (MECP 2015). To minimize these impacts and cope with global climate change, a long-term goal for GHG emissions reduction has been developed for the Province of Ontario.

Metrolinx contributes to Ontario's goal of reducing overall GHG emissions by promoting increased use of public transportation. In addition to the benefits inherent to public transit, Metrolinx's Sustainability Strategy aims to integrate sustainability goals into all aspects of how Metrolinx plans, builds, and operates a sustainable transportation system (Metrolinx 2016).

Built on Metrolinx Planning for Resiliency (Metrolinx 2017), the Metrolinx Climate Adaptation Strategy outlines key actions organized by the "Plan, Build, Operate and Connect" framework to manage the uncertainties associated with climate change. It applies to a wide range of existing and planned infrastructure and aims to increase adaptive capacity across the organization (Metrolinx 2018).

Climate change and related extreme weather events are of concern to many segments of society and sectors of the economy. Two approaches for considering and addressing climate change (MECP 2017) in project planning – mitigation (**Section 5.2**) and adaptation (**Section 5.3**) – have been reviewed for the DSBRT Project to assess potential future climate change implications and enhance resiliency.

5.1 Policy Context

5.1.1 Government of Ontario

The Government of Ontario recognizes climate change as a problem; one with solutions and opportunities. Ontario's Climate Change Strategy sets out the transformative change required to reduce GHG emissions by 80 per cent below 1990 levels by 2050

(Government of Ontario 2015). Following consultation and input from Ontarians, the Climate Change Strategy highlights five areas of transformation:

1. A prosperous low-carbon economy with world-leading innovation, science and technology,
2. Government collaboration and leadership;
3. A resource-efficient, high-productivity society;
4. Reducing GHG emissions across sectors; and
5. Adapting and thriving in a changing climate.

Built on the foundation formed by Ontario's Climate Change Strategy (MECP 2015), Ontario's Climate Change Action Plan is a five-year plan that will help Ontario fight climate change over the long term (MECP 2016). The areas of action identified in this plan cross a wide spectrum. The action areas that are applicable to this Project include:

- Creating a cleaner transportation system by addressing GHG pollution from cars on the road today, by increasing the availability of zero-emission vehicles on the road tomorrow, by deploying cleaner trucks, and making transit more available (Climate Change Action Plan, 2016, Section 4); and
- Building on progress, leading by example and acting on opportunities to make government operations carbon neutral. Ontario will achieve this by reducing GHG pollution across the government's facilities, operations and procurement (Climate Change Action Plan, 2016, Section 4).

5.1.2 Ministry of the Environment, Conservation and Parks

MECP published the *Consideration of Climate Change in Environmental Assessment in Ontario (guide) (October 2017)* to set out the ministry's expectations for considering climate change in the preparation, execution and documentation of environmental assessment studies and processes. The guide also outlines how environmental assessment processes and studies can incorporate climate change impacts considerations.

The guide covers the consideration of:

- The impacts of a project on climate change;
- The impacts of climate change on a project; and
- Various means of identifying and minimizing negative impacts during project implementation.

A climate change consideration during the environmental assessment process results in an undertaking or project:

- That has taken into account alternative methods to reduce its greenhouse gas emissions and negative impacts on carbon sinks; and
- That has been planned in a manner that takes into account future changes in climate and the impacts a changing climate could have on the project.

TABLE 5.1 shows how climate change considerations have been applied to the study components in relation to the guide.

TABLE 5.1 CONSIDERATION OF CLIMATE CHANGE IN THE PRE-TPAP AND TPAP PHASES

Consideration	Project Phase for Implementation	Areas Considered	Type of Evaluation
A project's impacts on climate change	Pre-TPAP, detail design, construction, operations	Planning for transit	Qualitative
		GHG emissions	Quantitative
		Vegetation compensation	Qualitative
		Energy consumption	Qualitative
Impacts of climate change on a project	Detail design, construction, operation	Air Temperature	Qualitative
		Precipitation	Qualitative
		Extreme weather events	Qualitative
		Drought	Qualitative

5.1.3 Metrolinx

Metrolinx has identified Climate Change as a key influence on transportation in the 2041 Regional Transportation Plan (RTP) published in 2018. The 2041 RTP supports the goal of a low-carbon future through encouraging a shift in individual travel choices to more energy-efficient options (Metrolinx 2018).

Metrolinx Sustainability Strategy outlines the specific steps the organization will take to meets its sustainability goals as below:

- Goal 1: Become Climate Resilient (Metrolinx Sustainability Strategy, 2018, Page 14);

- Goal 2: Reduce Energy Use and Emissions (Metrolinx Sustainability Strategy, 2018, Page 16);
- Goal 3: Integrate Sustainability in Our Supply Chain (Metrolinx Sustainability Strategy, 2018, Page 18);
- Goal 4: Minimize Impact on Ecosystems (Metrolinx Sustainability Strategy, 2018, Page 22); and
- Goal 5: Enhance Community Responsibility (Metrolinx Sustainability Strategy, 2018, Page 24).

To move forward on climate resiliency, Metrolinx aims to adopt a more comprehensive, proactive stance. Through the development of Planning for Resiliency report, four main areas of work have been identified:

- Awareness, education and communication (Planning for Resiliency, 2017, Section 5.2);
- Assessing risks and opportunities (Planning for Resiliency, 2017, Section 5.2);
- Building climate resiliency across the enterprise (Planning for Resiliency, 2017, Section 5.2); and
- Monitoring and adaptive management (Planning for Resiliency, 2017, Section 5.2).

Following the completion of Planning for Resiliency report, Metrolinx developed a Corporate Climate Adaption Strategy (2018) that describes the commitment and approach to operate climate resilient transportation services. Key actions have been outlined according to the following framework of Plan, Build, Operate and Connect:

- Plan for regional transportation needs, in the short, medium and long term, using evidence-based criteria to recommend priority projects and services where climate resiliency measures are needed (Metrolinx Climate Adaptation Strategy, 2018, Page 12);
- Build new regional rapid transit throughout the GTHA that reduces vulnerability and risk, and are more resilient and adaptive to climate change and extreme weather events (Metrolinx Climate Adaptation Strategy, 2018, Page 12);
- Operate regional transit services including GO Transit and the UP Express, and programs such as Smart Commute, in addition to LRT and Bus Rapid Transit (BRT) lines that are operated in conjunction with Municipal Service Providers, in a manner that reduces our vulnerability to extreme weather events and climate change, and increases our climate resiliency and adaptive capacity (Metrolinx Climate Adaptation Strategy, 2018, Page 12); and

- Connect the region, and internal Business Units by coordinating work and enabling stronger and more comprehensive solutions than what could be achieved individually, especially among interdependent infrastructure such as transportation, stormwater management systems, and electricity generation and transmission (Metrolinx Climate Adaptation Strategy, 2018, Page 12).

5.2 Potential Effects of the Project on Climate Change (Climate Change Mitigation)

The effects of the Project on climate change (mitigation) have been evaluated both quantitatively and qualitatively are discussed below.

5.2.1 Planning for Transit

Metrolinx contributes to and supports Ontario's goal of reducing overall GHG emissions by promoting a shift in individual travel choices. This primarily includes a shift from driving single occupant vehicles (SOVs) to more energy-efficient options, such as public transit, active transportation (i.e. walking, cycling), carpooling, and/or teleworking. The implementation of the BRT service and active transportation facilities as part of this Project are anticipated to help shift mode choices away from SOVs to transit and active transportation. This is anticipated to result in significant benefits including reduced GHG emissions and "carbon footprint".

5.2.2 Greenhouse Gas Emissions

The assessment of emission impacts associated with the DSBRT Project was undertaken as part of the Air Quality Impact Assessment. This is discussed in more detail in **Appendix H**. The development of this proposed BRT is promoting a cleaner transportation option by removing personal vehicles from the road and reducing pressure on the already congested arterial roadways of the GTHA. With the conservative approach of assuming the fleet will be diesel-fueled transit buses, the DSBRT will result in negligible change in the overall GHG emissions compared to Future No-Build scenario. This is a worst-case estimate of the Project's impact on GHG emissions as it does not consider a reduction in personal vehicle use due to the addition of the Build scenario or the use of hybrid or electric power buses. The implementation of the DSBRT Project will promote an alternative means for personal vehicles and also utilize newer and cleaner technology in its bus fleet.

From the perspective of maintenance of bus fleet and guarantee continual GHG reductions, mitigation measures include:

- The proposed BRT will ensure that all equipment is maintained and operated efficiently, to ensure no additional GHG emissions are developed due to improper maintenance; and
- Stations will be designed to minimize idling for passenger vehicles parking or dropping off as well as for buses that are arriving and departing.

To conclude, this new BRT infrastructure will provide reliable and safe public transit system to the public, while providing a positive effect on climate change with reducing passenger vehicles and congestion within the GTHA.

5.2.3 Vegetation Compensation and Revegetation

As discussed in **Section 4.2.4**, displacement of/disturbance to vegetation and vegetation communities has been avoided/minimized to the extent possible. Disturbed lands that are suitable for restoration post-construction, shall be restored. Compensation will be in accordance with applicable environmental policies and the standards of respective agencies and municipalities.

The temporary displacement of and/or disturbance to vegetation and vegetation communities will occur as a result of the construction of the DSBRT corridor associated with grading, the construction work around bridges, and the extension/replacement of culverts, etc. Old field seed mix and mulching or erosion control blanket, in accordance with construction specific standards, will be placed in areas of soil disturbance to provide adequate slope protection and long-term slope stabilization.

Additionally, efforts to control non-native and invasive plant species that have become established, as well as prevent the establishment of new non-native and invasive plant species, at a minimum shall be implemented.

5.2.4 Energy Consumption

Energy-efficient illumination design improves the efficiency of lighting fixtures integrated onto the shelter canopy or roof and reduce the overall energy consumption. Lighting will be contained within the boundaries of the platform to avoid “light spills”. Up-lighting will be avoided to minimize energy consumption and additional light pollution. Detailed discussion on lighting design could be found in **Appendix A2**. The platform floor is also designed to be light coloured concrete to enhance light during the day and reduce light energy usage at night.

5.3 Potential Effects of Climate Change on the Project (Climate Change Adaptation)

With the impacts of climate change, it is expected that the Study Area will likely experience increasing incidents of extreme weather events such as freeze and thaw cycles, severe flood events, increased frequency of heat waves, storms and high winds. These events can result in a variety of unfavorable conditions within the proposed BRT infrastructure, as well as in the natural environment surrounding the Study Area. The effects of climate change on the Project have been evaluated and discussed below.

5.3.1 Air Temperature

Ontario is predicting that the average temperature within Southwestern Ontario will rise approximately 5 to 6 degrees in the next 80 years. Within these forecasted temperature

increase, the public will rely more on their personal vehicles to travel in comfort (MNDMNRF 2007).

Metrolinx recognizes that heat events and prolonged heat waves will occur more frequently due to climate change. By implementing a comfortable and reliable BRT infrastructure, the number of personal vehicles operating within these extremes can be expected to decrease. Buses within the proposed infrastructure are expected to receive reliable maintenance and will be operated to encourage efficiency in order to reduce its overall carbon footprint. Weather protected boarding areas will become increasingly important to reduce effects of extreme heat on transit riders. The following elements have been considered:

- Provision of shade structures for summer conditions; and
- Landscape design that maximizes tree cover, reduce hard surfaces and minimize heat retention and the urban heat island effect.

High temperatures can also lead to expansion of the roadway resulting in cracks and surface abnormalities. Temperatures will be monitored, and roadways will be visually checked for abnormalities to confirm safety for buses and passengers, as part of the regularly scheduled maintenance.

5.3.2 Precipitation

Recognizing the importance of understanding risks and vulnerabilities to the effects of climate change including precipitation, Metrolinx addresses the need to build the physical infrastructure and operate transit network in a manner that is adaptive and resilient to future climatic conditions. The latest floodplain maps and models have been adopted to provide updated information and help predict and plan for extreme weather.

The GTHA has also witnessed several high rain events within the past decade that have led to flooding and infrastructure damage. Flooding situations from high rain can be a result of low porosity of concrete and asphalt. This low porosity can result in localized flooding within the surrounding environment.

To mitigate this runoff issue, it is expected that the proposed BRT will be equipped with a storm water collection system that will collect runoff and transport it to safe stormwater management systems. Such storm water management system will be designed to handle extreme weather conditions, however the BRT will also be monitored and if localized flooding is identified emergency procedures as part of operations management plan will be implemented and buses will either be re-routed for safer operations or shut down until flooding conditions improve.

A SWM Plan and ESC Plan will be developed prior to construction so that the runoff generated during construction and in post-development conditions will be controlled based on rainfall in predicted future scenario to promote climate resilience. Guiding documents to be considered during detail design include:

- Stormwater Management Planning and Design Manual, MECP March 2003;
- Wet Weather Flow Management Guidelines, City of Toronto, November 2006;
- Wet Weather Flow Management Master Plan, City of Toronto, April 2017;
- Stormwater Management Criteria, TRCA, August 2012; and
- Erosion and Sediment Control Guide for Urban Construction, TRCA, 2019.

The design has considered the potential effect of climate change on the Project to reduce vulnerability to changes in precipitation frequencies and intensities. Potential adaptation to deal with changing climate conditions may include the following:

- Extreme/intense rain and flooding.
    - Review/modify floodplain/stormwater frequency design criteria and implement the SWM Report during construction/operation;
    - Inclusion of stormwater management measures in the design to minimize increase in stormwater peak runoff; and
    - Implement erosion and sediment control measures during the construction phase of the Project to ensure extreme rain events taking place during soil disturbance does not result in unpredictable erosion.

5.3.3 Extreme Weather Events

Wind and lightning can result in power lines being compromised, resulting in power loss to roadways and signs. The proposed BRT system will be constructed so that the buses can still operate in scenarios where power is not available. The BRT will also have reflective markers to provide support to buses when power is lost, or fog is present.

5.3.4 Drought

Streetscape design will consider water conservation measures to reduce the effects of drought on the Project, such as:

- Efficient use of water for tree irrigation to increase survival of new trees;
- Using water conserving systems to reduce consumption; and
- Planting drought resistant vegetation.

6. Consultation

6.1 Consultation Overview

Consultation is an integral component of the Transit Project Assessment Process (TPAP) and essential to the successful completion of this study. Consultation was undertaken throughout the study to assist in the planning and impact assessment process for the Durham-Scarborough Bus Rapid Transit (DSBRT) Project. The consultation process was designed to meet the requirements of *Ontario Regulation 231/08, Transit Projects and Metrolinx Undertakings*.

6.1.1 Approach to Communication and Consultation

A Consultation and Engagement Strategy was developed at the Project's outset to guide consultation and engagement for the DSBRT Project. The overarching goals of the strategy were to develop:

- Understanding of the Project;
- Support for the preferred corridor design with stakeholders, and,
- Consensus to advance the Project towards implementation.

The Project team recognized and encouraged stakeholders' expectations that their input would contribute to Project decision-making. To meet this expectation, the consultation process must be **transparent**, **traceable** and **responsive**. These three descriptors became key themes of the Consultation and Engagement Strategy. Each theme is described below:

- **Transparent**: Demonstrating how decisions are being made as the study progresses by making relevant material available, and by clearly indicating how participant input can influence decision-making and study outcomes;
- **Traceable**: Illustrating how the process was completed and how information has been used to make decisions. This includes making records of all consultation activities accessible and available to the public; and,
- **Responsive**: Providing timely feedback to stakeholders and seeking input at key milestones in the process to advance a design that addresses what was heard, while remaining cognizant and sensitive to the unique needs of the wide-range of stakeholders.

It was considered essential that the study reflect the needs of the many interests, contexts, and functions of the diverse Study Area, however, it was also known that there would be varying opinions on how the Project should proceed. The goal was to build

consensus on the preferred corridor design among participants, by providing a clear understanding of how the design was developed. For those who disagreed with the preferred corridor design, the traceable process allowed the Project team to reference how decisions were made. The consultation process aimed to build understanding through effective communication of the problems/opportunities and potential designs being considered, with an opportunity for participants to listen and be heard.

For the DSBRT Project, the consultation process was structured into two phases: Pre-Planning Activities and TPAP, both of which included public consultation opportunities.

The TPAP is an environmental assessment process (O. Reg 231/08), approved under the Environmental Assessment Act, developed specifically for the approval of public transit projects. The TPAP focuses on the assessment of potential impacts of a transit project. It is a streamlined process that allows project commencement, review, and approval to occur within six months. *Due to the short six-month time frame, most work is undertaken prior to commencing the TPAP. This stage is referred to as Pre-Planning Activities in* O. Reg 231/08*.*

The focus of consultation during the Pre-Planning Activities was to identify stakeholders, provide information on the DSBRT Project and collect information on preliminary concerns. During the TPAP phase, the focus of consultation was to follow up with the stakeholders and confirm that their concerns were sufficiently addressed and to identify any further concerns. This report documents the consultation processes undertaken during the two phases: the Pre-Planning Activities phase is documented in **Section 6.2** and TPAP in **Section 6.3**.

Metrolinx offered a wide range of communication, consultation activities, and outlets to reach all interested members of the public, residents and businesses, review agencies, Indigenous Nations, and other stakeholders to solicit comments and feedback relating to the Project including:

- Project website (https://www.metrolinxengage.com/en/engagement-initiatives/durham-scarborough-bus-rapid-transit);
- Online Interactive Map (https://www.dsbrtmap.ca/);
- Project email address (dsbrt@metrolinx.com);
- Mailings/notifications;
- Online Public Information Sessions; and,
- Letters to Indigenous Nations.

In 2018, Metrolinx made a commitment to building positive and meaningful relationships with Indigenous Peoples in alignment with its strategic objectives. The Indigenous Relations Office (IRO), established in 2019, has a mandate to build and grow relationships with Indigenous Nations, organizations, businesses and customer-residents. In 2020, the IRO became the sole point of contact for Indigenous Nations and

supports the Environmental Programs & Assessment department to coordinate engagement and communication related to all Metrolinx projects. Consistent with this commitment, Metrolinx has engaged with Indigenous Nations on the DSBRT project. See **Section 6.2.8** and **Section 6.3.7** for details on how and when Indigenous Nations were consulted. Record of correspondence with Indigenous Nations is provided in **Appendix K5**.

6.1.2 Record of Consultation

Consultation was initiated well before the commencement of the TPAP, through the mailing of initial contact letters to stakeholders and Indigenous Nations, and the initiation of the Project website. A record of all Project consultation undertaken during the regulatory consultation phase has been maintained. **Appendix K** documents all Project correspondence and meeting summaries. All comments received from the public have been redacted to protect personal information under the Freedom of Information and Protection of Privacy Act.

6.1.3 Identification of Interested Parties

O. Reg 231/08 provides a list of stakeholders that must be consulted during TPAP. The list includes:

- The Director and Regional Director of the Environmental Approvals Access and Service Integration Branch (of the Ministry of the Environment, Conservation and Parks);
- The regional office of the Ministry of the Environment, Conservation and Parks;
- Indigenous Nations;
- Property owners within 30 metres of the corridor; and
- Any other person, including regulatory agencies and members of the public that may be interested in the Project.

This list was treated as the starting point for developing the contact lists, as the Project team believes that consulting with more people only leads to a better preliminary design and a greater chance of successful implementation. The interested parties that were consulted for the DSBRT Project are categorized into three groups:

- Indigenous Nations;
- Stakeholder groups;
- Government Review Agencies; and
- Members of the public.

6.1.4 Influence of Consultation on the Transit Project Assessment Process

Consultation activities completed during Pre-Planning Activities and the TPAP are documented in this chapter. Key comments received include input on the preliminary design, requests to be added to the Project Mailing List, and requests to review and comment on project information and supporting technical studies.

All comments and questions received were considered by the Project team. Questions were addressed through direct follow-up by the Project Team. All comments and questions are documented in **Appendix K**.

Comments on the preliminary design included input on existing conditions, potential impacts and mitigation measures. This input resulted in updates to the preliminary design including but not limited to:

- Ellesmere Road from Military Trail to Kingston Road: the technically preferred design presented at Public Information Centre #2 was to widen to 6-lanes with two centre-median transit lanes and four lanes for general traffic (two lanes in each direction). Based on public input and in consultation with City of Toronto staff, the preferred design was revised. The preliminary design maintains the existing 4-lane cross-section and convert two centre lanes for transit only, maintaining two lanes for general traffic (one lane in each direction);
- New traffic signals on Ellesmere Road: the preliminary design has been refined to provide three new traffic signals on Ellesmere Road to provide additional left-turn/U-turn access and new pedestrian crossings;
- West end terminus: options were presented at Public Information Centre #2 to connect the DSBRT to Scarborough Centre and the future Scarborough Subway Extension. Based on public input regarding traffic congestion and delays at the intersection of Ellesmere Road and McCowan, and in coordination with the Scarborough Subway Extension project, the DSBRT route is recommended to follow Grangeway Avenue;
- Pickering Village in Town of Ajax: the technically preferred design presented at Public Information Centre #2 was to maintain the existing 4-lane cross-section and convert two curb lanes for transit only, maintaining two lanes for general traffic (one lane in each direction). Based on public input and in consultation with Durham Region and the Town of Ajax, with consideration for the heritage conservation district and other constraints, the preferred design was revised. The preliminary design widens Kingston Road to a 5-lane cross-section with one westbound lane for general traffic, two centre-median transit lanes, and two eastbound lanes for general traffic;
- Downtown Whitby: the technically preferred design presented at Public Information Centre #2 was to maintain the existing 4-lane cross-section and convert two curb lanes for transit only, maintaining two lanes for general traffic (one lane in each direction). Based on public input and in consultation with

Durham Region and the Town of Whitby, the preferred design revised. The preliminary design at the Brock Street intersection maintains the current operation with traffic and transit sharing one westbound lane and a dedicated westbound right-turn lane. From Brock Street to Byron Street, wider sidewalks will be provided while maintaining one westbound lane, one eastbound transit-only lane, and one eastbound lane for general traffic;

- Dundas Street in the Town of Whitby: the technically preferred design presented at Public Information Centre #3 was to widen Dundas Street from Annes Street to Jeffrey Street to 6-lanes with two centre-median transit lanes and four lanes for general traffic (two lanes in each direction). Based on public input and in consultation with Durham Region and Town of Whitby staff, the preferred design was revised. The preliminary design maintains the 4-lane cross-section from Byron Street to Cochrane Street / Annes Street with one general traffic lane in each direction and two centre-median bus lanes. From Cochrane Street / Annes Street to Raglan Street, the preliminary design proposes one westbound general traffic lane, two centre-median bus lanes, and two eastbound general traffic lanes for a total of five lanes;

- CP Rail bridge in the Town of Whitby: the DSBRT project will replace the CP Rail bridge with a new structure to accommodate centre-median bus lanes on Dundas Street, plus new walking and cycling infrastructure consistent with Town of Whitby and Durham Region plans;

- Downtown Oshawa BRT operations: the technically preferred BRT operation presented at Public Information Centre #2 included contraflow transit on King Street and Bond Street. Based on public input and in consultation with Durham Region and City of Oshawa staff, the preferred design was revised. The preliminary design creates concurrent transit in the curb lanes (e.g., eastbound on King Street, westbound on Bond Street);

- Downtown Oshawa parking: the technically preferred design resulting in impacts to on-street parking on King Street and Bond Street in Downtown Oshawa between McMillan Drive to east of Simcoe Street. Based on public input and in consultation with Durham Region and City of Oshawa staff, the preferred design was revised. The preliminary design maintains more on-street parking;

- Waverly Street in the City of Oshawa: the technically preferred design presented at Public Information Centre #3 restricted left-turns at Waverly Street. Based on public input, requests from emergency services, and in consultation with Durham Region and City of Oshawa staff, the preferred design was revised. A new traffic signal at Waverly Street with dedicated left-turn lanes in each direction, is included in the preliminary design; and,

- Accessibility and active transportation: the preliminary design has been refined through the project development in response to public input and evolving active transportation plans to optimize walking and cycling infrastructure along the DSBRT and protect for additional cycling connections to north-south routes.

Accessibility will continue to be a focus as the project moves forward to detail design.

Requests to be added to the Project mailing list were actioned throughout the Pre-Planning and the TPAP phases of the study, with refinements made to the contact list. As updated contact details were provided for specific agency contacts, additional refinements were made.

Requests for Project information and environmental reports were responded to as soon as the Project information and reports were available. The draft Stage 1 Archaeological Assessment was shared with Indigenous Nations on March 19, 2021 via email. Other environmental reports were circulated via email on April 22, 2021. See more details in **Section 6.2.8**.

Details of comments and questions received and Project team responses (including changes made to the EPR or Project designs) are available in **Chapter 6** and **Appendix K**. Permits and approvals were influenced by consultation, as well as commitments to future work, which are documented in **Chapter 7** and **Chapter 8** respectively.

6.2 Pre-Planning Activities Consultation

Note that this section captures consultation from project initiation to Notice of Commencement of the TPAP. Consultation during TPAP is described in **Section 6.3**.

6.2.1 Public and Stakeholder Consultation

6.2.1.1 Stakeholder Consultation

At the Project's outset, a stakeholder contact list was developed to identify all potentially interested stakeholders. The contact list was formed by compiling a list of all agencies and ministries with a direct interest or approvals in the Study Area, staff from relevant departments of the local municipalities, major landowners, neighbourhood associations, Business Improvement Areas/Associations (BIA), and special interest groups related to transit and active transportation, among others. The agencies and organizations were then grouped by interest and these groups were invited to form three stakeholder groups: the Technical Advisory Group (TAG), the Municipal Technical Advisory Group (MTAG), and the Stakeholder Advisory Group (SAG). The contact lists for each stakeholder group are further described in **Section 6.2**.

6.2.1.2 Public Meetings

Public Information Centre #1

The purpose of Public Information Centre (PIC) #1 was to introduce the Durham-Scarborough Bus Rapid Transit Project to the public and present the findings of previous studies. The PIC was also held to obtain feedback on the proposed scope of

planned technical studies and the “pinch point” locations, which are constrained areas along the corridor. A summary of the PIC is included in **Appendix K2**.

PIC #1 consisted of six events. In June 2019, four events were held in the following municipalities in Durham Region: City of Pickering, Town of Ajax, Town of Whitby and the City of Oshawa. In September 2019, two events were held in Scarborough. Details on the times and locations of the events are included in **TABLE 6.1**.

A number of methods were used to notify the public, stakeholders and Indigenous Nations of the PIC, including mailouts, emails, newspaper advertisements, online notices, word of mouth, and posters. The Notice of Public Information Centre is included in **Appendix K2**.

The same information was presented at all six PIC events. Information was presented on 26 display boards. Printed copies of the Initial Business Case (2018) were also available for review.

TABLE 6.1. PUBLIC INFORMATION CENTRE #1 EVENT DETAILS

Pickering	Ajax
Thursday, June 6, 2019 6 p.m. to 8 p.m. Pickering Recreation Complex	Tuesday, June 11, 2019 6 p.m. to 8 p.m. McLean Community Centre
Oshawa	**Whitby**
Wednesday, June 12, 2019 12 p.m. to 2 p.m. Civic Recreation Complex	Wednesday, June 12, 2019 7 p.m. to 9 p.m. Anderson Collegiate Vocational Institute
Scarborough	
Thursday, September 26, 2019 3:30 to 5:30 p.m. and 6:30 to 8:30 p.m. The Meeting Place, Science Wing (S-Wing) University of Toronto Scarborough Campus	

Participants were encouraged to submit comments to the Project team by filling out comment sheets that were provided at the sign-in table. Those who provided contact information and identified that they would like to receive Project updates, were added to the Project contact list. A total of 21 individuals signed-in at the June events and 32 signed-in at the September events.

In total, four comment sheets were submitted during the PIC events; one in June and three in September. Members of the public were also able to provide input by emailing the Project team. In total, seven emails were received; one during the Durham Region comment period, and six during the Scarborough comment period. Emails generally identified concerns about potential business impacts related to changes in access or requested additional details regarding a specific property. Five emails requested a 7-lane cross-section east of Brimley Road along Ellesmere Road.

Most input was received through one-on-one discussions with Project team members at the events and through the online survey. Overall, the feedback received at the PIC events showed that the public was generally supportive of the Project and interested in learning more about potential benefits and impacts as the Project progresses.

The public was generally aware of the existing Durham Region Transit PULSE service and was supportive of the recent road reconstruction that has taken place on Kingston Road to implement curbside bus-only lanes. Other opportunities and concerns that were identified through written comments and discussions with staff are listed below:

Opportunities to:

- Improve transit reliability and connections and encourage more people to take transit;
- Improve the local and regional active transportation network by implementing facilities along the corridor to fill in existing gaps;
- Improve the public realm along the corridor;
- Have a positive impact on the environment through the reduction of traffic congestion and greenhouse gases; and,
- Improve connections to existing major trip generators within Durham Region and Scarborough.

Concerns about:

- Potential duplication of service with the Lakeshore East GO rail corridor located south of the DSBRT corridor;
- Potential increase in traffic congestion;
- Left-turn and access restrictions due to medians;
- Potential business impacts including truck access; and,
- Impacts to surrounding neighbourhoods.

Public Information Centre #2

The purpose of Public Information Centre #2 was to receive input on the technically preferred options to implement the Bus Rapid Transit system in constrained areas or “pinch points”, specifically Downtown Oshawa, Downtown Whitby, Pickering Village (in Ajax), and Ellesmere Road east of Military Trail. Proposed Bus Rapid Transit stop locations were also presented for feedback, as well as updates on the technical studies completed to date. A summary of the PIC is included in **Appendix K2**.

PIC #2 consisted of six events. Two were held in the City of Toronto and four events were held in the following municipalities in Durham Region: City of Pickering, Town of

Ajax, Town of Whitby, and City of Oshawa. The same information was presented at each venue. Presentations, followed by a question-and-answer period were held in Scarborough, Whitby and Oshawa. Event details are included in **TABLE 6.2**.

A number of methods were used to notify the public, stakeholders and Indigenous Nations of the PIC, including mailouts, emails, newspapers advertisements, radio advertisements, online notices, word of mouth, and posters. The Notice of Public Information Centre is included in **Appendix K2.**

Information was presented on 38 display boards, which were organized in a manner which effectively presented Project information. Printed copies of the Initial Business Case (2018) and the cultural heritage and natural heritage existing conditions maps were available at the sign-in table.

TABLE 6.2. PUBLIC INFORMATION CENTRE #2 EVENT DETAILS

Scarborough	
Monday, November 18, 2019 3:30 p.m. to 5 p.m. and 6:30 p.m. to 8:30 p.m. · Presentation at 7 p.m. University of Toronto Scarborough Campus, The Meeting Place Science Wing (S-Wing), Second Floor	
Oshawa	**Whitby**
Tuesday, November 19, 2019 12 p.m. to 2 p.m. Presentation at 12:30 p.m. City Hall	Tuesday, November 19, 2019 6 p.m. to 8 p.m. Presentation at 6:30 p.m. Durham Region Headquarters
Pickering	**Ajax**
Wednesday, November 20, 2019 12 p.m. to 2 p.m. Pickering Town Centre	Wednesday, November 20, 2019 6 p.m. to 8 p.m. St. George's Anglican Church

Roll plans of the Study Area were also available at the six PIC events. The roll plans showed the five pinch point locations and the proposed Bus Rapid Transit stop locations. Attendees were encouraged to provide feedback by adding sticky notes.

Participants were encouraged to submit feedback to the Project team by filling out the comment sheets provided at the sign-in table. Those who provided contact information and identified that they would like to receive Project updates, were added to the Project contact list. A total of 112 individuals signed-in at the PIC.

In total, 22 comment sheets were received during the PIC events. Members of the public were also able to provide input by emailing the Project team. In total, seven emails were received. Key themes raised in the emails included environmental impact concerns, streetscape and cycling infrastructure improvements, and requests to be added to the Project contact list.

Overall, the feedback received at the PIC events showed that the public was generally supportive of the Project and interested in learning more as the design develops. Most input was received through one-on-one discussions with Project team members at the events, comment sheets, and the online survey. Key opportunities and concerns that were identified through written comments and discussions with staff are listed below:

Opportunities to:

- Improve transit reliability and connections and encourage more people to take transit;
- Improve the active transportation network by implementing facilities along the corridor to fill in existing gaps and improve first and last mile connections;
- Improve the safety for all road users along the corridor;
- Improve the public realm along the corridor; and,
- Improve connections to existing major trip generators within Durham Region and Scarborough.

Concerns about:

- Potential increase in traffic congestion;
- Potential impacts to the historic character of Pickering Village;
- Potential for traffic infiltration in surrounding neighborhoods; and
- Access restrictions as a result of centre-median transit lanes.

Public Information Centre #3

The purpose of the PIC #3 was to receive input on the preliminary design and results of the technical studies, including potential impacts and proposed mitigation measures. Due to COVID-19, consultation was conducted virtually. Event details are included in **TABLE 6.3**.

TABLE 6.3. PUBLIC INFORMATION CENTRE #3 EVENT DETAILS

Virtual Event
Monday, November 16, 2020 through Sunday, January 10, 2021 https://www.metrolinxengage.com/DSBRT

A number of methods were used to notify the public, stakeholders and Indigenous Nations of the PIC, including mailouts, emails, newspapers advertisements, radio advertisements, online notices, word of mouth, and posters. The Notice of Public Information Centre is included in **Appendix K2.**

The virtual Public Information Centre included the following components:

- Narrated videos;
- Webpages and display boards;
- Design drawings and renderings; and
- Interactive map.

Participants were encouraged to ask questions, submit feedback, and share ideas with the Project team. Input was received through multiple channels, including:

- Online surveys;
- Ask a Question webpage;
- Interactive map;
- Emails;
- Telephone calls; and
- Community meetings.

In addition to these channels, the public was invited to sign-up for the Project mailing list, request hardcopies of Public Information Centre materials, or provide feedback to the Project team through the 'Contact Us' webpage on the Project website.

The following statistics represent participation between November 16, 2020 and January 10, 2021:

- Public Information Centre #3 Website: 4,866 users visited the Project website during Public Information Centre #3. The website amassed 9,281 unique pageviews and 13,746 total views;
- Online Surveys: 17 surveys were submitted;
- Ask a Question Comments: 19 questions were submitted by members of the public. The questions and responses received a total of 121 upvotes and downvotes;
- Interactive Map: The map attracted 2,549 unique visitors. 29 comments were submitted by 10 individuals; and
- Narrated Videos: The six narrated videos received a total of 1,147 views.

Two community meetings were also held during PIC #3. The meetings were hosted to help further understand the community's concerns related to the technically preferred preliminary design in Pickering Village in Ajax and Downtown Whitby. The meetings, hosted January 6 and January 7, respectively, included a brief presentation and a question-and-answer session. Details on the live events are included in **Appendix K2**.

The feedback received through the Public Information Centre demonstrated that the public had the most interest and concern related to the proposed design in Downtown Whitby and Pickering Village.

In both locations, the public recognized that the corridor is constrained and had varying opinions on elements that should be prioritized. Traffic and cultural heritage impacts

were significant concerns in both Whitby and Pickering Village. In Whitby, business impacts and the removal of on-street parking on Dundas Street were also key issues.

While most of the feedback on the design for Downtown Whitby was critical, the public commented favorably on the plan to widen sidewalks, improve the streetscape, protect cultural heritage resources, improve accessibility, and relocate parking.

Similarly, the design for Pickering Village was met with some criticism. However, the public acknowledged and supported the effort to maintain cultural heritage resources and the decision to revise the design to maintain the two eastbound general traffic lanes.

The public also showed an interest in local transit integration. Some feedback identified important connections to intersecting transit routes and facilities. Below is a summary of the key concerns and opportunities that were identified.

Concerns about:

- Traffic infiltration;
- Access restrictions;
- Removal of on-street parking in Downtown Whitby and Downtown Oshawa;
- Business impacts along Ellesmere Road and in Downtown Whitby;
- Gaps in the cycling network; and,
- Impacts to cultural heritage resources.

Opportunities to:

- Improve reliability and comfort of transit service;
- Improve accessibility;
- Improve the active transportation network;
- Enhance the public realm in Downtown Whitby; and,
- Raise awareness / incorporate elements of cultural heritage resources and local neighborhoods in the BRT stop design.

Whitby Public Meeting #1 (March 16, 2021)

In response to the public input received during PIC #3, the preliminary design in downtown Whitby was revised to address concerns relating to traffic flow and vehicular access.

The revised preliminary design was presented to the public at the Whitby Public Meeting hosted on March 16, 2021 at 6:30 pm on the Metrolinx Engage webpage

(https://www.metrolinxengage.com/en/dsbrtLIVE). The virtual open house was held to further understand the community's concerns related to the technically preferred preliminary design in Downtown Whitby and present the revised North Side Pedestrian Mall preliminary design. The meeting also provided Whitby residents the opportunity to ask questions and present comments. Presentation materials are included in **Appendix K2**.

The event was advertised on the Project website and the public had the option to register in advance of the meeting, although registration was not required to access the public event. In total, approximately 58 people attended the event.

The event was moderated by Metrolinx staff and questions were answered by a panel consisting of representatives from Metrolinx, Durham Region Transit, Durham Region, and the consultant team. The event was recorded and can be viewed on the Project website (https://www.metrolinxengage.com/en/dsbrtLIVE).

Participants were able to submit questions during the presentation using Slido, a Q&A app hosted on the Metrolinx Engage webpage. The Slido app allowed participants to upvote comments, effectively prioritizing questions to be answered by the panel. Generally, the moderator selected the most popular questions for the panel to answer during the meeting. Once the questions were answered, they were removed from the Slido page.

In total, 72 questions and comments were received from the community, many of which were answered during the online event. Questions, comments, and concerns generally related to the following themes:

- Impact on traffic operations, congestion, and impacts in residential areas;
- Traffic operations and concerns, livability, and safety of residents on Mary Street;
- Impacts to local businesses and consultation with business owners;
- Pedestrian safety;
- Proposed BRT route and alternate corridors;
- Responding to Whitby community needs;
- Design accessibility and mobility; and,
- Existing transit usage and the impact of COVID-19 on transit ridership;

Due to the volume of questions that were submitted, not all questions were able to be answered during the meeting. The Project team committed to responding to all comments posted during the information session, and answers will be posted on the Project website.

As follow-up to the Whitby Public Meeting, an online survey was developed to solicit additional feedback on the refined preliminary design for Downtown Whitby. The survey

was available at the Metrolinx Engage survey webpage (https://www.metrolinxengage.com/en/dsbrtLIVE/survey).

An email was sent to notify Whitby residents and business owners that the survey was available on the Project website. The survey was available from March 22, 2021 to March 28, 2021, and a total of 76 surveys were submitted. A summary of responses is included in **TABLE 6.4**. A full record of responses received is included in **Appendix K2**.

TABLE 6.4. ONLINE SURVEY RESPONSE SUMMARY

Do you prefer the refined preliminary design for Downtown Whitby (north side pedestrian transit mall) to the previous full transit mall design?
➢ 31% of respondents answered yes and 69% of respondents answered no. However, it is useful to note that participants may have responded "no" because they are generally unsatisfied with either preliminary design of the DSBRT Project through Downtown Whitby.
What aspects of the north side pedestrian mall design are most important to you? Rank these below.
➢ **Protect Downtown Whitby's character and cultural heritage:** 72% of respondents ranked this option as "most important" ➢ **Maintaining a lane for Eastbound traffic:** 70% of respondents ranked this option as "most important" ➢ **Provision of off-street parking to replace on-street parking spots:** 25% of respondents ranked this option as "most important" ➢ **Enhanced public realm and opportunities for patios and outdoor displays:** 24% of respondents ranked this option as "most important" ➢ **Increased sidewalk space and accessibility:** 21% of respondents ranked this option as "most important" ➢ **Improved transit reliability:** 9% of respondents ranked this option as "most important"
What do you think are the advantages of dedicated centre-median bus lanes outside of Downtown Whitby?
➢ There are no advantages of dedicated centre-median bus lanes / the DSBRT Project will negatively impact Whitby and the Downtown. (48 comments) ➢ Reliable and improved transit service and operations. (8 comments) ➢ Relocate the dedicated bus lanes to an alternate corridor (e.g. Rossland Rd., Taunton Rd.). (5 comments) ➢ Concerns related to impacts on residents and business owners / lack of consultation. (5 comments) ➢ Improved traffic flow and operations / less conflicts between busses and cars. (4 comments) ➢ Concerns related to traffic impacts and congestion to neighbouring streets. (4 comments) ➢ Maintain general traffic lanes in both directions. (7 comments) ➢ The DSBRT Project benefits people outside of Whitby. (3 comments) ➢ Concerns related to driver navigation regarding traffic signals / sightline issues. (3 comments) ➢ Ridership does not justify dedicated bus lanes. (2 comments) ➢ Improved pedestrian safety. ➢ Concern about loss of downtown parking. ➢ Inefficient use of resources.

What do you think are the disadvantages of dedicated centre-median bus lanes outside of Downtown Whitby?

- The DSBRT Project is a disadvantage / dedicated bus lanes are not needed / leave the downtown as is. (9 comments)
- Removed general traffic lanes / increased congestion. (22 comments)
- Traffic impacts to neighbouring residential areas. (12 comments)
- Safety concerns including pedestrian safety at centre-median bus stops and pedestrian safety in adjacent residential areas. (8 comments)
- Concerns related to left-turns and u-turns. (6 comments)
- Destruction of downtown heritage / pedestrian accessibility and overall access to the downtown. (6 comments)
- Negative impacts to small business. (5 comments)
- There is no transit demand and no need for dedicated bus lanes. (5 comments)
- There are no disadvantages. (5 comments)
- Centre-median bus lanes divide Whitby / change the landscape. (4 comments)
- Concerns related to noise. (3 comments)
- Poor use of road space / relocate the dedicated bus lanes to an alternate corridor (e.g., Rossland Rd., Taunton Rd.). (3 comments)
- Concerns related to construction. (2 comments)
- Concern about snow removal impacting general traffic lanes.
- Redundancy of transit services provided along corridor not necessary (e.g., DRT, GO).
- Inefficient use of resources.

Overall, if you have outstanding concerns with the Project, what are they? Select all that apply.

- **Traffic Operations:** 63% respondents selected this option
- **Construction impacts and mitigation strategies:** 49% respondents selected this option
- **Parking:** 42% respondents selected this option
- **Driveway access:** 37% respondents selected this option
- **Transit priority:** 17% respondents selected this option

How would you like us to share updates about the Project with you? Select all that apply.

- **Website:** 57% of respondents selected this option
- **Town Hall / Public Meeting:** 54% of respondents selected this option
- **Email:** 52% of respondents selected this option
- **E-newsletter:** 29% of respondents selected this option
- **FAQs:** 21% of respondents selected this option

Were you happy with the format of the presentation? Why or why not?

Approximately 37% of survey participants responded yes. Responses are summarized as follows:

- The presentation was informative / thorough / clear. (4 comments)
- The format was fine / worked well. (4 comments)
- The public meeting is a useful tool in informing the community. (3 comments)
- The presentation was well-presented and professional. (2 comments)
- The meeting allowed for community input and discussion. (2 comments)
- The graphics were good / helpful. (2 comments)
- Meeting length inadequate to hear all community concerns. (2 comments)

- The panel responded to public comments in order of priority as identified by meeting participants.
- When will Metrolinx post responses to the comments provided at the online community meetings?

Approximately 63% of survey participants responded no. Responses are summarized as follows:

- Cancel the DSBRT Project through Whitby / I do not support this Project / the DSBRT Project will have negative impacts. (12 comments)
- The presentation and survey questions are biased, and channel public input to favour one of the preliminary designs / there is no option to dislike both designs. (12 comments)
- The presentation should be longer and more engaging / questions were not answered adequately / format did not allow for follow-up responses by participants. (6 comments)
- Concerns about the lack of consultation throughout the planning process. (6 comments)
- Presentation and graphics are very technical and too complicated to understand. (5 comments)
- Format is not mobile-friendly.
- Format should have allowed for participants to ask questions live and review presentation materials in advance.

Additionally, members of the public were able to provide input via the Metrolinx Engage website (https://www.metrolinxengage.com/en/content/contact-dsbrt-team). A total of 20 submissions were received between March 22, 2021 and March 28, 2021. Comments are summarized as follows:

- Concerns related to traffic congestion and negative impacts to residential neighbourhoods;
- Concerns related to local business owners and residents not being engaged meaningfully;
- General opposition to the Project, and requests to leave downtown Whitby as is;
- General support for the DSBRT Project, and suggestions to improve transit priority plan;
- Concerns related to public tax spending; and
- Concern related to survey bias that deflects public opposition.

A full record of public correspondence is included in **Appendix K2**.

Whitby Public Meeting #2 (May 20, 2021)

In response to the public input received during the Whitby Public Meeting held on March 16, 2021, the preliminary design in downtown Whitby was revised to address concerns relating to traffic infiltration, traffic flow and vehicular access.

The revised preliminary design was presented to the public at the Whitby Public Meeting hosted on May 20, 2021 at 6:30 pm on the Metrolinx Engage webpage (https://www.metrolinxengage.com/en/dsbrtLIVEMay20). The virtual open house was held to further understand the community's concerns related to the North Side Pedestrian Mall preliminary design and present the revised three-lane design with a

westbound mixed traffic lane. The meeting also provided Whitby residents the opportunity to ask questions and present comments. Presentation materials are included in **Appendix K2.**

The event was advertised on the Project website and the public had the option to register in advance of the meeting, although registration was not required to access the public event. In total, 218 people registered for the event and approximately 216 people attended the event.

The event was moderated by Metrolinx staff and questions were answered by a panel consisting of representatives from Metrolinx, Durham Region Transit, Durham Region, and the consultant team. The event was recorded and can be viewed on the Project website (https://www.metrolinxengage.com/en/dsbrtLIVEMay20).

Participants were able to submit questions during the presentation using Slido, a Q&A app hosted on the Metrolinx Engage webpage. The Slido app allowed participants to upvote comments, effectively prioritizing questions to be answered by the panel. Generally, the moderator selected the most popular questions for the panel to answer during the meeting. Once the questions were answered, they were removed from the Slido page.

Participants were able to ask questions verbally during the presentation using Zoom, a third-party virtual meeting app. Participants entered a 'waiting room' in Zoom, and a moderator enabled them to ask their question to the panelists using voice and optional video. Not all participants in the 'waiting room' were able to ask their questions live due to time constraints.

In total, 110 questions were asked, with 101 questions submitted via Slido and 9 questions asked via Zoom 'call in'. Questions, comments, and concerns generally related to the following themes:

- Preference for a four-lane design for downtown Whitby rather than the current three-lane proposed design;
- Neighborhood traffic infiltration and associated safety considerations;
- Lack of community engagement and consultation; and,
- Lack of transparency from Metrolinx, Elected Officials, and Town of Whitby Staff.

Due to the volume of questions that were submitted, not all questions were able to be answered during the meeting. The Project team committed to responding to all comments posted during the information session. Answers to the remaining question themes have been posted on the Project website.

Oshawa Public Meeting (June 3, 2021)

In response to the City of Oshawa's request from the Development Services Committee meeting held on February 8, 2021, additional virtual consultation was held focused on

the DS BRT project in Oshawa. City of Oshawa staff provided assistance with advertising and messaging.

The revised preliminary design was presented to the public at the Oshawa Public Meeting hosted on June 3, 2021 at 6:30 pm on the Metrolinx Engage webpage (https://www.metrolinxengage.com/en/dsbrtLIVEJune3). The virtual open house was held to further understand the community's concerns related to the technically preferred preliminary design in Downtown Oshawa and present the revised preliminary design. The meeting also provided Oshawa residents the opportunity to ask questions and present comments. Presentation materials are included in **Appendix K2**.

The event was advertised on the Project website and the public had the option to register in advance of the meeting, although registration was not required to access the public event. In total, 75 people registered for the event and approximately 96 people attended the event.

The event was moderated by Metrolinx staff and questions were answered by a panel consisting of representatives from Metrolinx, Durham Region Transit, Durham Region, and the consultant team. The event was recorded and can be viewed on the Project website (https://www.metrolinxengage.com/en/dsbrtLIVEJune3).

Participants were able to submit questions during the presentation using Slido, a Q&A app hosted on the Metrolinx Engage webpage. The Slido app allowed participants to upvote comments, effectively prioritizing questions to be answered by the panel. Generally, the moderator selected the most popular questions for the panel to answer during the meeting. Once the questions were answered, they were removed from the Slido page.

Participants were able to ask questions by voice during the presentation using Zoom, a third-party virtual meeting app. Participants entered a 'waiting room' in Zoom, and a moderator enabled them to ask their question to the panelists using voice and optional video.

In total, 37 questions were asked, with 31 questions submitted via Slido and 6 questions asked via Zoom 'call in'. Questions, comments, and concerns generally related to the following themes:

- Transit connectivity and integration;
- Cycling and active transportation infrastructure; and,
- General information on preliminary design components.

Due to the volume of questions that were submitted, not all questions were able to be answered during the meeting. The Project team committed to responding to all comments posted during the information session. Answers to the remaining question themes were posted on the project website.

Scarborough Public Meeting (September 23, 2021)

A meeting was held on September 23, 2021.The virtual open house was held to further understand the community's concerns related to the technically preferred preliminary design and present the revised preliminary design. The meeting also provided Scarborough residents the opportunity to ask questions and present comments. Presentation materials are included in **Appendix K2**.

The event was advertised on the Project website and the public had the option to register in advance of the meeting, although registration was not required to access the public event. In total, 160 people registered for the event and approximately 91 people attended the event.

The event was moderated by Metrolinx staff and questions were answered by a panel consisting of representatives from Metrolinx, and the consultant team.

Participants were able to submit questions during the presentation using Slido, a Q&A app hosted on the Metrolinx Engage webpage. Participants were able to ask questions by voice during the presentation using Zoom, a third-party virtual meeting app. Participants entered a 'waiting room' in Zoom, and a moderator enabled them to ask their question to the panelists using voice and optional video.

In total, 72 questions were asked, with 69 questions submitted via Engage and 3 questions asked via Zoom 'call in'. Questions, comments, and concerns generally related to the following themes:

- Community Engagement:
    - Previous consultation completed to date;
    - How community comments are incorporated into the project design?;
    - Support for businesses impacted by the project (e.g., compensation); and,
    - Support for businesses during construction.
- TPAP process and Environmental:
    - Clarification concerning the TPAP process;
    - Status of the TPAP process; and,
    - Concerns about impacts to trees in Highland Creek, increased noise and air pollution.
- Safety:
    - BRT lane locations (e.g., centre medians);
    - Traffic calming; and,

- Accommodation of emergency vehicles.

- Active Transportation/Cycling:
  - Evaluation and incorporation of active transportation into the BRT design.
- Project Funding and Fares:
  - Source of project funding;
  - Project cost; and,
  - How fare revenues are used.

Due to the volume of questions that were submitted, not all questions were able to be answered during the meeting. The Project team committed to responding to all comments posted during the information session. Answers to the remaining question themes were posted on the project website.

6.2.1.3 Phone, Email or Mail and the Project Website

The following tools were available over the course of the DSBRT Project to learn about the Project and submit questions and feedback.

- Project website (https://www.metrolinxengage.com/en/engagement-initiatives/durham-scarborough-bus-rapid-transit)
- Online Interactive Map (https://www.dsbrtmap.ca/)
- Project email address (dsbrt@metrolinx.com)

A record of public correspondence is included in **Appendix K3**.

6.2.1.4 Directly Affected Property Owners

The Project team received property-specific questions from some property owners that had the potential to be directly impacted by the Project. Direct impacts are considered to include potential property impacts. When corresponding with property owners, the Project team provided information on the proposed preliminary design and outlined how the subject property may be impacted. The Project team also provided information on the study process, including current and future consultation opportunities, and proposed timelines. The intent was to inform the property owner that they would be further consulted as the design advances.

6.2.1.5 Summary of Feedback Received from Stakeholders and the Public

Extensive consultation was undertaken with stakeholders and the public during pre-TPAP. A summary of main themes heard during pre-TPAP consultation are:

Opportunities:

- Provide the highest priority for transit, and improve speed, reliability, comfort and convenience for transit passengers.
- Expand the active transportation network to fill in existing gaps and improve first and last mile connections.
- Improve accessibility to transit and along the corridor.
- Improve the public realm along the corridor.
- Raise awareness of and incorporate elements of cultural heritage resources and local neighbourhood in the BRT stop design.

Concerns:

- Access changes due to raised islands along dedicated transit lanes.
- Potential for traffic infiltration in surrounding neighbourhoods.
- Potential business impacts along Ellesmere Road and Downtown Whitby.
- Potential impacts to cultural heritage resources.
- Gaps in the cycling network.
- Impacts to on-street parking in Downtown Whitby and Downtown Oshawa.

A full record of stakeholder and public consultation is in **Appendix K3 and K4**.

6.2.2 Review Agency Consultation

6.2.2.1 Meetings with Agencies and Conservation Authorities

Five meetings have been held with the Review agencies. Meeting dates and a summary of each meeting is provided in **TABLE 6.5**. The group's Terms of Reference, contact list, meeting minutes and materials, record of correspondence and emails are provided in Appendix K4.1.

TABLE 6.5. REVIEW AGENCY MEETINGS

Date	Attendees	Meeting Summary
April 6, 2020	Ministry of Transportation Ontario #1	The Project team provided a brief overview of the DSBRT Project. The Project team presented 6 potential options for Kingston Road between Ellesmere Road and Port Union Road, including the preliminary evaluation of the options for MTO's consideration.

Date	Attendees	Meeting Summary
October 9, 2020	Ministry of Transportation Ontario #2	The purpose of the meeting was to review technical information provided in support of design options in the following three areas along the corridor: Kingston Road from Ellesmere Road to Port Union Road, Highway 401 westbound off-ramp in Pickering, and Dundas Street West at Highway 412 in Pickering.
July 21, 2021	Ministry of Transportation Ontario #3	The purpose of the meeting was to provide an update on the status of DSBRT design at MTO jurisdiction areas.
July 27, 2021	Ministry of Transportation Ontario #4	The purpose of the meeting was to discuss the Highway 412 interchange with Dundas Street in Whitby.
August 26, 2021	Ministry of Transportation Ontario #5	The purpose of this meeting was to provide an update on the DSBRT project and overview of the interface of DSBRT at the 3 MTO jurisdiction areas.

6.2.2.2 Regulatory Agency Review of Draft Technical Reports

On May 25, 2021, a copy of the Draft EPR was circulated to regulatory agencies for review. Below is the list of agencies and their representatives.

Agency	Contact
Infrastructure Ontario	Joanna Brown (joanna.brown@infrastructureontario.ca)
Ministry of Heritage, Sport, Tourism and Culture Industries	Karla Barboza (karla.barboza@ontario.ca)
Central Lake Ontario Conservation Authority	Andrew Fera (afera@cloca.com)
Toronto and Region Conservation Authority	Sharon Lingertat (sharon.lingertat@trca.ca) Margie Akins (Margie.Akins@trca.ca)
Ministry of Transportation	Jason White (jason.white@ontario.ca) Prashanth Selvakumar (Prashanth.Selvakumar@ontario.ca) Valerie Nantais (Valerie.Nantais@ontario.ca)
Ministry of Northern Development, Mines,Natural Resources and Forestry	Steven Strong (steven.strong@ontario.ca) Maria Jawaid (maria.jawaid@ontario.ca)
Ministry of Agriculture, Food & Rural Affairs	Jocelyn Beatty (jocelyn.beatty@ontario.ca)

6.2.3 Technical Advisory Group

The Technical Advisory Group (TAG) was formed in June 2019. Representatives from federal, provincial, and regional agencies and ministries with approvals and/or a direct technical interest in the DSBRT Project were invited to attend, including:

- Canada Transport Agency
- Ministry of Agriculture, Food and Rural Affairs

- Parks Canada
- Environment and Climate Change Canada
- Department of Fisheries and Oceans (DFO)
- CP Rail
- CN Rail
- Ministry of Indigenous Affairs
- Infrastructure Ontario
- Ministry of Transportation (MTO)
- Ministry of Municipal Affairs and Housing
- Ministry of Colleges and Universities
- Toronto and Region Conservation Authority (TRCA)
- Central Lake Ontario Conservation Authority (CLOCA)
- Toronto Transit Commission (TTC)
- City of Toronto
- City of Pickering
- Town of Ajax
- Ministry of Heritage, Sport, Tourism and Culture Industries (MHSTCI)
- Ministry Natural Resources and Forestry (MNRF)[1]
- Metrolinx
- Ministry of Energy, Northern Development and Mines[2]
- Ministry of the Environment, Conservation and Parks (MECP)
- Town of Whitby
- City of Oshawa
- Durham Region
- Durham Region Transit
- Enbridge Gas Distribution
- Hydro One
- Toronto Hydro
- Bell Canada
- Elexicon Energy
- Oshawa PUC Networks Inc.
- Imperial Oil SPPL
- Rogers Communications

Three meetings have been held with the TAG to date. Meeting dates, participating TAG representatives, and a summary of each meeting is provided in **TABLE 6.6**. The group's Terms of Reference, contact list, meeting minutes and materials, record of correspondence and emails are provided in **Appendix K4**.

[1] New Ministry name is Ministry of Northern Development, Mines, Natural Resources and Forestry (MNDMNRF)
[2] New Ministry name is Ministry of Energy

TABLE 6.6 TECHNICAL ADVISORY GROUP MEETINGS

Date	Attendees	Meeting Summary
June 6, 2019	Metrolinx; City of Toronto; TTC; TRCA; Durham Region; Elexicon Energy; Enbridge Gas Inc.; CLOCA; Oshawa PUC Networks Inc.; Rogers Communications; City of Oshawa; Town of Whitby; Toronto Hydro; Hydro One	The Project team provided an overview of the DSBRT Project, including information on the Project background, study process, schedule, consultation strategy and next steps. The purpose of the meeting was to obtain input on the pinch point locations along the corridor.
October 28, 2019	Metrolinx; CLOCA; Elexicon; Enbridge; Hydro One; Ministry of Heritage, Sport, Tourism and Culture Industries; Oshawa PUC Networks Inc.; Parks Canada; TRCA; City of Toronto; TTC; Durham Region	The Project team provided a brief overview of the DSBRT Project, including information on the Project background, study process, schedule, consultation strategy and next steps. The purpose of the meeting was to provide an update on the technical work completed to date and to obtain input on the technically preferred alternatives for each of the pinch point locations along the corridor.
October 28, 2020	Metrolinx; CN; Rogers; Enbridge Gas; Toronto Hydro; CLOCA; MTO; Enbridge; Ministry of Heritage, Sport, Tourism and Culture Industries; Oshawa PUC Networks Inc.; TRCA; City of Toronto; Town of Whitby; TTC; Durham Region; DRT	The Project team provided a brief overview of the DSBRT Project and presented the preliminary design. The purpose of the meeting was to provide an update on Project status and obtain feedback on the preliminary design and potential impacts and mitigation measures.

6.2.4 Municipal Technical Advisory Group

The Municipal Technical Advisory Group (MTAG) was formed in June 2019. Representatives from municipal agencies and ministries with approvals and/or a direct technical interest in the DSBRT Project were invited to attend, including:

City of Toronto

- City Planning:
  - Transit Implementation Unit
  - Transportation Planning
  - Community Planning
  - Urban Design
- Transportation Services:
  - Traffic Operations
  - Traffic Planning
  - Major Projects

Durham Region

- Planning
- Economic Development
- Transit
- Traffic
- Transportation Infrastructure
- Police Services
- Ambulances and Paramedic Services

- Economic Development and Culture
- Community Development Officer
- Toronto Community Housing Corporation
- Ravines and Natural Features Protection (RNFP)
- Urban Forestry
- Toronto Region Board of Trade
- Fire Services
- Police Services
- Paramedic Services
- Toronto Transit Commission (TTC)

City of Oshawa

- Planning
- Transportation
- Fire Services

City of Pickering

- Planning
- Transportation
- Fire Services
- Community Emergency Management

Town of Ajax

- Planning & Development Services
- Transportation
- Fire and Emergency Services

Town of Whitby

- Planning
- Transportation
- Fire Emergency Services

Four meetings have been held with the MTAG to date. For the third MTAG meeting, a plenary session was held with all members. Additional individual sessions were held with each of the local municipalities to provide an overview of the design and discuss local issues and concerns. Meeting dates, participating MTAG representatives, and a summary of each meeting is provided in **TABLE 6.7**. The group's Terms of Reference, contact list, meeting minutes and materials, record of correspondence and emails are provided in **Appendix K4**.

TABLE 6.7. MUNICIPAL TECHNICAL ADVISORY GROUP MEETINGS

Date	Attendees	Meeting Summary
June 6, 2019	Metrolinx; City of Toronto; TTC; City of Oshawa; Durham Region; Town of Whitby; City of Pickering; Town of Ajax	The Project team provided an overview of the DSBRT Project, including information on the Project background, study process, schedule, consultation strategy and next steps. The purpose of the meeting was to obtain input on the pinch point locations along the corridor.
October 28, 2019	Metrolinx; City of Toronto; TTC; Town of Ajax; City of Oshawa; City	The Project team provided a brief overview of the DSBRT Project, including information

Date	Attendees	Meeting Summary
	of Pickering; Durham Region Transit; Town of Whitby; Durham Region	on the Project background, study process, schedule, consultation strategy and next steps. The purpose of the meeting was to provide an update on the technical work completed to date and to obtain input on the technically preferred alternatives for each of the pinch point locations along the corridor.
October 7, 2020	Plenary Session Metrolinx; City of Toronto; TTC; Town of Ajax; City of Oshawa; City of Pickering; Durham Region Transit; Town of Whitby; Durham Region	The purpose of the meeting was to provide an update on Project status and the technical studies completed to date and obtain feedback on potential impacts and mitigation measures.
October 7, 2020	City of Oshawa Session Metrolinx; Durham Region Transit; City of Oshawa, Durham Region	The purpose of the meeting was to obtain feedback on the preliminary design in the City of Oshawa.
October 7, 2020	Town of Whitby Session Metrolinx; Durham Region Transit; Town of Whitby, Durham Region	The purpose of the meeting was to obtain feedback on the preliminary design in the Town of Whitby.
October 7, 2020	Town of Ajax Session Metrolinx; Durham Region Transit; Town of Ajax, Durham Region	The purpose of the meeting was to obtain feedback on the preliminary design in the Town of Ajax.
October 7, 2020	City of Pickering Session Metrolinx; Durham Region Transit; City of Pickering, Durham Region	The purpose of the meeting was to obtain feedback on the preliminary design in the City of Pickering.
November 3, 2020	City of Toronto Session Metrolinx; City of Toronto; TTC	The purpose of the meeting was to obtain feedback on the preliminary design in the City of Toronto.
October 12, 2021	City of Oshawa Session Metrolinx; Durham Region Transit; City of Oshawa, Durham Region	The purpose of the meeting was to provide an update on the study progress, summary of consultation to date, changes in preliminary design since PIC#3 in Oshawa, draft implementation strategy, environmental and archeological studies conducted, and next steps.
October 12, 2021	Town of Whitby Session Metrolinx; Town of Whitby, Durham Region	The purpose of the meeting was to provide an update on the study progress, summary of consultation to date, changes in preliminary design since PIC#3 in Whitby, draft implementation strategy, environmental and archeological studies conducted, and next steps.
October 12, 2021	Town of Ajax Session Metrolinx; Durham Region Transit; Town of Ajax, Durham Region	The purpose of the meeting was to provide an update on the study progress, summary of consultation to date, changes in preliminary design since PIC#3 in Ajax, draft implementation strategy, environmental and archeological studies conducted, and next steps.

Date	Attendees	Meeting Summary
October 13, 2021	City of Pickering Session Metrolinx; Durham Region Transit; City of Pickering, Durham Region	The purpose of the meeting was to provide an update on the study progress, summary of consultation to date, preliminary design in Pickering, draft implementation strategy, environmental studies conducted, cultural heritage features in Pickering and next steps.
October 13, 2021	City of Toronto Session Metrolinx; City of Toronto	The purpose of the meeting was to provide an update on the study progress, summary of consultation to date, changes in preliminary design since PIC#3 in Toronto, draft implementation strategy, environmental and archeological studies conducted, and next steps.

6.2.5 Stakeholder Advisory Group

The Stakeholder Advisory Group (SAG) was formed in June 2019. Representatives from major property owners, business owners, and associations with an interest in the DSBRT Project were invited to attend, including:

- Toronto Association of Business Improvement Areas
- Downtown Whitby BIA
- Pickering Village BIA
- Downtown Oshawa BIA
- Highland Creek Community Association
- Residents Rising Neighbourhood Association
- Scarborough Centre for Healthy Communities
- Scarborough Community Renewal Organization
- Scarborough Neighbourhood Action Plan (NAP) Committee
- East Scarborough Boys and Girls Club
- Confederation of Resident and Ratepayer Associations in Toronto
- Scarborough Residents Unite Neighbourhood Association/Scarborough Village Community Association
- Rouge Valley Health System - Centenary Health Centre
- Toronto District School Board (TDSB)
- Toronto Lands Corporation (subsidiary of TDSB)
- Toronto Catholic District School Board (TCDSB)
- Durham District School Board (DDSB)
- Durham Catholic District School Board (DCDSB)
- Guildwood Village Community Association

- Toronto Strong Neighbourhoods Strategy Community Development Officers
- University of Toronto Scarborough Campus
- Centennial College
- Trent University – Durham
- Ontario Tech University
- Durham College
- Scarborough Town Centre
- Pickering Town Centre
- RioCan Durham Centre
- Oshawa Centre
- Ajax Downs
- Scarborough Health Network
- Glen Andrew Community Association
- North Bendale Community Association
- Midland Park Community Association
- Centennial Community Recreation Association
- MornelleCAN in Mornelle Court
- Scarborough Campus Students' Union
- Ajax-Pickering Board of Trade
- Whitby Chamber of Commerce
- Greater Oshawa Chamber of Commerce

Five meetings have been held with the SAG to date: two with all SAG members, two with Toronto members only, and one with Durham members only. Meeting dates, participating SAG representatives, and a summary of each meeting is provided in **TABLE 6.8**. The group's Terms of Reference, contact list, meeting minutes and materials, record of correspondence and emails are provided in **Appendix K4**.

TABLE 6.8. STAKEHOLDER ADVISORY GROUP MEETINGS

Date	Attendees	Meeting Summary
June 5, 2019	Highland Creek Community Association; Whitby Chamber of Commerce; Downtown Whitby BIA; Durham District School Board; Centennial College; Metrolinx; City of Toronto	The Project team provided an overview of the DSBRT Project, including information on the Project background, study process, schedule, consultation strategy and next steps. The purpose of the meeting was to obtain input on the pinch point locations along the corridor.
August 26, 2019	Glen Andrew Community Association; Guildwood Community Association; East Scarborough Boys and Girls Club; Brett McCandless; Councillor Jennifer McKelvie and Councillor Paul Ainslie; Metrolinx; TTC; City of Toronto	The Project team provided an overview of the DSBRT Project, including information on the Project background, study process, schedule, consultation strategy and next steps. The purpose of the meeting was also to obtain input on the pinch point locations along the corridor, with a focus on the Ellesmere Road pinch point.

Date	Attendees	Meeting Summary
October 28, 2019	Metrolinx; City of Toronto; Durham Region; Toronto Catholic School Board; Town of Whitby; Trent University; University of Toronto Scarborough Campus; Whitby Chamber of Commerce	The Project team provided a brief overview of the DSBRT Project, including information on the Project background, study process, schedule, consultation strategy and next steps. The purpose of the meeting was to provide an update on the technical work completed to date and to obtain input on the technically preferred alternatives for each of the pinch point locations along the corridor.
October 28, 2020	Durham Region SAG Session Metrolinx; Durham Region; Durham Region Transit; Downtown Whitby BIA; Durham District School Board; Oshawa Centre; Trent University; Whitby Chamber of Commerce	The Project team provided a brief overview of the DSBRT Project and presented the preliminary design in Durham Region. The purpose of the meeting was to provide an update on Project status and obtain feedback on the preliminary design and potential impacts and mitigation measures.
November 4, 2020	City of Toronto SAG Session Metrolinx; City of Toronto; TTC; UTSC; Scarborough Community Renewal Organization; Toronto Lands Corporation	The Project team provided a brief overview of the DSBRT Project and presented the preliminary design in the City of Toronto. The purpose of the meeting was to provide an update on Project status and obtain feedback on the preliminary design and potential impacts and mitigation measures.

6.2.6 Shelters and Streetscape Workshop

A Stop Architecture Workshop and a Streetscape Workshop were held on February 4, 2020. Representatives from Metrolinx, Durham Region, Durham Region Transit, TTC, and City of Toronto participated in the workshops. The purpose of the workshops were to receive feedback and direction to help advance the shelter and platform design and the streetscape design.

The Stop Architecture Workshop included an overview of the typical components that make up a Bus Rapid Transit shelter. Components were broken up into three groups: the look, the information and the parts. The intent of the workshop was to receive direction on the components to be included as part of the DSBRT shelters.

The Streetscape Workshop included an overview of the preliminary typologies developed as part of the streetscape study: Urban, Campus, Typical and Naturalized. These typologies would be applied to stop locations along the corridor to help inform the streetscape design. The intent of the workshop was to receive feedback on the streetscape components that should be included in the DSBRT streetscape design.

6.2.7 Other Stakeholder Meetings

Notification and consultation were carried out to encourage the involvement of government review agencies (i.e., transit authorities, Conservation authorities, utility companies, emergency medical services (EMS), etc.) throughout the stages of this

study. Agencies were invited to participate in the PICs and focused meetings to address specific concerns and technical requirements.

Agencies were invited to attend the two rounds of PIC #1 held June 6, 2019 to June 12, 2019 and September 29, 2019. Additionally, a second PIC was held on November 18, 2019 to November 20, 2019, and a third PIC was held on November 16, 2020 to January 10, 2021. PIC invitation letters were mailed on November 16, 2018, for PIC# 1, January 20, 2020, for PIC# 2, and November 3, 2020 for PIC# 3, respectively.

The Project team met with individual stakeholders on an as-needed basis throughout the duration of the Project. Meetings were typically held to confirm specific details that influenced the preliminary design. Meeting dates, participating stakeholders, and a summary of each meeting is provided in **TABLE 6.9**. Meeting minutes and materials, excluding meetings with local municipalities, are provided in **Appendix K6.**

TABLE 6.9. INDIVIDUAL STAKEHOLDER MEETINGS

Date	Attendees	Meeting Summary
May 3, 2019	City of Toronto Eglinton East Light Rail Transit Team	City of Toronto provided an overview of the Eglinton East Light Rail Transit (EELRT) project, including the design to date. The interaction between the DSBRT and EELRT was also discussed.
May 5, 2021	Durham Region Committee of the Whole #1	An overview of the DS BRT project was presented for information, including details on the project background, study process, schedule, consultation strategy and next steps.
May 30, 2019	TTC Scarborough Subway Extension Team	TTC provided an overview of the Scarborough Subway Extension (SSE) project. The interaction between the DSBRT and SSE was also discussed, specifically how DSBRT buses will circulate and pick-up/drop-off passengers for the new subway station.
July 5, 2019	University of Toronto Scarborough Campus	The Project team provided an overview of the DSBRT Project, including information on the Project background, study process, schedule, and next steps. Access to University of Toronto Scarborough Campus was also discussed.
September 11, 2019	Town of Whitby #1	The Project team provided an overview of the DSBRT Project, including information on the Project background, study process, schedule, consultation strategy and next steps. The Town of Whitby provided information related to on-going and future studies that pertain to the Study Area, as well as the Town's goals to improve walkability.

Date	Attendees	Meeting Summary
December 18, 2019	Durham Region Council	The project team provided a brief overview of the DS BRT project, including information on the project background, study process, schedule, consultation strategy and next steps. Information was also presented on the technically preferred alternatives for the pinch points in Durham Region.
January 10, 2020	Town of Whitby #2	The Project team met with the Town of Whitby to discuss the design in the Whitby portion of the Study Area. The transit mall option between Byron and Green Streets was preferred by the Town. Outside of the downtown pinch point, the Town agreed that the Environmental Assessment would protect for a 6-lane cross-section with centre-median transit lanes.
February 3, 2020	City of Oshawa Council	The project team provided a brief overview of the DS BRT project. Information was also presented on the technically preferred alternative for the Downtown Oshawa pinch point.
February 8, 2020	Oshawa Development Services Committee	The purpose of the meeting was to provide an overview of the DSBRT project and information presented at PIC #3.
March 17, 2020	Town of Ajax #1	The Project team provided a brief overview of the DSBRT Project. The Project team presented potential options for the Pickering Village pinch point, including 4-lane, 5-lane and 6-lane cross-sections, noting various traffic and cultural heritage impacts of each.
April 6, 2020	Ministry of Transportation #1	The Project team provided a brief overview of the DSBRT Project. The Project team presented 6 potential options for Kingston Road between Ellesmere Road and Port Union Road, including the preliminary evaluation of the options for MTO's consideration.
May 1, 2020	City of Toronto #1	The purpose of the meeting was to review and discuss the proposed scope for traffic operations modelling in the City of Toronto for the DSBRT Project.
June 4, 2020	Highland Creek Community Association #1	The purpose of the meeting was to provide information on the DSBRT Project, discuss the technically preferred option for Ellesmere Road and to answer Highland Creek Community Association's questions.
June 22, 2020	City of Toronto #2	The purpose of the meeting was to provide an overview of the civil design submission for City staff.
July 2, 2020	Durham Region #1	The purpose of the meeting was to discuss design elements and confirm design criteria

Date	Attendees	Meeting Summary
		pertaining to the Durham section of the BRT.
July 20, 2020	City of Toronto #3	The purpose of the meeting was to discuss the traffic report and growth rate assumptions.
July 29, 2020	Durham Region #2	The purpose of the meeting was to discuss the traffic report and growth rate assumptions.
July 31, 2020	City of Oshawa #1	The purpose of the meeting was to discuss the design alternatives in Downtown Oshawa, including the east end turnaround. Other municipal works such as the King Street improvements were also discussed.
August 10, 2020	Durham Region #3	The purpose of the meeting was to confirm the recommended cycling facilities for the Durham Region portion of the DSBRT corridor.
August 24, 2020	City of Toronto #4	The purpose of the meeting was to confirm the recommended cycling facilities for the Toronto portion of the DSBRT corridor.
September 17, 2020	City of Toronto #5	The purpose of the meeting was to discuss Toronto and TTC's comments on the second design submission.
September 18, 2020	Durham Region #4	The purpose of the meeting was to discuss Durham Region and DRT's comments on the second design submission.
September 22, 2020	Scarborough Community Renewal Organization	The purpose of the meeting was to provide information on the DSBRT Project, discuss the recommended design for Ellesmere Road and answer the organization's questions.
October 2, 2020	Highland Creek Community Association #2	The purpose of the meeting was to discuss the recommended design for Ellesmere Road and answer HCCA's questions.
October 9, 2020	Ellesmere Road Business Information Session #1	The purpose of the meeting was to provide information on the DSBRT Project, discuss traffic patterns and business needs along Ellesmere Road.
October 9, 2020	Ministry of Transportation #2	The purpose of the meeting was to review technical information provided in support of design options in the following three areas along the corridor: Kingston Road from Ellesmere Road to Port Union Road, Highway 401 westbound off-ramp in Pickering, and Dundas Street West at Highway 412 in Pickering.
October 26, 2020	City of Pickering Council #1	The purpose of the meeting was to provide an update on Project status and obtain feedback on the preliminary design and potential impacts and mitigation measures.

Date	Attendees	Meeting Summary
November 2, 2020	Town of Whitby Council	The purpose of the meeting was to provide an update on Project status and obtain feedback on the preliminary design and potential impacts and mitigation measures.
November 9, 2020	Oshawa Development Service Committee #1	The purpose of the meeting was to provide an update on Project status and obtain feedback on the preliminary design and potential impacts and mitigation measures.
November 11, 2020	Durham Region Committee of the Whole #2	The purpose of the meeting was to provide an update on Project status and obtain feedback on the preliminary design and potential impacts and mitigation measures.
November 16, 2020	Town of Ajax Council #1	The purpose of the meeting was to provide an update on Project status and obtain feedback on the preliminary design and potential impacts and mitigation measures.
November 17, 2020	Whitby Business Improvement Association #1	The purpose of the meeting was to provide an update on the Durham-Scarborough BRT Project and discuss the preferred design, with a particular focus on Downtown Whitby. The Project team aimed to identify businesses concerns and discuss ways to improve the design to mitigate impacts.
November 18, 2020	City of Toronto Executive Committee	The purpose of the meeting was to provide an update on the Durham-Scarborough BRT Project and discuss the preferred design.
November 26, 2020	Toronto Emergency Services	The purpose of the meeting was to review the preferred design in Toronto to make sure it accommodates emergency service operations.
November 27, 2020	Trent University	The purpose of the meeting was to review the design near Trent University and discuss potential impacts and mitigation measures.
November 30, 2020	Elexicon	The purpose of the meeting was to discuss the preferred design and determine potential impacts to utilities and mitigation measures.
December 2, 2020	Oshawa Power	The purpose of the meeting was to discuss the preferred design and determine potential impacts to utilities and mitigation measures.
December 9, 2020	Durham Region Cycling Coalition	The purpose of the meeting was to provide information on the Durham-Scarborough BRT Project and obtain feedback on the preliminary design, including the proposed cycling facilities in Durham Region.
December 15, 2020	Hydro One	The purpose of the meeting was to discuss the preferred design and determine

Date	Attendees	Meeting Summary
		potential impacts to utilities and mitigation measures.
January 28, 2021	Durham Region #5	The purpose of the meeting was to review the alternative transit mall design in Downtown Whitby with Durham Region's traffic and transportation departments.
January 28, 2021	City of Toronto #6	The purpose of the meeting was to determine the ultimate design and potential interim measures between Morningside and Kingston Road.
January 28, 2021	Ellesmere Road Businesses #2	The purpose of the meeting was to provide information on the Durham-Scarborough BRT Project, discuss traffic patterns and business needs along Ellesmere Road.
February 9, 2021	Canadian Pacific	The purpose of the meeting was to discuss the proposed modifications to the CP bridge.
February 11, 2021	City of Toronto #7	The purpose of the meeting was to confirm design elements in the City of Toronto.
February 22, 2021	Town of Whitby #3	The purpose of the meeting was to present and discuss the North Side Pedestrian Mall option, and the boundaries of the 6-lane cross-section east and west of the downtown.
February 23, 2021	Durham Region Emergency Services	The purpose of the meeting was to review the preferred design in Durham to ensure it accommodates emergency service operations.
February 25, 2021	Whitby Business Improvement Association #2	The purpose of the meeting was to present, discuss and hear comments and concerns related to the North Side Pedestrian Mall option.
March 5, 2021	City of Oshawa #2	The purpose of the meeting was to discuss the City's concerns raised in the Staff Report to Development Services Committee, including but not limited removal of on-street parking, shelter design, access and consultation.
March 9, 2021	Whitby Chamber of Commerce #1	The purpose of the meeting was to present and discuss the North Side Pedestrian Mall option, and the boundaries of the 6-lane cross-section east and west of the downtown.
March 10, 2021	Town of Whitby #4	The purpose of the meeting was to discuss the Town's concerns related to the design in the Town of Whitby, including the North Side Pedestrian Mall.
March 16, 2021	Ministry of the Environment, Conservation and Parks	The purpose of the meeting was to discuss the Durham-Scarborough BRT Project, including proponency, proposed TPAP

Date	Attendees	Meeting Summary
		timelines, and matters of provincial importance. MECP was also asked to confirm the list of potentially interested Indigenous Nations.
March 25, 2021	Breadsource	The purpose of the meeting was to discuss Breadsource's operations and determine potential mitigation measures.
March 26, 2021	City of Oshawa #3	The purpose of the meeting was to discuss the City's concerns raised in the Staff Report to Development Services Committee, including but not limited removal of on-street parking, shelter design, access and consultation.
April 1, 2021	Durham District School Board	The purpose of the meeting was to discuss and better understand the request from DDSB for their school buses to utilize the Bus Rapid Transit dedicated lanes to facilitate door to door pick-up and drop-off.
April 8, 2021	Town of Whitby #5	The purpose of the meeting was to discuss the preliminary design at Euclid/Henry (library, urban filter); downtown 2-lane or 3-lane options; west of downtown 6-lane/5-lane; east of downtown 6-lane; consultation next steps; town comments on traffic analysis.
April 8, 2021	City of Toronto #8	The purpose of the meeting was to discuss the Ellesmere Road design from Military Trail to Kingston Road, including median breaks for local transit, signal at Mornelle Court, the Rouge Bridge, and the report to the Executive Committee.
April 20, 2021	Olde Whitby Neighbourhood Association #1	The purpose of the meeting was to discuss the concerns raised by the Olde Whitby Neighbourhood Association, including traffic, cultural heritage, safety and consultation.
April 22, 2021	Town of Whitby Special Council Meeting #1	Town of Whitby Council hosted a special Council Meeting to present the latest preliminary design in the Town of Whitby and obtain feedback.
April 28, 2021	Byron Estates	The purpose of this meeting was to discuss the Condo board and owner/residents of DCC84 concerns regarding the proposed design through downtown Whitby, as part of the Durham-Scarborough BRT project, and what refinement option might be possible to the existing design options to alleviate the communities concerns with the project through downtown.
April 28, 2021	Durham Condominium Corporation 84 (DCC84)	The purpose of the meeting was to discuss the concerns of the Condominium Board,

Date	Attendees	Meeting Summary
		owners, and residents of DCC84 regarding the proposed DS BRT design through downtown Whitby.
May 5, 2021	City of Oshawa #4	The purpose of the meeting was to discuss design elements and parking with the Oshawa section of the corridor.
May 6, 2021	Olde Whitby Neighbourhood Association #2; Perry's District; DCC84	The purpose of the meeting was to discuss the concerns raised by the Olde Whitby Neighbourhood Association, Perry's District, and DCC84, including the downtown 3-lane option.
May 7, 2021	Butchie's	The purpose of the meeting was to discuss concerns of Andrea Nicholson, owner of Butchie's Restaurant in Whitby, related to expropriation, parking lot impacts, entrance/egress impacts, construction timelines, retribution for businesses and business supports.
May 7, 2021	Highland Creek Community Association #3; Councillor McKelvie	The purpose of the meeting was to discuss the concerns of the Highland Creek Community Association, including parking, left-turns, cycling infrastructure, and street trees.
May 10, 2021	Whitby Business Improvement Association #3	The purpose of the meeting was to look at proposed design revisions for the DS BRT in the Town of Whitby.
May 12, 2021	Whitby Chamber of Commerce #2	The purpose of the meeting was to review the refined preliminary design and address project impacts and mitigation measures.
May 14, 2021	City of Pickering	The purpose of the meeting was to discuss the concerns of City of Pickering staff.
May 25, 2021	City of Pickering Council	The purpose of the meeting was to share information and consult the Committee regarding accessibility of the DS BRT Project.
May 28, 2021	Raglan Street Residents; Councillors Newman and Leahy	The purpose of the meeting was to discuss with residents of Raglan Street and Councillors Newman and Leahy (Whitby) whether an alternative solution may be considered for the area from McQuay to Raglan/Cochrane.
June 1, 2021	Cycle Toronto; Access Alliance; Toronto East Cyclists; City of Toronto	The purpose of the meeting was to discuss the cycling infrastructure proposed for the Toronto segment of the DS BRT.
June 7, 2021	Oshawa Development Services Committee	The purpose of the meeting was to provide an update on the DS BRT project to the Development Services Committee.

Date	Attendees	Meeting Summary
June 8, 2021	Oshawa Landowners & Multi-tenant Properties	The purpose of the meeting was to discuss left-turn/U-turn access to buildings, parking, and potential business impacts.
June 9, 2021	Durham Region Committee of the Whole #3	The purpose of the meeting was to provide an update on project status and get feedback on the preliminary design, potential impacts, and mitigation measures.
June 18, 2021	Town of Ajax	The purpose of the meeting was to review preliminary design and traffic operations at Pickering village area.
June 21, 2021	Town of Ajax Council #2	The purpose of the meeting was to provide council with an update on the DS BRT project schedule and preferred preliminary design, and answer questions from Council Members.
June 21, 2021	Town of Whitby Special Council #2	The purpose of the meeting was to seek council endorsement of the preferred technical option for BRT implementation on Highway 2 to allow for commencing TPAP and detailed design stages for the project. Vote carried (5-4) in support.
June 24, 2021	Ellesmere Road Businesses #3	The purpose of the meeting was to discuss the concerns of businesses located along Ellesmere Road in Scarborough, including left-turn restrictions and truck access.
July 6, 2021	City of Toronto Executive Committee	The purpose of the meeting was to receive the report (June 21, 2021) regarding the Update on Metrolinx Transit Expansion Projects - Second Quarter 2021.
July 14, 2021	City of Toronto Council	The purpose of the meeting was for City Council to vote on MM35.22, to request Metrolinx to further engage the Highland Creek Community and evaluate design alternatives without a curbed centre median along Ellesmere Road. The motion was adopted.
July 14, 2021	TTC Advisory Committee on Accessible Transit	The purpose of the meeting was to provide information on the Project, including the technically preferred design in the City of Toronto and the accessibility components of the Project.
July 14, 2021	Whitby Public Library	The purpose of the meeting was to discuss the design of DSBRT and the impact to the Whitby Public Library and Celebration Square.
July 20, 2021	Town of Whitby #6	The purpose of the meeting was to discuss and review town plan capital program for structures along Dundas St.

Date	Attendees	Meeting Summary
July 21, 2021	Ministry of Transportation Ontario #3	The purpose of the meeting was to provide an update on the status of DSBRT design at MTO jurisdiction areas.
July 27, 2021	Ministry of Transportation Ontario #4	The purpose of the meeting was to discuss the Highway 412 interchange with Dundas Street in Whitby.
August 26, 2021	Ministry of Transportation Ontario #5	The purpose of this meeting was to provide an update on the DSBRT project and overview of the interface of DSBRT at the 3 MTO jurisdiction areas.
August 31, 2021	Aldgate Group	The purpose of this meeting was to observe site operations for the Aldgate Centre and other driveways along Ellesmere Road west of Markham Road and discuss truck access options for businesses along Ellesmere Road.
September 6, 2021	GO Transit Bus Operations	The purpose of this meeting was to provide a background on the Durham-Scarborough Bus Rapid Transit project.
September 23, 2021	Scarborough Public Meeting	The purpose of this meeting was to provide an update on the DSBRT project including consultation, preliminary design, safety benefits and next steps.

The Project team also presented to a number of the local municipal advisory committees with mandates related to the DSBRT Project. The purpose of this consultation was to provide information and spread awareness of the Project and obtain feedback from the committee members. Details are included in **TABLE 6.10**.

TABLE 6.10. ADVISORY COMMITTEE MEETINGS

Date	Committee	Meeting Summary
October 7, 2020	Ajax Heritage Advisory Committee	The purpose of the meeting was to review the Cultural Heritage Evaluation Reports prepared for properties within Pickering Village.
December 8, 2020	Whitby Heritage Advisory Committee	The purpose of the meeting was to provide feedback on the Cultural Heritage Report for the DSBRT Project.
December 16, 2020	Ajax Accessibility Advisory Committee	The purpose of the meeting was to provide information on the DSBRT Project, including the proposed design in Ajax and the accessibility features.
February 2, 2021	Oshawa Environmental Advisory Committee	The purpose of the meeting was to provide information on the DSBRT Project, the technically preferred design in Oshawa and the Project's environmental components.
February 3, 2021	Oshawa Active Transportation Advisory Committee	The purpose of the meeting was to provide information on the DSBRT Project, the

Date	Committee	Meeting Summary
		technically preferred design in Oshawa and the active transportation components of the Project.
February 17, 2021	Oshawa Accessibility Advisory Committee	The purpose of the meeting was to provide information on the Project, including the technically preferred design in the City of Oshawa and the accessibility components of the Project.
February 25, 2021	Oshawa Heritage Advisory Committee	The purpose of the meeting was to provide information on the Project, including the technically preferred design in the City of Oshawa and the cultural heritage components of the Project.
March 2, 2021	Whitby Accessibility Advisory Committee	The purpose of the meeting was to provide information on the Project, including the technically preferred design in the Town of Whitby and the accessibility components of the Project.
March 3, 2021	Whitby Sustainability Advisory Committee	The purpose of the meeting was to provide information on the Project, including the technically preferred design in the Town of Whitby and the sustainability and climate change components of the Project.
March 9, 2021	Whitby Heritage Advisory Committee	The purpose of the meeting was to provide information on the Project, including the technically preferred design in the Town of Whitby and the cultural heritage components of the Project.
March 11, 2021	Durham Region Active Transportation and Safe Roads Committee	The purpose of the meeting was to provide information on the DSBRT Project, the technically preferred design in Durham Region and the active transportation components of the Project.
March 11, 2021	Whitby Active Transportation Advisory Committee	The purpose of the meeting was to provide information on the DSBRT Project, the technically preferred design in the Town of Whitby and the active transportation components of the Project.
March 17, 2021	Pickering Accessibility Advisory Committee	The purpose of the meeting was to provide information on the Project, including the technically preferred design in the City of Pickering and the accessibility components of the Project.
March 18, 2021	Downtown Whitby Development Steering Committee	The purpose of the meeting was to provide information on the DSBRT Project, the technically preferred design in the Town of Whitby.
March 18, 2021	Durham Region Environmental Committee	The purpose of the meeting was to provide information on the Project, including the technically preferred design in Durham

Date	Committee	Meeting Summary
		Region and the environmental components of the Project.
March 23, 2021	Durham Region Accessibility Committee	The purpose of the meeting was to provide information on the Project, including the technically preferred design in Durham Region and the accessibility components of the Project.
March 23, 2021	Durham Region Transit Advisory Committee	The purpose of the meeting was to provide information on the Project, including the technically preferred design in Durham Region.
March 24, 2021	Pickering Heritage Committee	The purpose of the meeting was to provide information on the Project, including the technically preferred design in the City of Pickering and the cultural heritage components of the Project.

6.2.8 Indigenous Nations Engagement

6.2.8.1 Identification of Indigenous Nations

The initial consultation with MECP, identified Indigenous Nations with constitutionally protected Aboriginal and Treaty Rights or other potential interest in the Project.

On May 30, 2019, the identified Indigenous Nations were contacted to confirm interest in the Project. Indigenous Nations were engaged and contacted to ensure that the Project addresses all concerns raised by constitutionally protected Aboriginal and Treaty Rights. Consultation and engagement with Indigenous Nations was led by Metrolinx. The consultant team provided support and prepared materials to assist in consultation and engagement activities, as needed.

As required under O. Reg. 231/08, Metrolinx sent a letter to the MECP on May 30, 2019 requesting assistance in identifying Indigenous Nations that may have an interest in the Project. On July 8, 2019, MECP confirmed the applicable Indigenous Nations (via email). This correspondence is provided in **Appendix K5**. The following Indigenous Nations were identified:

- Alderville First Nation
- Beausoleil First Nation
- Chippewas of Georgina Island
- Chippewas of Rama First Nation
- Curve Lake First Nation
- Hiawatha First Nation
- Huron-Wendat Nation
- Kawartha Nishnawbe First Nation
- Mississaugas of the Credit First Nation
- Mississaugas of Scugog Island First Nation

Prior to the TPAP, MECP provided a letter reconfirming the identified Indigenous Nations on April 16, 2021. The letter is provided in **Appendix K5**. The Indigenous Nations contact list and all correspondence is also included in **Appendix K5**.

6.2.8.2 Correspondence with Indigenous Nations

The identified Indigenous Nations were sent a Project introduction letter and invitation to PIC #1 on May 30, 2019.

No Project specific meetings were held with Indigenous Nations during the Pre-Planning Activities phase. Metrolinx included offers to provide additional information or to schedule a meeting when distributing Notices of Public Information Centres #1, #2, and #3 to Indigenous Nations on May 30, 2019, November 15, 2019, and November 11, 2020, respectively. Metrolinx has also provided individual offers for meetings in response to comments from Indigenous Nations; a summary can be seen in **TABLE *6.11***.

In addition to circulating the PIC notes, the Draft Stage 1 Archaeological Assessment was shared with Indigenous Nations for review and comment on March 19, 2021 via email. Metrolinx received a letter from Huron-Wendat Nation noting satisfaction with the report's findings. This is summarized in **TABLE *6.11***.

On April 22, 2021, the following draft environmental reports were shared for review and comment:

- Natural Environment Report;
- Arborist Report;
- Cultural Heritage Report; and
- Cultural Heritage Evaluation Reports #1 (601 Kingston Road West, 605 Kingston Road West, and 607-611 Kingston Road West, Ajax) and #2 (571 Kingston Road West, 575 Kingston Road West, 577 Kingston Road West, and 579 Kingston Road West, Ajax).

Metrolinx received detailed comments from Curve Lake First Nation regarding the draft Natural Environment Report, Cultural Heritage Report, and CHERs. These comments are detailed in **TABLE *6.11***.

TABLE 6.11. SUMMARY OF COMMENT-RESPONSES RELATED TO FACILITATING CONSULTATION WITH INDIGENOUS NATIONS

Date	Indigenous Nation	Summarized Comment	Metrolinx Response
2019-06-03	Kawartha Nishnawbe	Kawartha Nishnawbe holds proven Treaty and Aboriginal rights in the area affected by the project but has insufficient resources to engage with	While Metrolinx is not in a position to provide funding, we are available to support Kawartha Nishnawbe engagement with the project. For example, we are available to meet and discuss the project and can

Date	Indigenous Nation	Summarized Comment	Metrolinx Response
		Metrolinx on the DS BRT Project.	provide project summary details and support review by the community. We would greatly appreciate feedback confirming if the community will be participating and, if so, how project engagement can be approached to support the community's participation.
2019-11-19	Curve Lake First Nation	Please provide a File Fee for this project and keep Curve Lake First Nation apprised throughout all phases of this project.	While Metrolinx is not in a position to provide funding, we would like to support Curve Lake First Nation's engagement with this project. Metrolinx is committed to sharing information and attending the community if you would like to discuss this project further.
2021-04-29	Huron-Wendat Nation	The report adequately describes the Indigenous land use and settlement. The report is satisfactory for the purposes of the Stage 1 assessment of the Study Area. Regarding the future archaeological work, HWN is requesting to be consolidated at every stage and of course provide liaisons for all work. Pease do not hesitate to contact our team should you have questions and to follow up with the next steps.	N/A
2021-06-18	Curve Lake First Nation	The draft environmental reports did not acknowledge Indigenous Knowledge (IK) systems and do not acknowledge CLFN's cultural values or interests. Noted errors and omissions related to CLFN's history on the land. Provided comments related to natural heritage, specifically the aquatic environment.	Comments discussed with CLFN at a monthly meeting with Metrolinx held on January 10, 2022. Metrolinx is working towards addressing CLFN's feedback related to natural heritage, cultural heritage, and archaeology with CLFN during the EPR 30-day review period for incorporation by February 22, 2022. Metrolinx will discuss and address CLFN's feedback at the next CLFN monthly meeting scheduled for February 15, 2022.
2021-06-23	Mississaugas of the Credit First Nation	The archeological report was overlooked in our review queue. The DOCA office was quite busy during the month of May and our capacity issues continue for the moment. Therefore, while we	Thanks for letting us know. I will pass this on to the project team. Did you want me to inquire as to a possible extension?

Date	Indigenous Nation	Summarized Comment	Metrolinx Response
		are unable to complete the report review at this time, I want to confirm that MCFN is interested in continuing on participation on this project for any Stage 2 assessment required.	

6.2.9 Elected Officials Consultation

The Project team has held briefings with members of local and regional Councils, as well as Members of Provincial Parliament. Details are included in **Table 6.12**.

TABLE 6.12. ELECTED OFFICIAL BRIEFINGS

Date	Elected Officials	Meeting Summary
April 29, 2019	Durham Region MPPs	Durham Region MPPs were briefed on the DS BRT project and planned consultation.
December 3, 2020	Mayor Don Mitchell (Town of Whitby)	The purpose of the meeting was to present information on the proposed transit mall in Downtown Whitby.
February 19, 2021	MPP Lorne Coe	The purpose of the meeting was to provide an overview of the DS BRT design and consultation performed in Whitby, and upcoming consultation.
March 25, 2021	Councillor Paul Ainslie	The purpose of this meeting was to provide an overview of the current design for the DSBRT Project and upcoming GO Expansion Works in Councillor Ainslie's Ward (Scarborough Southwest).
March 29, 2021	Regional Councillor Marilyn Crawford; Councillor Rob Tyler-Morin	The purpose of this meeting was to provide an overview of the current design for the Project; specifically, through Pickering Village and the Town of Ajax.
April 6, 2021	Regional Councillor and Deputy Mayor Christopher Leahy; Regional Councillor Steve Yamada; Councillor JoAnne Drumm; Councillor Deidre Newman	The purpose of this meeting was to discuss the community concern regarding the proposed North Side Pedestrian Mall design through downtown Whitby, as part of the DSBRT Project.
April 9, 2021	Regional Councillor Rhonda Mulcahy; Councillor Steve Lee	The purpose of this meeting was to discuss the community concern regarding the proposed North Side Pedestrian Mall design through downtown Whitby, as part of the DSBRT Project.
April 19, 2021	MPP Lorne Coe	The purpose of this meeting was to discuss the community concern regarding the proposed North Side Pedestrian Mall design through downtown Whitby and what refinements might be possible to the existing design options to alleviate the

Date	Elected Officials	Meeting Summary
		communities' concerns with the Project through downtown.
April 21, 2021	Regional Councillor and Deputy Mayor Christopher Leahy; Regional Councillor Steve Yamada; Councillor Deidre Newman	The purpose of this meeting was to discuss the community concern regarding the proposed design through downtown Whitby and what refinement option might be possible to the existing design options to alleviate the communities' concerns with the Project through downtown.
April 22, 2021	Councillor Steve Lee; Regional Councillor Elizabeth Roy; Regional Councillor Rhonda Mulcahy; Councillor JoAnne Drumm	The purpose of this meeting was to discuss the community concern regarding the proposed design through downtown Whitby, and what refinement option might be possible to the existing design options to alleviate the communities' concerns with the Project through downtown.
April 30, 2021	MPP Vijay Thanigasalam	The purpose of this meeting was to provide an update on the DS BRT project and the proposed design through Scarborough-Rouge Park.
May 26, 2021	MPP Rod Philips	
June 4, 2021	MPP Mitzie Hunter	The purpose of this meeting was to review project elements, impacts, and changes to the Scarborough-Guildwood community.
June 8, 2021	MPP Rod Philips	The purpose of this meeting was to provide MPP Philips with an overview of why the preferred design for Ajax was the 5-lane design, rather than a 6-lane option.
June 16, 2021	Mayor Shaun Collier	The purpose of this meeting was to discuss the design solution for the Ajax section of the DS BRT.
June 21, 2021	MPP Rod Philips; Councillor Rob Tyler-Morin; Councillor Marilyn Crawford	The purpose of this meeting was to discuss the design solution for the Ajax section of the DS BRT, specifically Pickering Village.
August 17, 2021	MPP Thanigasalam	The purpose of this meeting was to discuss the design solution for the Toronto section of the DS BRT.

No Project specific briefings have been held with Federal elected officials.

6.3 Transit Project Assessment Process Consultation

6.3.1 Notice of Commencement and Public Information Centre #4

The Notice of TPAP Commencement and Public Information Centre #4 was issued on October 14, 2021 as per O. Reg. 231/08. The Notice was mailed to Indigenous Nations listed in Section 6.2.8 and property owners within 30 metres of the project corridor on October 4, 2021. Unaddressed Admail was sent to residents and businesses within 500

metres of the project corridor. Agencies, Indigenous Nations and utilities were notified by email on October 14, 2021. The Notice was also published in five local newspapers.

A summary of the channels used to disseminate the Notice is provided in **Table 6.13**. The circulated agencies, utilities, and Indigenous Nations from the Master Contact List can be viewed in **Appendix K1**.

TABLE 6.13. NOTICE OF COMMENCEMENT DISTRIBUTION

Channel	Date of Issue	Stakeholder
Newspapers	Scarborough Mirror – October 14 and 21, 2021; Ajax-Pickering News Advertiser – October 14 and 21, 2021; Whitby This Week – October 14 and 21, 2021; Oshawa This Week – October 14 and 21, 2021; Clarington This Week – October 14 and 21, 2021 L'Express Toronto – October 15 and 22, 2021	General Public
Direct Mail (Canada Post)	Mailed October 10, 2021	Property Owners within 30 m
Unaddressed Admail (Canada Post)	Mailed October 15, 2021	Residents, Businesses, Tenants within 500 m
Project Website	October 14, 2021	General Public
Indigenous Nations (Letters via Email)	October 14, 2021	Indigenous Nations

6.3.2 Project Website

The project website was updated at the start of TPAP to maintain all previous consultation materials and host new content. The project website was maintained throughout the TPAP consultation period. Additional information included on the website included:

- Notice of Commencement and Public Information Centre #4;
- Project overview and background information;
- Preliminary design of the BRT routes in each community; and,
- Public engagement including materials from past engagement events, interactive map and Frequently Asked Questions.

The project website continued to have a map of the Study Area and Project Team contact information.

6.3.3 Public Information Centre #4

The purpose of Public Information Centre #4 was to present and seek feedback on the preliminary design, potential impacts, and proposed mitigation measures. Due to the

ongoing COVID-19 pandemic, PIC #4 was held virtually on the Metrolinx Engage website from Thursday, October 14 to November 11, 2021. PIC #4 was open for a 4 week period to allow time for individuals to review the materials.

Notice of PIC #4 was issued on October 14, 2021, jointly with the Notice of Commencement through the channels shown in **Table 6.13**

Three live virtual events were held on October 21, 26, and 28, 2021. There was a presentation and an opportunity for attendees to ask questions and provide comments to the Project Team. These events were recorded and posted to the project website for the public to review at their convenience.

The following materials were available on the website:

- Live event & recordings;
- Webpages and display boards;
- Design drawings and renderings; and,
- Interactive map.

Participants were encouraged to ask questions, submit feedback, and share ideas with the project team. Input was received through multiple channels, including:

- Online surveys;
- Ask a Question webpage;
- Interactive map;
- Emails;
- Telephone calls; and,
- Community meetings.

A summary of key engagement statistics is provided below. The statistics represent participation between October 14, 2021 and November 11, 2021:

- **Public Information Centre #4 Website:** 2,490 users visited the project website during Public Information Centre #4. The website amassed 6,899 unique pageviews and 8,838 total views.
- **Online Surveys:** 69 surveys were submitted.
- **Ask a Question Comments:** 11 questions were submitted by members of the public. The questions and responses received a total of 88 upvotes and downvotes.

- **Interactive Map**: The map attracted 2,678 unique visitors. 11 comments were submitted by 5 individuals.
- **Preliminary Design Pages:** Design drawings received a total of 1152 views:
  - Toronto Preliminary Design: 335 views.
  - Pickering Preliminary Design: 249 views.
  - Ajax Preliminary Design: 183 views.
  - Whitby Preliminary Design: 249 views.
  - Oshawa Preliminary Design: 136 views.

Online surveys were located on the preliminary design pages for each of the five municipalities: Toronto, Pickering, Ajax, Whitby and Oshawa. The public was encouraged to complete the survey to provide feedback to the project team.

The surveys were available from October 14, 2021 to November 11, 2021. A total of 69 online surveys were submitted. A summary of responses is included in **TABLE 6.14**. A full record of responses received is included in **Appendix K2**.

TABLE 6.14. ONLINE SURVEY RESPONSE SUMMARY

Are there aspects of the design you like?
Toronto & West Turn Around ➢ Separated and protected cycling infrastructure. (23 comments) ➢ Dedicated bus transit lanes. (14 comments) **Pickering** ➢ Separated bike lanes and tree lined streets. (3 comments) ➢ None (5 comments) **Ajax** ➢ Dedicated centre lanes will improve traffic situation. ➢ Do not agree with new design plan. **Whitby** ➢ Wider sidewalks and less cars in downtown. ➢ Provision of Multi-Use Path. ➢ Excellent shelter design. ➢ Good tree canopy along main street. **Oshawa & East Turn Around** ➢ No feedback received.
Are there design refinements you'd like us to consider during detail design?
Toronto & West Turn Around ➢ Protected intersections. ➢ Complete street fully realized, with lots of space for people to cycle, walk, and roll.

- Extend the dedicated bikeway east on Kingston Road across the Rouge River.
- Include secure bicycle parking and Bike Share stations at all the transit stops
- Integration of the active transportation corridor with other trails and bike routes.

Pickering

- Better protection for cyclists at intersections.
- Connections to other cycling lanes with regional cycling plans.
- Refined bus shelter rendering and information showing material, colour, and shape.
- More accessibility to transit hubs like GO.
- Raised continuous sidewalks, safe cycle stand near bus platform and traffic calming measures throughout the street.

Ajax

- A single lane westbound from Rotherglen stretching to west of Elizabeth Street through Ajax is insufficient.
- Keep 2 lanes in both directions for straight through vehicular traffic.
- Detailed design for bus stops and sidewalks.
- Detailed design for Church Street intersection.

Whitby

- Move the westbound bus stop on Dundas Street in the pinch point in downtown Whitby - from east of Byron Street to east of Brock Street.
- Changes to roads around downtown core to handle traffic.
- Transit maps + arrival time screens on major stops.

Oshawa & East Turn Around

- Do not widen the road.
- Replace existing traffic lanes with BRT.

Do you have suggestions on how to make BRT more accessible?

Toronto & West Turn Around

- Buses should have frequent service and traffic signal priority.
- Secure bike parking to increase the possibility of people accessing the stations.
- Connect to existing bike lanes/paths in the city.
- Ensure safe lanes and dedicated spaces for all road users, including cyclists, pedestrians, buses and car.
- Plant trees along sidewalks and near stations to provide shade to commuting pedestrians.
- Fair integration across DRT, GO and TTC.

Pickering

- Proposal seem very accessible.
- Focus on locations which are near to mall and businesses.
- Raised continuous crosswalks on intersections

Ajax

- Should have LRT instead of BRT.
- Keep bus stop at Ajax Go station.
- Free transit for seniors.

Whitby

- Create facilities for buses to carry bicycles and install automatically controlled extending ramps for wheelchairs.
- Decrease transit fare cost.

Oshawa & East Turn Around

- No feedback received.

Do you have any questions about the potential impacts of BRT on your community?

Toronto & West Turn Around

- How will BRT increase active transportation?
- How will BRT decrease pollution?
- Will there be at least some electric buses that'll use it?
- How will increased bus traffic affect the Rouge Park?
- Impact to schools during construction

Pickering

- Conduction timeliness and road disruptions/plans.
- Anticipated wait times at intersections vs. what's current?
- Compensation for impact to home values.
- Will transit agencies use electric buses?

Ajax

- Impacts to air quality during and after constriction.
- Cost and noise
- Increased traffic congestion due to reduction in lanes.
- Concerns above Church Street intersections.

Whitby

- Environmental impacts on Mary Street.
- Concerns for pedestrian safety on Mary Street.
- Plan on mitigating the traffic bottleneck between Byron and Garden.
- How reducing traffic lane will handle the increasing traffic at Whitby.
- Potential impacts of BRT on the traffic in neighbourhoods adjacent to downtown.

Oshawa & East Turn Around

- No feedback received.

Is there any other information you'd like to see?

Toronto & West Turn Around

- Extending bike lane and BRT further west.
- Walk timing at signalised crossings.
- Usage rate for various transportation methods.
- Proposed schedule, frequency and timing of traffic lights.
- Construction timelines.
- More renderings that are beautiful and ambitious.

Pickering

- Construction timeliness should be highlighted.
- Landscape and bus design specifications.
- How many people will be benefitted?
- How impact to business and environment will be handled?
- Residents for and against the project.
- More renderings.
- More information how to turn left.

Ajax ➢ Hard statistics to support projected increase in transit ridership. ➢ More beautiful renderings. **Whitby** ➢ Construction timetable. ➢ Cost vs Benefits analysis. ➢ More beautiful renderings. **Oshawa & East Turn Around** ➢ Connecting diagrams of bus routes which would show where the stops for those connecting route are/will be. ➢ When will service be extended further east to Courtice?
Any other questions or comments?
Toronto & West Turn Around ➢ How else is Metrolinx reaching out to people? ➢ Plans look great. ➢ DSBRT will greatly improve the neighbourhood and access for everyone. **Pickering** ➢ Open a poll to residents. ➢ Look at the pros and cons of dedicated transit lanes. **Ajax** ➢ Plan from Rotherglen to Elizabeth Street is a disaster. **Whitby** ➢ What safety measures will be implemented on Mary Street to protect pedestrians. **Oshawa & East Turn Around** ➢ No feedback received.

Participants were encouraged to submit feedback, ask questions, or share their ideas to the project team by participating in the 'Ask a Question' message board. Users were required to register to be able to participate.

In total, 11 comments were posted to the virtual message board during the duration of the Public Information Centre. The main themes of the comments are summarized below:

- Traffic impacts;
- Left turn lanes;
- In-person venues consideration for PIC vent.
- Alternate route for BRT instead of Ellesmere between Port Union Rd and Morningside?
- Safe access for people from driveways during construction.
- Use of dedicated transit lanes by other transit agencies and emergency vehicles.

- Accessibility for pedestrians (with mobility devices or strollers at signalled intersections?
- Mitigation measures for the businesses that are impacted during construction.
- Local and regional transit integration.

A full record of public correspondence is included in **Appendix K2**.

6.3.4 Review/Municipal Agency and Utilities Consultation

As described in **Section 6.3.1**, agencies/utilities received an email at the start of TPAP. A summary of correspondence with agencies and utilities is provided in **Appendix K4**.

6.3.5 Stakeholder Consultation

A summary of correspondence with stakeholders is provided in **Appendix K4**. There were individual meetings which were held with TAG, SAG & MTAG members during the TPAP consultation period and a summary of each meeting is provided in **TABLE 6.15**. The groups' Terms of Reference, contact list, meeting minutes and materials, record of correspondence and emails are provided in **Appendix K4**.

TABLE 6.15 STAKEHOLDER & TECHNICAL ADVISORY GROUP MEETINGS DURING TPAP

Date	Stakeholder Group	Attendees	Meeting Summary
October 18, 2021	SAG	City of Toronto SAG Session Metrolinx; City of Toronto; TTC; UTSC; TDSB; Cycle Toronto; Toronto East Cyclists; Glenn Andrew Community Centre; Scarborough Community Renewal Association; Scarborough Campus Student Union; HCCA; Boys and Girls Club of Scarborough	The Project team provided a brief overview of the DSBRT Project and presented the preliminary design in the City of Toronto. The purpose of the meeting was to provide an update on preliminary design, project schedule, stakeholder consultation, and technical studies.
October 19, 2021	SAG	Durham Region SAG Session Metrolinx; Durham Region; Durham Region Transit; Whitby Chamber of Commerce; Durham District School Board; Oshawa Centre; Trent University; RioCan; Ontario Tech University; Durham Region Cycling Coalition	The Project team provided a brief overview of the DSBRT Project and presented the preliminary design in the Region of Durham. The purpose of the meeting was to provide an update on preliminary design, project schedule, stakeholder consultation, and technical studies.
October 27, 2021	TAG	Metrolinx; Elexicon; Enbridge Gas; Rogers; Pickering Fire Services; Parks Canada; Oshawa Fire Services; Toronto Hydro; Region of Durham; Town of Whitby; MTO;	The Project team provided a brief overview of the DSBRT Project. The purpose of the meeting was to provide an update on study progress, summary of consultation

Date	Stakeholder Group	Attendees	Meeting Summary
		MHSTCI; MECP; TRCA; Region of Durham Paramedic Services; City of Toronto; Town of Ajax; CLOCA	to date, preliminary design reviews, draft implementation strategy and environmental studies conducted.
November 22, 2021	MTO	MTO; Metrolinx; Region of Durham; City of Toronto	The purpose of this meeting was to provide an update on the DSBRT design criteria, preliminary design, and traffic operations at three MTO interface areas.
December 7, 2021	MTO	MTO; Metrolinx	The purpose of this meeting was to discuss the draft preliminary design criteria and potential exemptions.
December 10, 2021	MHSTCI	MHSTCI; Metrolinx	The purpose of this meeting was to discuss cultural heritage studies and preliminary findings.
December 20, 2021	MTO	MTO; Metrolinx	The purpose of this meeting was to discuss the draft preliminary design criteria and potential exemptions.
January 12, 2022	Town of Whitby	Town of Whitby	The purpose of this meeting was to provide an update on the proposed bridge and culvert modifications.

6.3.6 Other Stakeholder Meetings

Stakeholder meetings were held during the TPAP. The content of the meetings are summarized in **TABLE 6.16**, with a full record provided in **Appendix K6**.

TABLE 6.16. OTHER STAKEHOLDER MEETINGS DURING TPAP

Date	Stakeholder	Meeting Summary
November 2, 2021	Pickering Village in Ajax	Pop-up event for Metrolinx including DSBRT and other projects. Note Councillor Marilyn Crawford was present.
November 3, 2021	Trent University, Oshawa Campus	Pop-up event to promote PIC#4 and answer questions from students, faculty and the general public.
November 8, 2021	Woburn Community & Aldgate Businesses	The focus of the meeting was to discuss community concerns and the need for transit reliability, and connectivity, through the Ellesmere Road segment of the DSBRT. Note MPP Mitzie Hunter was present.
November 16, 2021	Toronto East Cycle Group	The focus of the meeting was to address their inquiries around preliminary design plans for the Durham Scarborough BRT. The group was generally in favour of the project but had specific questions around design details relating to the cycle infrastructure.
November 18, 2021	Mornelle Court Community	The focus of the meeting with Mornelle Court residents was to share details and preliminary design plans for the Durham Scarborough BRT.

Date	Stakeholder	Meeting Summary
		Note MPP Mitzie Hunter and Councillor Paul Ainslie were present.
December 1 and 3, 2021	Whitby Public Library	Pop-up event to promote PIC#4 and answer questions from the general public.

6.3.7 Indigenous Nations Engagement

The Indigenous Nations identified in **Section 6.2.8.1** were provided with the TPAP Notice of Commencement on October 14, 2021 and Notice of EPR Completion on January 20, 2022.

On January 4, 2022, Metrolinx provided 8 additional CHERs for Indigenous Nations' review and comment. Metrolinx is continuing collaboration with Curve Lake First Nation for inclusion of Indigenous Knowledge systems in environmental reports, as noted in **TABLE *6.11***.

All of the above-noted correspondence is provided in **Appendix K5**.

6.3.8 Elected Officials Consultation

No Project specific briefings have been held with elected officials during TPAP.

6.3.9 Notice of Completion of the Environmental Project Report

The Notice of Completion of the Environmental Project Report was issued on January 20, 2022. The Notice of EPR Completion was distributed through the same channels as listed in **TABLE *6.17*** and to the same stakeholders as the Notice of Commencement, as well as any others that had been added to the stakeholder list after that milestone. The Notice of EPR Completion is in **Appendix K7** and the Project Mailing List is in **Appendix K1**.

TABLE 6.17 NOTICE OF COMPLETION DISTRIBUTION

Channel	Date of Issue	Stakeholder
Newspapers	Scarborough Mirror – January 20 and 27, 2022 Ajax-Pickering News Advertiser – January 20 and 27, 2022 Whitby This Week – January 20 and 27, 2022 Oshawa This Week – January 20 and 27, 2022 Clarington This Week – January 20 and 27, 2022 L'Express Toronto – January 21 and 28, 2022	General Public
Direct Mail (Canada Post)	Mailed January 14, 2022	Property Owners within 30 m
Project Website	January 20, 2022	General Public
Indigenous Nations (Letters via Email)	January 20, 2022	Indigenous Nations

6.4 Future Consultation

Metrolinx is committed to continued engagement with stakeholders, residents, and businesses beyond the TPAP, through the detailed design and construction phases of the DSBRT. As described in Chapter 8, the proponents will:

- Develop a Communication Plan for the detail design and construction phases of the Project. This will include a community relations program to provide regular updates to businesses, residents, and the travelling public. Metrolinx will include this Project in on-going engagement with Indigenous Nations.
- Establish Construction Liaison Committee(s) comprised of community stakeholders to proactively identify, monitor and address construction issues.
- Create a Project Information Office that is open to the public during construction. Metrolinx Community Engagement Specialists will be on-hand during regular office hours to answer questions and share information about the Project. The Project Information Office may also be a space to hold meetings or workshops.
- Continue consultation with municipal and agency staff (including TRCA, CLOCA, MECP, MNDMNRF, Parks Canada, etc.) as required to ensure compliance with the applicable environmental policies, guidelines and plans regarding acceptable mitigation/compensation protocols for habitat loss within the forest/wetland communities/significant natural heritage features, and to identify any additional required mitigation measures to ensure impacts to these areas are minimized to the extent possible.
- Consult further with lower and upper tier municipalities and regulatory agencies, such as TRCA, CLOCA, MECP, and Parks Canada during the detail design/pre-construction phase to discuss tree compensation and restoration plans. Consult with private property owners before any tree removals and or tree impacts/injuries occur on private property.
- Consult with Municipal heritage staff and other jurisdictions as appropriate to determine if proposed infrastructure will be subject to specific policies within heritage conservation districts or conservation areas (parks).
- Consult with municipal heritage staff and the MHSTCI as early as possible during detail design to complete additional cultural heritage studies.
- Consult with staff from fire, police, ambulance, engineering, construction services, transportation services, and other applicable departments from City of Toronto, Durham Region, City of Pickering, Town of Ajax, Town of Whitby and City of Oshawa to develop an Emergency Response and Incidence Management Plan. Consultation with municipal staff will confirm that each jurisdictions rules and regulations are upheld.

- Consult with City of Toronto, Durham Region, City of Pickering, Town of Ajax, Town of Whitby and City of Oshawa to develop a Traffic Management and Control Plan that identifies appropriate routes for heavy truck traffic that is supported by a Haul Route Analysis.
- Continue engagement with Indigenous Nations during future phases of the Project, specifically regarding any future studies and fieldwork related to natural heritage, cultural heritage, and archaeology.

If, in the future, changes are proposed to the Project Description provided in Chapter 2 of this EPR, consultation will be undertaken with MECP with regard to the process to be followed under Section 15 of Ontario Regulation 231/08.

7. Permits and Approvals

7.1 Permits and Approvals

In addition to meeting the requirements of *Ontario Regulation 231/08 Transit Projects and Metrolinx Undertakings*, several federal, provincial, and municipal permits, approvals, and authorizations will be required prior to implementation of the Project.

A preliminary list of the permits, approvals, and authorizations that are anticipated to be required is provided below. Prior to construction, during the detail design phase, the proponent will continue consultation with the City of Toronto, Durham Region, City of Pickering, Town of Ajax, Town of Whitby, and City of Oshawa as well as with relevant stakeholder agencies (i.e., TRCA, CLOCA, MECP, MNDMNRF, MHSTCI, MTO, Parks Canada, DFO, Transport Canada, Environment and Climate Change Canada) as necessary to review, confirm and secure all required permits, approvals, and authorizations for the implementation of the DSBRT.

7.1.1 Federal

7.1.1.1 Impact Assessment Act, 2019

On June 21, 2019, Bill C-69 (*Act to Enact the Impact Assessment Act and the Canadian Energy Regulator Act, to Amend the Navigation Protection Act and to make Consequential Amendments to other Acts*) received Royal Assent. On August 28 and 29, 2019, the *Impact Assessment Act* (IAA) came into effect, along with a new set of Regulations, establishing the legislative basis for the federal EA process. The new IAA replaces the previous Canadian Environmental Assessment Act (CEAA 2012) and is led by the Impact Assessment Agency of Canada.

Similar to the process under the CEAA 2012, federal impact assessments under the IAA are conducted for proposed physical activities that are “designated,” in two ways:

- through the *Physical Activities Regulations* (commonly known as the Project List which prescribes the physical activities that constitute a “designated project”); and,
- by the federal Minister of the Environment and Climate Change if, in the Minister’s opinion, the project may cause adverse effects within federal jurisdiction or adverse direct or incidental effects, or if public concern related to those effects warrants a designation.

A review of the Project List determined that implementation of the DSBRT does not constitute a “designated project” as described in the *Physical Activities Regulations* (Project List). As a result, based on this review, the activities associated with the

DSBRT are not subject to the IAA. Further review of IAA triggers should be undertaken during the detail design phase to confirm that the requirements of the IAA do not apply to the Project.

In addition, under the IAA, non-designated projects on federal lands are assessed by federal authorities before decisions are made regarding the federal EA process. The DSBRT is proposed to cross federal lands administered by Parks Canada. The IAA requires all federal authorities, such as Parks Canada, to determine, prior to approving a project, that "the carrying out of the project is not likely to cause significant adverse environmental effects." As a result, correspondence with Parks Canada has taken place throughout the preliminary design/EA and TPAP and will continue throughout the detail design phase to ensure their concerns are addressed and that appropriate mitigation measures recommended by Parks Canada are included in the design, and to ensure adherence to the Rouge National Urban Park Management Plan.

7.1.1.2 Species at Risk Act

As noted above, the DSBRT is proposed to cross the Rouge National Urban Park, which is federally-owned land administered by Parks Canada between Raspberry Road and Altona Road surrounding the Rouge River (Crossing 4) and its valleylands, both north and south of Kingston Road. These lands are designated under Section 14(1) of the *Rouge National Urban Park Act* and subject to the Rouge National Urban Park Management Plan. As a result, there is federally-owned land located within the Study Area; therefore, the Canada SARA has the potential to apply to any federally-designated SAR/SAR habitat located within this federal land.

A total of eight federally regulated SAR (those species regulated as 'Threatened' or 'Endangered' under the Canada SARA) have been recorded in the vicinity of the Study Area by secondary source data and external agencies, including two plant SAR (Butternut and streetscape Kentucky coffee-tree), one aquatic SAR (Redside Dace), and five wildlife SAR (Chimney Swift, Common Nighthawk, Bobolink, Least Bittern, Eastern Meadowlark). Only two of these SAR (Butternut – regulated as 'Endangered' under the Canada SARA, and Kentucky coffee-tree – regulated as 'Threatened' under the Canada SARA) were identified within the vicinity of the Study Area during field investigations. Neither of these two plant SAR are located on federal lands (Rouge National Urban Park); therefore, permitting under the Canada SARA will not be required for these two plant species. Redside Dace (regulated as 'Endangered' under the Canada SARA) has been reported as potentially occurring in Carruthers Creek (Crossing 14). This watercourse crossing is not located on federal lands; therefore, permitting under the Canada SARA should not be required. A Canada SARA permit could potentially be required for Redside Dace if the rescue of potentially stranded fish is required during construction dewatering (discussed below). Based on the habitat conditions in the Study Area and the results of the breeding bird survey undertaken by LGL in June 2019, only two of the five federally regulated wildlife SAR and their habitat (Bobolink and Eastern Meadowlark – both regulated as 'Threatened' under the Canada SARA) have the potential to be impacted by the DSBRT.

Further correspondence will take place prior to construction with Environment and Climate Change Canada, DFO, and Parks Canada (along with MECP) during the detail design phase, as required, to confirm whether there will be any impacts to the federally designated SAR or their habitat (in particular Bobolink and Eastern Meadowlark), and to ensure appropriate environmental protection, mitigation, monitoring, and compensation measures will be developed.

During the detail design phase, the requirements for permitting under the Canada SARA will be reviewed and confirmed with Environment and Climate Change Canada, DFO, and Parks Canada, as necessary, to determine whether mitigation or overall benefit are required. Prior to construction, further targeted field investigations must be undertaken, as required, for the federally designated SAR (in particular for Bobolink and Eastern Meadowlark) during the appropriate season using specified specific standardized protocols. Surveying for these species must be conducted to establish their presence or absence, and thus, the appropriate steps for protection and permitting. In addition, if federally listed aquatic SAR (i.e., Redside Dace) are present within a watercourse and dewatering will occur during construction, a Canada SARA permit from DFO may be necessary for the rescue of potentially stranded fish. This will be determined during the detail design phase. Fish and Wildlife Collector's permits for salvage will also be obtained during the detail design phase as required.

7.1.1.3 Fisheries Act

The *Fisheries Act* was established to manage and protect Canada's fisheries resources. It applies to all waters of Canada and is binding to federal, provincial, and territorial governments. DFO's former "No Net Loss Policy" under the federal *Fisheries Act* is a long-term policy objective to achieve overall net gain of productive capacity of fish habitat. The habitat programs of DFO, assisted by cooperative undertakings with other federal departments, provincial and territorial governments, private industry and non-government groups, is administered to achieve this policy objective for fisheries resources through various protection measures and resource planning initiatives.

On February 6, 2018, DFO introduced proposed amendments to restore lost protections and incorporate modern safeguards into the *Fisheries Act*. On August 28, 2019, these changes came into effect and strengthened fish and fish habitat protection provisions under the modernized *Fisheries Act*, as well as regulations that support these provisions. The amendments address key considerations, including prohibitions against causing the death of fish (other than by fishing) and the re-introduction of the concept of harmful alteration, disruption, or destruction (HADD) of fish habitat regulated under the Act. If a HADD is unavoidable, authorization from DFO under Subsection 35(2) of the *Fisheries Act* may be issued.

Consultation with DFO during the detail design phase will be necessary to determine whether HADD of fish habitat will occur at locations where works are proposed below the high-water line (i.e., within the bankfull width of the channel) in fish habitat. Currently, this consultation consists of the preparation and submission of request for review forms and subsequent consultation with DFO biologists. This process is used to

determine next steps which could include proceeding with the works under a letter of advice or the application for an authorization under the *Fisheries Act*. Requests for review forms should be submitted to DFO for all crossings where culvert or bridge works are proposed (all crossings except Crossings 1, 2, 4, and 22, see **TABLE 4.2**). A *Fisheries Act* Authorization will be secured during the detail design phase, if required. Fish Collector's permits for salvage will also be obtained during the detail design phase, as required.

7.1.1.4 Migratory Birds Convention Act

The *Migratory Birds Convention Act, 1994* (MBCA) prohibits the killing, capturing, injuring, taking, or disturbing of migratory birds (including eggs) or damaging, destroying, removing, or disturbing of nests. Migratory insectivorous and non-game birds are protected year-round, and migratory game birds are protected from March 10 to September 1. Environment Canada provides Nesting Periods when migratory birds are most likely to be nesting, within a respective geographic zone. The DSBRT Study Area is located within Environment Canada's Nesting Zone C2 (Nesting Period: end of March – end of August). A number of bird species recorded within the Study Area are afforded protection under the MBCA. Bird species protected under the MBCA were documented across a variety of habitat types within the Study Area. To comply with the requirements of the MBCA, disturbance, clearing, or disruption of vegetation where birds may be nesting must be completed outside the migratory bird nesting timing window of April 1 to August 31. In the event that these activities must be undertaken from April 1 to August 31, a pre-clearing nest survey will be conducted by a qualified avian biologist to identify and locate active nests of species covered by the MBCA.

7.1.1.5 Canadian Navigable Waters Act

The *Canadian Navigable Waters Act* (CNWA) received Royal Assent on June 21, 2019 and is administered by Transport Canada through the Navigation Protection Program. The new CNWA replaces the previous *Navigation Protection Act* and is intended to strengthen environmental protection by expanding the regulation of major works and obstructions on navigable waters, even those not explicitly defined within a Schedule to the Act. The amended Act still applies to works which are constructed or placed in, on, over, under, through, or across any navigable waterway.

None of the watercourses crossed by the Project are scheduled under the CNWA, and a *Navigation Protection Act* opt-out request has not been submitted for any of the culverts/structures within the DSBRT Study Area. All works on unscheduled waterways that were not opted-out are to be treated as 'legacy' works and must therefore be considered the same as any work on a scheduled waterway. An application must always be submitted for works proposed at these waterways and approval must be received prior to undertaking any activities. As a result, prior to the commencement of any work and during the detail design phase, for all proposed works on the waterways within the DSBRT Study Area, the proponent will be required to either submit a voluntary application and receive an Approval document or undertake the owner-led Public Resolution Process with no Transport Canada involvement. During the detail

design phase, the proponent will make a determination regarding how to proceed and consultation with Transport Canada will take place as required. CNWA provisions will also be reviewed during the detail design phase and the proponent will be required to adhere to the current legislation and obtain/submit any required permits/approvals under the CNWA prior to construction, if required.

7.1.2 Provincial

7.1.2.1 Conservation Authorities Act

Under Ontario Regulation 166/06 of the *Conservation Authorities Act* (Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses), the TRCA is responsible for managing the renewable natural resources within nine watersheds in the Greater Toronto Area. Under Ontario Regulation 42/06 of the *Conservation Authorities Act* (Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses), the CLOCA is responsible for managing the renewable natural resources within four major watercourses and eighteen minor watercourses draining an area of over 639 km^2. The goal of these regulations is to ensure public safety and property protection with respect to natural hazards (including erosion and flooding), and to safeguard watershed health by preventing pollution and destruction of sensitive environmental areas such as wetlands, shorelines, watercourses, and valleylands. These regulations provide TRCA and CLOCA with the authority to regulate interference and development within the regulated areas.

Metrolinx, as a Crown agency of the Province of Ontario, is generally not subject to the legal requirements of the *Conservation Authorities Act* and the conservation authorities' permitting processes and, as such, is legally unable to obtain authorizations for these requirements. Notwithstanding, Metrolinx/the proponent will work closely with conservation authorities to achieve conformance to their respective requirements (including TRCA's *Living City Policies for Planning and Development in the Watersheds of the Toronto and Region Conservation Authority*). Both TRCA and CLOCA have been involved in the review of the DSBRT project (and provided secondary source natural heritage information) and participated as part of the Technical Advisory Group during the preliminary design/EA and TPAP process. During the detail design phase, engagement with TRCA and CLOCA will continue including consultation/negotiation processes and submitting design information, where appropriate, without formally entering into the permitting process. Compensation and mitigation compliance and agreement for habitat loss will be undertaken with TRCA and CLOCA and any additional required mitigation measures will be identified during the detail design phase. Restoration of suitable forest and/or wetland habitat will be undertaken at a compensation ratio to be determined through further discussion with regulatory agencies (including TRCA/CLOCA) as part of implementing the Project. Compensation will be in accordance with applicable environmental policies and the standards of respective agencies and municipalities.

The following commitments specific to the TRCA/CLOCA will be addressed during the detail design phase:

- Site-specific erosion and sedimentation control measures to be implemented prior to construction, maintained during construction, and removed after construction (once soils have stabilized) will be identified prior to construction following a number of different guidelines including TRCA's Erosion and Sediment Control Guide for Urban Construction (2019a) and Silt Smart – Erosion and Sediment Control Effectiveness Monitoring and Rapid Response Protocol for Large Urban Development Sites (Credit Valley Conservation, MNDMNRF, MOE, DFO 2012);
- The preliminary Drainage/Stormwater Management Plan will be updated in consultation with TRCA and CLOCA (and other regulatory agencies) to manage storm and surface drainage/runoff and build upon the drainage/stormwater management mitigation measures/practices outlined in the EPR. Where feasible, the plan for the management of stormwater will adhere to the TRCA's The Living City Policies (TRCA 2014), at least within the TRCA's jurisdiction;
- Low impact development (LID) measures will be incorporated to the extent possible, where stormwater management is required along the DSBRT to achieve stormwater management as per TRCA and CLOCA stormwater management criteria;
- Mitigation proposed at the culverts/structures requiring improvements (to be reviewed during the detail design phase) includes minimizing the design to keep necessary bridge widenings and culvert extensions as short as possible, employing retaining walls to reduce encroachment into riparian areas and confining work to as small an area as possible; and
- Fish and wildlife friendly culvert and bridge design will continue to be considered as part of the Project. No new barriers to fish passage will be created from works associated with the Project. Opportunities to improve fish passage via culvert works will be considered further during the detail design phase, where feasible. DSBRT structure/culvert modifications have been designed to maintain and promote wildlife passage across the landscape.

7.1.2.2 Ontario Endangered Species Act, 2007

The purpose of the Ontario *Endangered Species Act, 2007* (ESA 2007) is to protect Ontario's SAR and their habitats, and to promote the recovery of species that are at risk. Through research and field investigations, species presence/absence and suitability of habitat are assessed. A species included as a Species at Risk in Ontario (SAR) listed as an extirpated, endangered, or threatened species receives protection under Section 9 of the Ontario ESA 2007. A species listed as endangered or threatened also receives habitat protection under section 10 of the Ontario ESA 2007. Habitat protection is important to protect and enhance a species' ability to carry out its life processes including reproduction, rearing, hibernation, or feeding. A determination of

whether a proposed development will contravene subsection 10(1) of the Ontario ESA 2007 is required prior to the undertaking. Where impacts to SAR are proposed, mitigation measures or overall benefit must be implemented as determined through Ontario Regulation 242/08 or through permitting under the Ontario ESA 2007.

A total of 17 aquatic, plant, and wildlife SAR (as well as endangered bat species) have been recorded within the vicinity of the Study Area and are discussed in detail in **Section 4.2.7.1**. Further correspondence will take place with MECP during the detail design phase, as required, to discuss the provincially designated SAR (and SAR habitat) that have been identified or have the potential to be located in the vicinity of the Study Area (in particular for seven SAR including Redside Dace, American Eel, Butternut, Bobolink, Barn Swallow, Bank Swallow, Eastern Meadowlark) as well as SAR bat species, any potential impacts of the proposed work on these species and their habitat, and appropriate protection / mitigation / monitoring / compensation measures. The requirements for permitting under the Ontario ESA (Ontario Regulation 242/08, etc.) will be reviewed and confirmed with MECP as necessary to determine whether mitigation or overall benefit are required. Prior to construction, further targeted field investigations (including a detailed Butternut survey and Butternut Health Assessment) must be undertaken as required for SAR during the appropriate season using specified specific standardized protocols. Surveying for these species must be conducted to establish their presence or absence, and, thus, the appropriate steps for protection and permitting (see **Section 4.2.7.1** for details). Fish and Wildlife Collector's permits for salvage will also be obtained during the detail design phase, as required.

It is anticipated that the remaining ten SAR (Eastern Pondmussel, Kentucky coffee-tree, Golden Eagle, Chimney Swift, Common Nighthawk, Peregrine Falcon, Bald Eagle, Least Bittern, Red-necked Phalarope, and Snapping Turtle) recorded within the vicinity of the Study Area should not be impacted and should not require targeted field surveys or permitting under the Ontario ESA (see **Section 4.2.7.1** for details).

7.1.2.3 Ontario Fish and Wildlife Conservation Act

The *Fish and Wildlife Conservation Act* (1997) regulates hunting, trapping, and fishing practices and aims to preserve wildlife at risk. The Act also regulates the conservation of wildlife and outlines the limited instances in which wildlife may be kept in captivity. A Licence to Collect Fish for Scientific under this Act will be required if a relocation of fish outside of the work area is required during construction. A Wildlife Collector's Authorization under this Act will also be required if the relocation of wildlife outside the work area (including amphibians, reptiles, and small mammals) is necessary during the construction phase of this project.

7.1.2.4 Ontario Environmental Protection Act

The Ontario *Environmental Protection Act, 1990* is the primary pollution control legislation in Ontario and can be used interchangeably with the Ontario *Water Resources Act*. The legislation is administered by MECP and prohibits discharge of any contaminants into the environment that cause or are likely to cause adverse effects. Amounts of approved contaminants must not exceed limits prescribed by the

regulations. The Act also requires that spills of pollutants are reported and cleaned up promptly. The *Environmental Protection Act* also has the authority to establish liability on the party at fault. The On-Site and Excess Soil Management Regulation (O. Reg. 406/19) under the *Environmental Protection Act* requires that any fill placed in environmentally sensitive areas meets Table 1 standards. Any soil placed on cropland or pasture must meet the definition of topsoil as per the *Municipal Act.*

7.1.2.5 Ontario Water Resources Act

The Ontario *Water Resources Act, 1990* is administered by MECP and focuses on both groundwater and surface water throughout the province. The purpose of the Act is to provide for the conservation, protection, and management of Ontario's waters and for their efficient and sustainable use, to promote Ontario's long-term environmental, social, and economic well-being. The Act regulates sewage disposal and "sewage works" and prohibits the discharge of polluting materials that may impair water quality. The *Ontario Water Resources Act* regulates well construction, operation, and abandonment in addition to the approval, construction, and operation of "water works".

MECP requires a PTTW or an EASR for groundwater takings exceeding 50,000 liters per day (L/day). For construction, a PTTW is required for dewatering extraction rates that exceed 400,000 L/day. An EASR is required for a rate between 50,000 and 400,000 L/day. Groundwater control or unwatering must be designed and implemented by a specialist contractor and be drawn down to a depth of at least 1 m below the excavation base level, or as necessary, to ensure stable conditions during excavation. Surface water shall be directed away from the excavation areas to prevent ponding of water. A category 3 PTTW is required by the MECP for water takings in excess of 400,000 L/day. The Contractor will be responsible for obtaining any required discharge approvals and documentations. For volumes less than 50,000 L/day that do not require MECP approval, industry standard best practices must be adhered to and documented (similar to those in the Water Taking and Discharge Plan required for an EASR).

A more detailed understanding of the construction activities that may require construction dewatering is required during the detail design phase. This will allow for an additional and more localized evaluation at potential construction dewatering sites and will allow the Project team to calculate estimates of construction dewatering rates and confirm the need for appropriate MECP approvals. In addition, this will confirm the locations of nearby water wells that may be in use near the proposed dewatering locations (with likely requirement for mail surveys/field verification activities). The combined dewatering rate from all sources will be considered when assessing the dewatering permitting requirements for the Project. The proponent will be responsible for obtaining any required discharge approvals and documentations including any PTTW and/or EASR approvals prior to construction. A Water Taking and Discharge Plan must be prepared prior to construction. Pumping discharge will also comply with any requirements from the local municipalities and conservation authorities.

7.1.2.6 Ontario Heritage Act

The Ministry of Heritage, Sport, Tourism and Culture Industries (MHSTCI) is responsible for approvals under the Ontario Heritage Act, including:

- Acceptance and confirmation of the Archaeological Assessment Reports and entry into the Ontario Public Register of Archaeological Reports; and,
- All Ontario government ministries and public bodies prescribed under Ontario Regulation 157/10, including Metrolinx, are required to follow the Standards and Guidelines for Conservation of Provincial Heritage Properties, prepared under section 25.2 of the *Ontario Heritage Act*, when making any decisions affecting cultural heritage resources on lands under their control.

Based on the results from CHERs discussed in **Section 4.5.1.3**, none of the properties anticipated to be directly impacted, meet the criteria for Provincial Heritage Property of Provincial Significance set out in Ontario Regulation 10/06. In the case of any properties identified as Provincial Heritage Property of Provincial Significance and where the proposed project will require demolition or removal of any building, structure or heritage attribute on the property or if the property is to be transferred out of provincial control, Metrolinx is required to obtain MHSTCI Minister's consent.

7.1.2.7 Public Transportation and Highway Improvement Act

The *Public Transportation and Highway Improvement Act,* 1990 governs the MTO's authority to regulate within the ROW of provincial highways. A construction project on or near a provincial highway may need a permit from the MTO under the legislation. Legal Agreements and Approvals with MTO will be developed with the Project Agreement. Agreements associated with 407 East Concessionaire include, but not limited to, encroachment permits, conditions related to warranty periods associated with Letter of Credit and insurance, and associated cost agreement, including Capital and Operations, Maintenance and Rehabilitation costs (OM&R).Applications from developers, municipalities, utility companies and the general public are reviewed to ensure they follow all policy rules and guidelines.

The MTO's design approval process will be followed during detail design, including Executive Reviews of 30%, 60% and 90% design documents. Endorsement from the MTO Project Team staff is required before going to Senior Management for endorsement. The design criteria and PHM-125 drawings are MTO legal documents and will need to be updated to reflect the most recent design at each milestone. The design criteria will need to be presented at every executive review. This includes notifying senior management of updates as the design progresses.

7.1.3 Municipal

A range of municipal permits and approvals (and exemptions in some cases) may be obtained for implementation of the Project including, but not limited to,

permits/approvals related to municipal noise by-laws, municipal road occupancy by-laws, municipal sewer use by-laws, and municipal tree protection by-laws. The proponent will continue correspondence with the City of Toronto, Durham Region, City of Pickering, Town of Ajax, Town of Whitby, and City of Oshawa during the detail design phase to address any outstanding concerns raised by municipal staff and will obtain all permits and approvals as they are needed.

7.1.3.1 Municipal Tree Protection By-laws/Municipal Tree Removal Permits

The Arborist Report (**Appendix D**) outlines all applicable municipal tree protection by-laws that apply to the implementation of the DSBRT. Consultation will continue with the municipalities during the detail design phase to reconfirm the requirements for tree removal permits associated with the municipal tree protection by-laws. Permits related to municipal tree protection by-laws and other applicable tree removal permits will be obtained from municipalities as required during the detail design phase (see **Appendix D**), and as outlined in Metrolinx's Vegetation Guideline (2020), TRCA's Guideline for Determining Ecosystem Compensation (2018), TRCA's Forest Edge Management Plan Guidelines (2004), and the upper and lower tier municipal tree protection by-laws. The recommended tree protection measures that will be implemented to ensure no impacts occur to trees designated for retention including those trees identified as impacted/injured are presented in **Appendix D**. Compensation for the removal of trees within the Study Area will be provided, and refinements to compensation requirements will be undertaken, during the detail design phase, at such time when tree removal permits have been approved by municipal agencies. Compensation (as well as all restoration/replanting plans) must be submitted to municipal staff prior to permit issuance. Tree protection hoarding must be installed and approved prior to permit issuance. The ecological compensation approach (Metrolinx Vegetation Guideline 2020) will only apply to those trees located on Metrolinx property.

The remainder of the by-law regulated trees located on private or municipally owned property will be compensated for based on the requirements of applicable municipal tree protection by-laws. All private property ownership data (including names, mailing addresses, and email addresses) for trees on private property that are proposed to be removed/impacted will be provided to the municipalities by the proponent at the time of permit application during the detail design phase. Opportunities to transplant trees identified for removal within the Study Area will be considered during the detail design phase, where feasible. Of the 3,278 trees identified for removal, a total of 966 trees less than or equal to 10 cm DBH and in good health are within the Study Area and will be considered for transplanting, where feasible. However, some of these trees may be located in proximity to underground utilities and opportunities for transplanting may be limited in these areas (due to regulations/limits on the use of mechanical equipment for transplanting).

7.1.3.2 Noise By-Law Exemptions

Should a need to complete work outside of the hours allowed in the applicable noise by-laws, the Contractor is to seek any required exemptions and permits directly from the

applicable jurisdiction, in advance of any work performed outside of the allowable time periods. If an exemption cannot be obtained, then construction will proceed in accordance with the requirements of the noise By-laws.

7.1.3.3 Construction Vibration Permits – City of Toronto By-Law No.514-2008

Construction Vibrations provides vibration limits that are not to be exceeded by any construction activity. The limits are presented in **TABLE 3.34**. This by-law requires an applicant for a construction permit to complete a Vibration Control Form, on which the nature of the construction activity is identified. The form identifies specific construction activities for which vibration would be anticipated to be an issue (e.g., blasting), but also includes a general entry: "any other construction activity or method that has the potential to cause vibrations which may impact on buildings or structures outside of the construction site that is the subject of the permit application". If any of the noted activities on the Vibration Control Form are identified as applicable to the permit application, then a Professional Engineer must be engaged to prepare supporting documentation outlining a zone of influence for the source(s) of vibration, and specifically identify whether the zone of influence extends beyond the property boundaries of the construction site.

If a zone of influence is found to extend beyond the construction site boundary, a pre-construction consultation and monitoring program is required. This involves consultation with the public, including all property owners and occupants within the zone of influence, to advise on the possibility of construction vibrations, and involves the preparation of a detailed vibration report from a Professional Engineer.

This report must summarize the consultation process, as well as detail the results of pre-construction measurements and pre-construction building inspections, identify mitigation measures, and outline a construction monitoring program.

Where a pre-construction plan is required, there is also a requirement to complete a public communications and complaints protocol. This is intended to inform the public of the construction schedule in advance, provide means by which to contact the applicant (i.e., to lodge a complaint), and outline a procedure by which to address complaints.

8. Commitments to Future Work

8.1 Summary of Future Commitments, Mitigation Measures and Monitoring Requirements

TABLE 8.1 provides a summary of the commitments outlined throughout this report. The commitments result from proposed mitigation measures to address potential impacts of the DSBRT, as well as commitments to future consultation with MECP, Indigenous Nations, regulatory agencies, applicable stakeholders, and property owners. The table is separated by environmental component, including the general or specific commitment and during which phase of the Project it will be implemented. This table will be the basis for an Environmental Mitigation and Monitoring Plan (EMMP), which will be developed to ensure that the commitments to mitigation are completed throughout the detail design, construction, and operation phases of the Project, and that such mitigation is effective.

TABLE 8.1. SUMMARY OF POTENTIAL IMPACTS, MITIGATION MEASURES AND MONITORING

Environmental Component	Project Phase	Future Commitment	Agencies to be Consulted
GENERAL			
General	Between TPAP approval and Detail Design	This Environmental Project Report (EPR) was completed in accordance with *Ontario Regulation 231/08 Transit Projects and Metrolinx Undertakings*. If, in the future, changes are proposed to the Project Description provided in Chapter 2 of this EPR, consultation will be undertaken with MECP with regard to the process to be followed under Section 15 of *Ontario Regulation 231/08*.	MECP
Impact Assessment Act	Detail Design	Undertake a further review of *Impact Assessment Act* triggers to confirm that the requirements of the *Impact Assessment Act* do not apply to the Project.	Parks Canada Impact Assessment Agency of Canada
	Detail Design	Consult with Parks Canada to ensure recommended mitigation measures related to Rouge National Park are considered in the detail design and construction planning and adherence to the Rouge National Urban Park Management Plan (Parks Canada 2019).	
MTO Permits and Approvals	Detail Design/ Construction	Continue correspondence with MTO to address any outstanding concerns raised by MTO staff and obtain all required permits and approvals.	MTO
	Detail Design	Follow the MTO approval process during the detail design for those locations within MTO jurisdiction.	
	Detail Design/ Construction	Provide design criteria and PHM-125 drawings to MTO for those locations within MTO jurisdiction.	
	Construction	Adhere to MTO requirements for construction, quality control, and commissioning with respect to the MTO ROW design.	
	Detail Design/ Construction	Consult with MTO to define and document considerations such as additional maintenance agreements, insurance and/or warranty arrangements for Dundas Street bridge over Highway 412.	
Municipal Permits and Approvals	Detail Design/ Construction	Continue correspondence with the City of Toronto, Durham Region, City of Pickering, Town of Ajax, Town of Whitby, and City of Oshawa during the detail design, and construction phases to address any outstanding concerns raised by municipal staff and obtain all required permits and approvals.	City of Toronto Durham Region City of Pickering Town of Ajax Town of Whitby City of Oshawa
Hydro One	Detail Design / Construction	Detailed engineering drawings of all proposed permanent changes within the operating limits of the corridor will be provided to Hydro One for review, following drawing requirements outlined in *Secondary Land Use Proposal Submission Requirements In and Around Hydro One Transmission Corridors*. Detailed drawings will be submitted for the three locations where Hydro One's high voltage electrical transmission corridor crosses the BRT route. A license agreement with the Province of Ontario (Infrastructure Ontario) will be obtained prior to entry onto the lands to require properties on either side of the road allowance within the Hydro corridor for temporary workspace. Prior to construction, final construction plans will be provided to Hydro One for review for safety and compatibility. Construction activities must maintain the electrical clearance from the transmission line conductors as specified in the Ontario Health and Safety Act for the respective line voltage. Hydro One will be consulted during all stages of the DSBRT project.	
TRANSPORTATION			
Roadway Facilities	Detail Design	Conduct comprehensive and detailed geotechnical investigations at structures and culverts to analyze and define the construction method that ensures structural safety and avoids operational disruptions on the existing structure. This work will be discussed and coordinated with the corresponding municipal agencies during the implementation phase.	MTO City of Toronto Durham Region City of Pickering Town of Ajax Town of Whitby City of Oshawa
	Detail Design	Consider refinements to the design of the Highland Creek bridge (located on Ellesmere Road, west of Neilson Road) to address evolving road design and cycling facility standards, continuity of active transportation facilities east and west of the bridge, and bridge maintenance requirements.	
	Detail Design	Review and integrate the design of Ellesmere Road with the latest EELRT project information, in coordination with City of Toronto and TTC.	
	Detail Design	Integrate with design of the future SSE Scarborough Centre bus terminal and transit operations on Grangeway Avenue.	
	Detail Design	Consider and integrate with other future rapid transit initiatives and active transportation initiatives impacting the Project.	

Environmental Component	Project Phase	Future Commitment	Agencies to be Consulted
	Detail Design	Consult with staff from emergency services (fire, police, ambulance) from City of Toronto, Durham Region, City of Pickering, Town of Ajax, Town of Whitby, and City of Oshawa to identify additional median break locations for emergency access. Review and confirm design and signage details for identified median break locations.	
	Detail Design	Consult with Accessibility Advisory Committees and agencies that support persons with disabilities and review accessibility requirements to ensure the path of travel from sidewalk/bus stops to trail entrances are accessible.	
	Detail Design	Station stop design/architecture will be reviewed and refined/revisited in accordance with Metrolinx's BRT standards.	
	Detail Design	Explore design refinements to minimize grading impacts and reduce the need for retaining walls. Clearance between toe walls and edge of sidewalks can be refined during detail design in consultation with municipal operations and maintenance staff.	
	Detail Design	Review pedestrian, cycling and driveway crossings, following municipal standards best practices to address safe integration of facilities and mitigate conflicts at mixing zones.	
	Detail Design	Review the design of new or rehabilitated walking and cycling facilities in the context of provincial and municipal standards, Vision Zero policies, and applicable best practices. Within the City of Toronto, this includes the City of Toronto's On-Street Bikeway Design Manual.	
	Detail Design	Review individual driveways to maintain vehicle and pedestrian access in consultation with property owners. Design refinements may include geometric design improvements to the roadway or driveway. Conduct sightline analysis of driveways.	
	Detail Design	For any impacted properties located north of the redesigned intersection at Parkington Crescent, standard pedestrian and vehicular access will be provided during and post-construction, including if needed geometric roadway/driveway design improvements and/or the provision of an access road with a standard turn-around facility.	
	Detail Design	Consider graffiti management best practices for future retaining walls including form liner surface treatment, installation of anti-graffiti coating per applicable standards, and/or mural installation.	
	Detail Design	Conduct a Safety Audit of the preliminary design of Ellesmere Road from Military Trail to Kingston Road, including considering and evaluating design alternatives without a curbed centre median. Explore recommendations from the Safety Audit with City of Toronto Transportation Services for potential refinements to the design.	
	Detail Design	Explore design refinements to optimize the section of Ellesmere Road between Conlins Road and Kingston Road. Optimization of this section may include consideration of new traffic signals with left-turn/U-turn capacity, new protected pedestrian crossings, additional safety improvements, median design solutions, additional local transit stop locations and integration of the BRT stops to support local transit operations.	
	Detail Design	Explore opportunity to centre the pavement width on the King Street and Bond Street structures over Oshawa Creek.	
	Detail Design	Explore design refinements to improve existing horizontal and vertical alignment to current standards.	
	Detail Design	Optimize the proposed MUP design in the northeast quadrant of Dundas Street West and Halls Road North closer to the roadway to minimize impacts to the existing lateral concrete pipe and headwall.	
	Detail Design	Explore drainage design refinement on Dundas Street West between 70+410 and 70+550 with drainage pipe under EB lanes that will outlet into the existing south ditch around 70+550.	
	Detail Design	Explore design refinements in Downtown Whitby, including the BRT WB stop location at Brock Street, and the potential to create symmetrical sidewalk widths on the north and south sides of Dundas Street between Byron Street and Brock Street.	
	Detail Design	Explore design refinements at Celebration Square and Central Public Library to further mitigate impacts, working closely with Town of Whitby Engineering Services, Heritage Planning, and Strategic Initiatives.	
	Detail Design/ Construction	Follow the most current version of applicable road standards.	
	Detail Design/ Construction	Determine maintenance expectations, roles, and responsibilities for the infrastructure.	
Railway Crossings	Detail Design	Follow established design guidelines and standards for rail crossing grade separations, including sightline and clearance, to meet infrastructure, operations, and safety requirements.	Railway Agencies Durham Region

Environmental Component	Project Phase	Future Commitment	Agencies to be Consulted
	Detail Design	Conduct comprehensive and detailed geotechnical investigations to analyze and define the construction method to ensure structural safety and avoid operational disruptions on existing tracks. Discuss and coordinate this work with the corresponding railway agencies.	
Traffic	Detail Design	Develop a Traffic Staging and Management Plan. Within the City of Toronto, this plan is to meet City requirements for a Traffic and Transit Management Plan (TTMP) and an Access Management Plan (AMP). An updated Traffic Impact Assessment (TIA) may be required depending on the project implementation timeline.	City of Toronto Durham Region City of Pickering Town of Ajax Town of Whitby City of Oshawa
	Detail Design	At the Military Trail / Ellesmere Road intersection near UTSC, incorporate the findings of the City of Toronto TSLIP (Transportation Safety Local Improvement Project), as appropriate.	
	Detail Design	Complete a haul route analysis to confirm that heavy single unit trucks are not subject to detour routes through residential areas, that turning radius is adequate for safe operation on detour routes, and that heavy single unit trucks can safely and easily access loading and unloading facilities.	
	Detail Design	Review the median break design on a site-by-site basis and refine, as appropriate, to prevent general traffic from making illegal U-turns at breaks (e.g., using semi-mountable curbs). Gaps should not be provided at driveway locations. Gaps must accommodate winter maintenance and bus breakdown conditions.	
	Detail Design / Construction	Develop and implement a Signage and Wayfinding Action Plan which directs vehicle and pedestrian traffic through the Study Area during construction by identifying appropriate locations and types of signage required.	
	Construction	Prepare an Emergency Response and Incident Management Plan, which ensures that emergency vehicles have enough space to navigate during peak traffic periods, that emergency vehicles are provided with sufficient turning radius to access incident sites, and that infrastructure built into the street, such as fire hydrants, are always accessible.	
	Operations	Develop signal timing plans that provide protected-only (fully-protected) left-turn signal phasing at all signalized intersections.	
	Operations	Consider signal timing changes or additional turn lane storage in the detail design for Ellesmere Road at Markham Road, and Kingston Road from Altona Road to west of Elizabeth Street.	
	Operations	Consider signal timing changes along Ellesmere Road from Morningside Avenue to Kingston Road, and along Kingston Road from Ellesmere Road to Raspberry Road: • Longer traffic signal cycle length • Protected/permissive northbound and southbound left turn phases • Adaptive signal timing	
	Detail Design/ Construction/ Operations	Monitor traffic volumes and adjust signal timings as necessary before, during and after construction for on-going operation.	
NATURAL ENVIRONMENT			
Watercourses and Hydrological Features	Detail Design	Conduct a detailed assessment of storm and surface drainage and watercourses to inform the detail design.	TRCA CLOCA MECP MNDMNRF Transport Canada City of Toronto Durham Region City of Pickering Town of Ajax Town of Whitby City of Oshawa
	Detail Design	Update the preliminary Drainage/Stormwater Management Plan in consultation with regulatory agencies (including TRCA/CLOCA) to manage storm and surface drainage/runoff and build upon the drainage/stormwater management mitigation measures/practices. Where feasible, the plan for the management of stormwater will adhere to the TRCA's The Living City Policies (TRCA 2014), at least within the TRCA's jurisdiction. Low impact development (LID) measures will be incorporated to the extent possible where stormwater management is required along the DSBRT to achieve stormwater management as per TRCA and CLOCA stormwater management criteria. Runoff generated by the new DSBRT lanes will be collected and treated using approved stormwater management practices employing a treatment-train approach including source, conveyance and end-of-pipe measures, where feasible. Stormwater management mitigation design will consider the environmental setting into which the drainage system will be placed. Salt vulnerable areas will be identified and the potential for salt impacted drainage in these areas must be assessed.	
	Detail Design	Treat all works on unscheduled waterways that were not opted out as 'legacy' works, which must be considered the same as any work on a scheduled waterway. An application must always be submitted for works proposed at these waterways and approved prior to undertaking any activities. As a result, prior to the commencement of any work and during the detail design phase for all proposed works on the waterways within the Study Area, either submit a voluntary application and receive an approval document or undertake the owner-led Public Resolution Process	

Environmental Component	Project Phase	Future Commitment	Agencies to be Consulted
		without Transport Canada involvement. Determine how to proceed and consult with Transport Canada as required. Review CNWA provisions, adhere to the current legislation, and obtain/submit any required permits/approvals under the CNWA prior to construction, if required.	
	Detail Design	Initiate TRCA's Voluntary Project Review (VPR) process. Submit design drawings, following TRCA submission requirements. Design project components within TRCA's regulated area in accordance with TRCA's guidelines. Prepare and submit an interim site protection plan to TRCA if proposed works are phased over multiple construction seasons.	
	Construction	Report all spills that could potentially cause damage to the environment to the Spills Action Centre of the MECP. A Spill Response Plan will be developed for spill containment and clean-up.	
Aquatic Environment	Detail Design	Confirm crossings over watercourses are designed to minimize impacts on the aquatic environment. Additional site-specific mitigation may be necessary to mitigate impacts to the aquatic environment during construction. The potential need for additional site-specific mitigation will be investigated through consultation with permitting agencies such as TRCA, CLOCA, MECP and DFO. Mitigation proposed at the culverts/structures requiring improvements includes minimizing the design to keep necessary bridge widenings and culvert extensions as short as possible, employing retaining walls to reduce encroachment into riparian areas and confining work to as small an area as possible.	TRCA, CLOCA MECP DFO Indigenous Nations
	Detail Design	Consider fish and wildlife friendly culvert and bridge design as part of the Project. No new barriers to fish passage will be created from works associated with this project and a fish passage analysis will be conducted during detail design for existing and proposed conditions at all crossings where direct fish habitat is present or potentially present. An analysis of existing and proposed fish passage for jumping and non-jumping fish will be completed at all watercourses that constitute direct (or potential direct) fish habitat. Opportunities to improve fish passage via culvert works will be considered, where feasible. DSBRT structure/culvert modifications have been designed to maintain and promote wildlife passage across the landscape.	
	Detail Design	Consult with DFO to determine whether harmful alteration, disruption or destruction (HADD) of fish habitat will occur at locations where works are proposed below the high-water line (i.e., within the bankfull width of the channel) in fish habitat. Currently, this consultation consists of the preparation and submission of request for review forms and subsequent consultation with DFO biologists. This process is used to determine next steps which could include proceeding with the works under a letter of advice or the application for an authorization under the *Fisheries Act*. Requests for review forms should be submitted to DFO for all crossings where culvert or bridge works are proposed (all crossings except Crossings 1, 2, 4, and 22). Obtain a *Fisheries Act* Authorization, if required and secure any required Fish Collector's permits for salvage. Indigenous Nations will be advised in advance of future fieldwork and in-water works.	
	Construction	No in-water work (or work on watercourse banks) will be permitted from April 1 to June 30 to protect spawning warmwater fish, incubating eggs and fry emergence and from September 16 to June 30 to protect coldwater fish spawning, egg incubation and fry emergence (and to protect Redside Dace).	
	Detail Design/ Construction	Implement restoration/enhancement for all crossings where work (in-water or riparian) is proposed. Where restoration/enhancement will not suffice to offset/mitigation impacts, compensation will be employed. Compensation plans, if necessary, will be completed in consultation with regulatory agencies. Draft compensation plans will be shared with Indigenous Nations.	
	Detail Design	Update the Drainage/Stormwater Management Plan (see Watercourses/Hydrological Features).	
Terrestrial Environment	Detail Design	Commence consultation with CLOCA and TRCA early in detail design to develop the vegetation compensation strategy in parallel with design refinements to minimize impacts.	TRCA CLOCA
	Detail Design	Delineate natural heritage feature limits and ELC vegetation communities at a detail design level to inform impacts both temporary and permanent and development of restoration and compensation strategies.	TRCA CLOCA
	Detail Design	Prepare an Environmental Monitoring and Contingency Plan, if required, (in accordance with TRCA/CLOCA standards) to address potential emergencies during construction where valley or stream corridors, wetlands, woodlands, and/or hazardous land are impacted.	TRCA CLOCA MECP MNDMNRF Parks Canada City of Toronto Durham Region City of Pickering Town of Ajax
	Detail Design	Undertake further detailed review of the environmental policy guidelines/documents as well as agency consultation (with TRCA, CLOCA, MECP, MNDMNRF, Parks Canada, etc.) to ensure compensation, mitigation compliance, and agreement for habitat loss and to identify any additional required mitigation measures.	
	Detail Design	Undertake compensation through ecological restoration such as the creation or enhancement of habitat and carry out the planning early to maximize options for restoration to the natural system. Compensation for communities other than forest and wetland communities (i.e., CUW, CUT and CUM) will be considered/discussed during the detail design phase.	

Environmental Component	Project Phase	Future Commitment	Agencies to be Consulted
	Detail Design	Compensation should be implemented coincident with the timing of natural heritage removals on a subwatershed scale (i.e., Creek by Creek) to ensure no net loss of ecological value over the period of project implementation, where possible.	Town of Whitby City of Oshawa
	Detail Design	When all other compensation efforts are not feasible, cash-in-lieu for impacts associated with conservation authority or municipal lands will be considered by Metrolinx/the proponent Funds will be used only for tree compensation as part of vegetation compensation to improve components of the natural heritage system, adhering to restoration principles outlined, to the extent possible. Cash-in-lieu for vegetation compensation through ecological restoration will be used for actual tree compensation for the purposes of creating or enhancing the natural heritage system for the benefit of either increasing contiguous habitat, providing buffering capacity, increasing habitat connectivity, etc. Further investigation of this compensation measure in conjunction with Metrolinx/the proponent and respective regulatory agencies, will be required. Cash-in-lieu compensation must be submitted prior to permit issuance.	
	Detail Design	Metrolinx, as a Crown agency of the Province of Ontario, is generally not subject to the legal requirements of the *Conservation Authorities Act* and the conservation authorities permitting processes. However, Metrolinx/the proponent will work closely with conservation authorities to achieve conformance to respective requirements (including TRCA's Living City Policies). Engagement with TRCA and CLOCA will continue including consultation/negotiation processes and submitting design information, where appropriate, without formally entering into the permitting process.	
	Detail Design	Comply with the noted principles and standards of all applicable environmental policy guidelines/documents (including the Metrolinx Vegetation Guideline (2020), Guideline for Determining Ecosystem Compensation (TRCA 2018), The Living City Policies (TRCA 2014), the Rouge National Urban Park Management Plan (Parks Canada 2019) and upper and lower tier municipal tree protection by-laws), and Ontario Regulations (including O. Reg. 166/06) to the final vegetation community impact areas which may be refined.	
	Detail Design / Construction	Engage in discussion with municipal staff as well as the above noted agencies to identify suitable sites for offsetting to compensate for habitat loss as part of implementing the Project. Restoration of suitable forest and/or wetland habitat will be undertaken at a compensation ratio to be determined through further discussion with regulatory agencies (TRCA, CLOCA, MECP, MNDMNRF, Parks Canada, etc.), as part of implementing the Project. Compensation will be in accordance with applicable environmental policies and the standards of respective agencies and municipalities. Compensation will be undertaken following applicable Tree By-laws and Ecological Restoration with replacement at a 1:1 ratio on an individual tree basis (Metrolinx 2020), and will be in accordance with applicable environmental policies and the standards of respective agencies and municipalities. Specific compensation requirements for municipal tree replacement ratios are outlined in **Appendix D**. The City of Toronto requires replacement ratios by tree category as follows as per the City of Toronto By-laws: • Private tree located on the Project Site: 3:1; • Private tree located on property adjacent to the Project Site or on the boundary of the Project Site and adjacent property: 3:1; • Park tree: 3:1; • RNFP tree: healthy tree >10 cm: 3:1; healthy tree <10 cm: 1:1; poor condition tree: 1:1; tree injury: 1:1; hedge removal: 1 tree per 5 m of hedge removed; and, • City tree: 3:1.	
	Detail Design	Review/update the proposed environmental protection/mitigation/monitoring measures for vegetation/vegetation communities/natural areas and undertake design refinements to further minimize impacts to forest and wetland communities to the extent possible (especially associated with access and staging during construction). Ensure tree protection hoarding plans are submitted and approved prior to permit issuance. Provide a summary of vegetation removals within each watershed if required for compensation purposes. Assess impacts to vegetation communities including wetlands. Any updates to the boundaries of evaluated wetlands will be completed in accordance with the Ontario Wetland Evaluation System by a qualified professional trained in the application of OWES and any changes will be submitted to MNDMNRF for review and confirmation.	
	Construction/ Operations	Maintenance of any prescribed restoration and manicured areas during the operation and maintenance phase, including removal of dumped garbage, will be on-going. Provide a warranty on planted materials to ensure that the newly planted material survives and fulfils the intended function. A two-year warranty applies to planted materials when part of a restoration plan for the City of Toronto.	
	Construction/ Operations	Forest/wetland edge and riparian and valleyland management will be undertaken for those communities where such management is recommended and in accordance with TRCA's Forest Edge Management Plan Guidelines (2004).	

Environmental Component	Project Phase	Future Commitment	Agencies to be Consulted
	Detail Design	Prepare a detailed landscape planting plan (including landscape composition planting layout drawings and consideration of plantings at the station sites) once areas identified for restoration have been determined in consultation with the respective agencies to help mitigate impacts to the adjacent natural and cultural environment. Submit restoration and replanting plans (along with erosion control fencing plans) prior to permit issuance. The planting plan will include recommended actions to minimize the spread of non-native and invasive/aggressive plant species. A one-to-two year watering plan for new plantings will be considered during detail design, as required.	
	Construction/ Operations	Monitoring of compensation planting areas will include contingencies to mitigate for plant mortality, species incompatibility with site conditions, invasive species presence, etc.	
	Construction	Transplant regionally rare plant species that cannot be avoided during construction into nearby vegetation communities with suitable habitat characteristics that will afford ongoing protection, where feasible.	
	Construction/ Operations	Efforts to control non-native and invasive plant species that have become established, as well as prevent the establishment of new non-native and invasive plant species, at a minimum will be implemented during the operations/construction phase	
	Post-construction	Discuss post-construction planting plans with local municipal arborists to ensure the planting list consists of climate change resilient species.	
	Detail Design	Consider native species varieties over horticultural varieties in particular within/adjacent to natural features/areas.	
Wildlife	Detail Design	Once proposed culvert/structure sizes are confirmed, re-calculate openness ratio (OR) for each of the culverts/structures to determine whether target animal groups can use the culverts/structures for passage. Where feasible, the culvert/structure size must reflect an approximate OR to facilitate animal movement. The minimum OR for small animals should be 0.05 and the minimum OR for large animals should be 0.6. A minimum clearance height of 3 m for structures that will provide passage for large animals is recommended. Where crossing structure sizing is constrained by existing sizing or other technical limitations, enhancement of crossing sites will be considered, where feasible.	TRCA CLOCA MNDMNRF MECP Parks Canada Environment and Climate Change Canada City of Toronto Durham Region City of Pickering Town of Ajax Town of Whitby City of Oshawa
	Detail Design	Despite limited opportunity for enhancement of existing crossings (due to the limited modifications to existing culverts/structures associated with the DSBRT), review wildlife passage recommendations and, where feasible, incorporate into the design to enhance the functionality of crossing structures for wildlife passage.	
	Detail Design	Conduct an assessment of light penetration into the crossing structures will be conducted to determine if adequate vegetation growth and establishment as cover will occur.	
	Detail Design	Perform further analysis at a site-specific level to determine wildlife barrier/funnel fencing requirements and to further explore fencing type required (e.g., small animal fencing vs. large animal fencing).	
	Construction	Wildlife salvage will occur prior to clearing and grubbing activities associated with construction where feasible, particularly in wetland habitats, to preserve vulnerable wildlife species (e.g., herpetofauna). Obtain all applicable Wildlife Collector's permits prior to any salvage activities.	
	Detail Design / Construction	To comply with the MBCA requirements, ensure disturbance, clearing or disruption of vegetation where birds may be nesting is completed outside the migratory bird nesting timing window of April 1 to August 31. If these activities must be undertaken from April 1 to August 31, a pre-clearing nest survey will be conducted by a qualified avian biologist to identify and locate active nests of species covered by the MBCA. Mitigation for the potential of bird collisions with bus shelters constructed of glass will be further developed during detail design. The design will comply with Canadian Standards Association A460:19 Bird Friendly Building Design and Toronto Green Standard for Bird Control.	
Species at Risk and Plant Species of Concern/Regionally Rare Plant Species	Detail Design	Further correspondence will take place with MECP, DFO, Environment and Climate Change Canada, and Parks Canada to discuss the SAR (and SAR habitat) that have been identified or have the potential to be located in the vicinity of the Study Area (in particular Redside Dace, American Eel, Butternut, Bobolink, Barn Swallow, Bank Swallow, Eastern Meadowlark, and SAR bat species), any potential impacts of the proposed work on these federally/provincially designated species and their habitat, and appropriate protection/mitigation/monitoring/compensation measures. A determination of whether a proposed development will contravene subsection 10(1) of the Ontario ESA 2007 and/or the Canada SARA 2002 is required prior to the undertaking. The requirements for permitting under the Ontario ESA (Ontario Regulation 242/08, etc.) and Canada SARA (2002) will be reviewed and confirmed with MECP, DFO, Environment and Climate Change Canada and Parks Canada as necessary to determine whether mitigation or overall benefit are required. Prior to construction, further targeted field investigations will be undertaken as required for SAR during the appropriate season using specified specific standardized protocols. Surveying for these species must be conducted to establish their presence or absence, and thus, the appropriate steps for protection and permitting.	MECP Environment and Climate Change Canada DFO Parks Canada TRCA CLOCA

Environmental Component	Project Phase	Future Commitment	Agencies to be Consulted
	Detail Design / Construction/ Operations	A detailed Butternut survey must be undertaken within 50 m of the proposed limits of disturbance during the appropriate timing window (i.e., leaf on) to determine if any additional Butternut trees are present, and thus, appropriate steps for protection, mitigation or permitting under the Ontario ESA. Also, at that time, a Butternut Health Assessment must be undertaken for each of the four Butternuts identified as well as any additional Butternut trees identified. This assessment will be conducted by a MNDMNRF designated Butternut Health Assessor. If SAR planting is identified as a requirement and planting in suitable areas adjacent to the ROW or in compensation areas is acceptable, planting, tending, monitoring, and reporting of SAR planting will be adhered to as per criteria/conditions under the Ontario ESA 2007.	
	Detail Design	For Redside Dace, if it is determined that the species is present within Carruthers Creek (Crossing 14), the Redside Dace/coldwater timing window (July 1-September 15) will be adhered to, rather than the warmwater window dictated by the reported thermal regime of the watercourse. Other site-specific mitigation may be necessary and will be determined through agency consultation. In addition, if federally-listed aquatic SAR (i.e., Redside Dace) are present within a watercourse and dewatering will occur during construction, a Canada SARA permit may be necessary for the rescue of potentially stranded fish. Fish and Wildlife Collector's permits for salvage will also be obtained during the detail design phase as required.	
	Detail Design	Obtain appropriate permits under the Ontario ESA and Canada SARA for impacts to SAR/SAR habitat, as required.	
	Detail Design / Construction	Where warranted (i.e., trees < 3 cm dbh, etc.), locate and identify plant species of concern/regionally rare plants that will be impacted by the DSBRT. Transplant regionally rare plant species that cannot be avoided during construction into nearby vegetation communities with suitable habitat characteristics that will afford ongoing protection, where feasible.	
Significant Natural Heritage Features	Detail Design	Complete any necessary design refinements to delineate the designated natural areas, plan policy areas, and regulations areas, and the construction areas within them, as well as to address the guidelines/policies/plans noted under Terrestrial Environment above (as well as the Greenbelt Plan (2017)). Review for any changes per outcome of the Province's consultation on growing the size of the Greenbelt (see ERO 019-3136 on the Environmental Registry), which may result in the addition, expansion and further protection of Urban River Valleys.	TRCA CLOCA MECP MNDMNRF Parks Canada City of Toronto Durham Region City of Pickering Town of Ajax Town of Whitby City of Oshawa
	Detail Design	Continue consulting with municipal and agency staff (including TRCA, CLOCA, MECP, MNDMNRF, Parks Canada, etc.) to ensure compliance with the applicable environmental policies, guidelines, and plans regarding acceptable mitigation/compensation protocols for habitat loss within the forest/wetland communities/significant natural heritage features, and to identify any additional required mitigation measures to ensure impacts to these areas are minimized to the extent possible.	
	Detail Design	Discuss opportunities for compensation to mitigate wetland and forest impacts early on during detail design.	
	Detail Design	Discuss timing of compensation to mitigate forest and wetland impacts early on during detail design.	
Watercourses Crossings	Detail Design	Conduct hydraulic analysis following *Natural Hazards Policies or the Technical Guide, River and Stream Systems; Flooding Hazard Limit* (2002) to ensure that all following flood hazard objectives are met: • Ensure that flood risk does not increase as a result of the proposed crossing for all design storm events up to, and including, the Regulatory event. • Safely convey the applicable design storm as per municipal, regional, and/or Ministry of Transportation guidelines considering implications of future land use on flooding. • Establish the requirements for crossing size (i.e., overtopping of the Regulatory event) while considering ingress/egress within the surrounding area in consultation with local municipal emergency managers. • Consider TRCA's Crossing Guideline for Valley and Stream Corridors (2015) in setting stream crossing objectives for watercourses under TRCA jurisdiction during the detail design phase. • Provide the design drawing of crossing C-02 to TRCA when available. • Confirm a cut/fill estimation will be confirmed and provide to TRCA. • Consider 300 m of a tributary of Lynde Creek between Lake Ridge Road and Halls Road for realignment. • Compete a Fluvial Geomorphologic Study where channel modification is needed to complete the structure extension. • Coordinate with TRCA to consider the proposed works related to flood control around Duffins Creek Bridge during detail design. The hydraulic condition could be further assessed using the 2D model obtained from the TRCA during detail design to further refine the design, the proposed grading plan, and fill volume within the floodplain.	TRCA CLOCA MECP City of Toronto Durham Region City of Pickering Town of Ajax Town of Whitby City of Oshawa

Environmental Component	Project Phase	Future Commitment	Agencies to be Consulted
Floodplain Management/ Flooding Hazards	Detail Design	Extension/replacement of existing watercourse crossing structures will consider the following; • For all defined watercourses (floodplains), complete detailed hydraulic assessments using the HEC-RAS model. Update floodline mapping to standards of TRCA and CLOCA to determine appropriate design storm and peak flow rate associated with the watercourse at the proposed crossing location based on future land use conditions. • Size proposed crossing structure to convey the appropriate peak flow rate without increasing flood elevations for the 2 to 100 year and Regional storm events. • Confirm flood hazard at the preferred crossing location using existing floodplain mapping and modelling. Update models as necessary to reflect more detailed topographical and flow data. • Refine the hydraulic analysis based on the detail design to ensure flooding objectives are met with regard to future land use changes. • Submit an updated floodplain map to TRCA upon final acceptance of the modelling and floodplain mapping. • Floodproof stops and their electrical utilities above the Regional flood event. Consult TRCA to consider mitigation regarding the design of stops and platforms within the regulatory area, including Notion Road stop.	TRCA CLOCA MECP City of Toronto Durham Region City of Pickering Town of Ajax Town of Whitby City of Oshawa
LANDFORMS/PHYSIOGRAPHY, SOILS, GEOLOGY AND GROUNDWATER			
Landforms and Physiography	Detail Design	See commitments for Geotechnical, Groundwater, and Watercourses/Hydrological Features.	TRCA CLOCA MECP City of Toronto Durham Region City of Pickering Town of Ajax Town of Whitby City of Oshawa
Bedrock Geology, Quaternary Geology and Soils	Detail Design	Define final soil profiles and prepare an Excess Materials Management Plan to manage excess/contaminated soils/materials to meet regulatory requirements in place at the time of detail design and excess materials management guidelines and specifications. Prepare an Erosion and Sedimentation Control Plan (including an erosion monitoring and sediment report program) including measures to monitor and maintain erosion and sedimentation control during construction to ensure their effectiveness. Site-specific erosion and sedimentation control measures to be implemented prior to construction, maintained during construction and removed after construction (once soils have stabilized) will be identified prior to construction following the guidelines including TRCA's Erosion and Sediment Control Guide for Urban Construction (2019a) and Silt Smart - Erosion and Sediment Control Effectiveness Monitoring and Rapid Response Protocol for Large Urban Development Sites (Credit Valley Conservation, MNDMNRF, MOE, DFO 2012). Initiate site-specific investigations (including boreholes/test pits and visual inspection – in combination with further geotechnical investigations) in the vicinity of areas of soil disturbance as necessary to obtain soils characteristics data. The potential impacts of the proposed construction work on soil stability/earth slopes will be assessed along with the more detailed soils data prior to construction and appropriate mitigation measures to maintain soil and earth slope stability will be identified and incorporated into the design.	TRCA CLOCA MECP
Geotechnical	Detail Design	Conduct a geotechnical slope stability study to determine the erosion hazard limits, where applicable, and development of mitigative measure against the risk of erosion hazards and potentially unstable slope in the long-term following the TRCA Geotechnical Engineering and Design Submission Requirements (November 2007).	TRCA
	Detail Design	Develop geotechnical design for earth works, grading, and alterations, retaining walls against erosion hazards where needed to protect the proposed project against the slope hazards and generate geotechnical design to mitigate the potential risk of being impacted by hazardous, unstable slopes in the long term. Include construction recommendations to ensure that the slopes are not adversely impacted during construction in the geotechnical design.	
Groundwater	Detail Design	Additional inspection of the individual water well records (and a desktop review) will be required to verify the list of wells and map their locations. Any further evaluations would likely require mail surveys/field verification activities in order to ensure impacts to these water wells are mitigated.	TRCA CLOCA

Environmental Component	Project Phase	Future Commitment	Agencies to be Consulted
	Detail Design / Construction	Obtain any required discharge approvals and documentations including any PTTW and/or EASR approvals. A Water Taking and Discharge Plan must be prepared prior to construction. Pumping discharge will also comply with any requirements from the local municipalities and conservation authorities. The combined dewatering rate from all sources will be considered when assessing the dewatering permitting requirements for the Project. A Water Taking and Discharge Plan will be completed during detail design to document potential impacts and mitigation associated with construction dewatering activities and support water taking approvals. The dewatering volumes, zones of influences and discharge plans and impact assessment will be completed during detail design phase. Manage surface water will at the construction site to prevent contact with exposed soil and/or surface water that comes in contact with exposed soils will be treated using stormwater detention ponds, basins, traps and bags.	MECP City of Toronto Durham Region City of Pickering Town of Ajax Town of Whitby City of Oshawa
TREE INVENTORY			
Tree Resources	Detail Design	Minimize the Project footprint to the extent possible to maximize the number of trees retained. Review impacts to trees during the detail design phase to refine the design and consider site-specific mitigation measures such as refinement of/exceptions to design criteria, the use of retaining walls and clear zone barriers for tree protection, and other site-specific measures to be implemented on a case-by-case basis.	TRCA CLOCA MECP Parks Canada City of Toronto Durham Region City of Pickering Town of Ajax Town of Whitby City of Oshawa
	Detail Design	Undertake a gap analysis (in accordance with municipal and TRCA/CLOCA requirements) on refinements and changes to the geometry of the preferred design alternative/DSBRT footprint to ensure that all trees are surveyed and impacts to trees within the Study Area are adequately addressed. Survey the trees at the intersection of Thickson Road and Dundas Street East.	
	Detail Design	Provide compensation for the removal of roadside trees within the Study Area in accordance with the Metrolinx Vegetation Guideline (2020), TRCA Guideline for Determining Ecosystem Compensation (TRCA 2018) and the TRCA Forest Edge Management Plan Guidelines (2004) (see Terrestrial Environment above). Refinements to compensation requirements will be undertaken when tree removal permits have been approved by municipal agencies. Compensation (as well as all restoration/replanting plans) must be submitted to municipal staff prior to permit issuance. Tree protection hoarding must be installed and approved prior to permit issuance. Utilize the ecological compensation approach (Metrolinx Vegetation Guideline 2020) for those trees to be removed that are located on Metrolinx property. Compensate for the remainder of the By-law regulated trees located on private or municipally owned property based on the requirements of applicable By-laws.	
	Detail Design	Update the compensation analysis for roadside trees when tree removal permits have been approved by municipal agencies.	
	Detail Design	Within TRCA's jurisdiction, consider compensation for trees in accordance with TRCA's Guideline for Determining Ecosystem Compensation (2018). See **Section 4.2.4.1** for details regarding compensation for the loss of forest/wetland communities.	
	Detail Design	Adhere to City of Toronto compensation ratios for the removal of trees within the City of Toronto and the City's additional requirements (see **Section 4.4.3**). Consult with private property owners before any tree removals and or tree impacts/injuries occur on private property. At a minimum tree replacement for private trees not regulated by City of Toronto tree removals By-laws should be at a ratio of 1:1. Removal of any By-law protected ash trees will require a permit from the City of Toronto. Removal of any By-law protected ash trees infested with Emerald Ash Borer will require a permit exemption from the City of Toronto.	
	Detail Design	Adhere to the Town of Whitby's compensation requirements for the removal of trees within the Town of Whitby (see **Section 4.4.3**).	
	Detail Design	Consult further with lower and upper tier municipalities and regulatory agencies, such as TRCA, CLOCA, MECP, and Parks Canada to discuss tree compensation and restoration plans.	
	Detail Design	Consult with Parks Canada if impacts to trees will occur within the Rouge National Urban Park.	
	Detail Design	Consult with the municipalities to reconfirm the requirements for tree removal permits associated with the municipal tree protection By-laws. Permits related to municipal tree protection by-laws and other applicable tree removal permits will be obtained from municipalities as required during the detail design phase, and as outlined in Metrolinx's Vegetation Guideline (2020), TRCA's Guideline for Determining Ecosystem Compensation (2018), TRCA's Forest Edge Management Plan Guidelines (2004) and the upper and lower tier municipal tree protection by-laws. The recommended tree protection measures that will be implemented to ensure no impacts occur to trees designated for retention including those trees identified as impacted/injured are presented in **Appendix D**.	
	Construction	Provide municipal agencies with the ability to perform on-site inspections in regards to tree planting, transplantation, and tree protection during implementation of the Project, as required.	

Environmental Component	Project Phase	Future Commitment	Agencies to be Consulted
	Detail Design	Ensure a Landscape Architect prepares planting plans for the tree plantings proposed as part of the compensation required in accordance with municipal standards for landscaping/tree requirements and in consideration of below ground infrastructure when developing the planting plans. Submit restoration and replanting plans (along with erosion control fencing plans) prior to permit issuance. Consider the limitations associated with tree planting in the vicinity of City of Toronto water infrastructure (and in the vicinity of the infrastructure of the other Study Area municipalities) when the locations of the buried infrastructure and the DSBRT infrastructure are identified.	
	Detail Design	Provide municipal staff with the opportunity to comment on tree planting specifications, species selection and planting locations during the development of the planting plans. Provide a warranty on planted materials to ensure that the newly planted material survives and fulfils the intended function. A two-year warranty applies to planted materials when part of a restoration plan is for the City of Toronto.	
	Detail Design / Construction	Consider opportunities to transplant trees identified for removal within the Study Area, where feasible. Transplant trees that measure less than or equal to 10 cm DBH and are in good health that have been identified for removal, where feasible.	
	Construction/ Operations	Undertake any required post-planting monitoring (by a qualified arborist) and/or maintenance/establishment program to monitor the health of the replacement/transplanted trees and provide recommendations for mitigation such as watering, pruning or fertilizing.	
	Detail Design / Construction	Undertake efforts to preserve those trees that are located on properties listed on Heritage Registers and are considered part of a cultural heritage landscape. Prioritize retention and protection of heritage trees and retain trees located on heritage properties to the extent possible.	
	Detail Design / Construction	Review the recommended tree protection measures to ensure no impacts occur to trees designated for retention including those trees identified as impacted/injured, and ensure all tree protection measures are implemented during construction. Proof of installed tree protection hoarding must be submitted for approval prior to permit issuance.	
	Construction	Ensure all work undertaken within the minimum TPZ of a tree is supervised by an ISA certified Arborist who will document the works that were completed and direct workers as required.	
	Construction/ Operations	Implement recommended invasive species management measures. Monitoring of planting will include contingencies to mitigate for invasive species presence/ management.	
	Construction	Ensure precautions are taken with the removal of ash wood during construction as Emerald Ash Borer (EAB) is widespread throughout the Study Area. Ensure the removal of ash trees from the Study Area is in compliance with the requirements of D-03-08 Phytosanitary Requirements to Prevent the Introduction Into and Spread Within Canada of the Emerald Ash Borer (Canadian Food Inspection Agency 2021). Where feasible, ash trees will not be removed from the site during the high-risk season (April 1 to September 30) of any given year.	
CULTURAL ENVIRONMENT			
Built Heritage Resources and Cultural Heritage Landscapes	Detail Design	Consult with municipal heritage staff, MHSTCI and local heritage advisory committees as appropriate to determine if proposed infrastructure will be subject to specific policies within heritage conservation districts or conservation areas (parks).	Indigenous Nations MHSTCI Municipal Heritage staff Local Heritage Advisory Committees
	Detail Design	A Heritage Impact Assessment (HIA) will be undertaken by a qualified person for the following properties: TO-004, TO-012, TO-013, PK-014, PK-018, AJ-003, AJ-007, AJ-009, AJ-014, AJ-015, AJ-016, AJ-017, AJ-018, AJ-020, AJ-021, AJ-037, AJ-038, AJ-040, AJ-043, AJ-059, WI-021,WI-046, WI-051, WI-063, WI-064, WI-065, and OS-006, (see **Chapter 4** and **Appendix E**). The HIAs will be completed in consultation with municipal heritage staff and the MHSTCI as early as possible during detail design.	
	Detail Design / Construction	Follow and adhere to the recommendations of all HIAs and the Cultural Heritage Report, including but not limited to strategies to protect heritage attributes.	
	Construction	Selection of construction staging and laydown areas will follow Metrolinx's selection procedures which include avoiding heritage properties wherever possible or effectively mitigating impacts where not possible.	
	Detail Design	Baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer will include this property in the condition assessment of structures within the vibration zone of influence for this project. (See under Vibration for more details)	
Archaeological Resources	Detail Design	Should the proposed work extend beyond the current Study Area, further archaeological assessment will be conducted to determine the archaeological potential of the surrounding lands. Indigenous Nations will be invited to participate in future archaeological assessment studies.	Indigenous Nations MHSTCI Municipal Heritage staff Local Heritage Advisory Committees

Environmental Component	Project Phase	Future Commitment	Agencies to be Consulted
		All required archaeological assessments (e.g., Stage 2 AA, and Stage 3, if recommended in the Stage 2AA) will be completed as early as possible during detail design and well in advance of any ground disturbing activities. It is understood that archaeological concerns have not been addressed until reports have been entered into the Ontario Public Register of Archaeological Reports where those reports recommend that: 1. the archaeological assessment of the project area is complete and 2. all archaeological sites identified by the assessment are either of no further cultural heritage value or interest (as per Section 48(3) of the Ontario Heritage Act) or that mitigation of impacts has been accomplished through an avoidance and protection strategy.	
	Detail Design	Parts of the Study Area exhibit archaeological potential in Segments 1, 2, 3, 4, and 5. These lands require Stage 2 archaeological assessment by test pit survey at five metre intervals. Stage 2 is required prior to any proposed construction activities on these lands. Part of the Study Area is adjacent to the Pioneer Memorial Garden Cemetery in Oshawa. Grave markers have been removed from their original locations and placed in a central cairn. Additionally, the current legal cemetery boundary may not be consistent with the historical cemetery boundary. Therefore, there is potential for unmarked burials associated with the cemetery to extend beyond the current cemetery boundary. The Disciples Church Site (AlGs-449) within Post Cemetery is considered to have Cultural Heritage Value or Interest and is within the Study Area (see Supplementary Documentation). MHSTCI will be consulted prior to any further work near the site. The Garden Site (AlGr-520) abuts the study area and is considered to have Cultural Heritage Value or Interest and to require Stage 4 Mitigation of Impacts. MHSCTI will be consulted prior to any further work near the site. The marine archaeological potential of Petticoat Creek, Duffins Creek, Carruthers Creek, Lynde Creek, and Pringle Creek within the Study area are to be evaluated by following the MHSTCI Criteria For Evaluating Marine Archaeological Potential checklist if project impacts to the riverbeds are proposed.	
	Detail Design	Baseline vibration monitoring should be undertaken in advance of construction. Should this advance monitoring assessment conclude that the structure(s) on this property will be subject to vibration impacts: (1) plan construction activities to avoid adverse vibration impacts; and where potential adverse vibration impacts cannot be avoided (2) a qualified engineer should include this property in the condition assessment of structures within the vibration zone of influence for this project. (See under Vibration for more details)	
SOCIO-ECONOMIC AND LAND USE			
Land Use	Detail Design/ Construction	Mitigation measures to address potential construction related impacts include: • Create and implement Dust Management Plan to identify a full list of measures to minimize the spread of dust and emissions that will be applied by the entity completing construction; • Fences and wind screens will be utilized to help minimize the spread of dust. Truckloads carrying dust-producing material will be covered; • Soil surfaces capable of producing dust will undergo wetting, covering, or paving to minimize the spread of dust; • Traffic speeds within the construction zone will be reduced to minimize the spread of dust; • Construction work schedules and procedures will adapt to changing weather conditions when negative impacts are possible, such as wetting during high speed winds; • Construction equipment and machinery will be in good working condition and undergo regular maintenance, and will comply with federal and provincial regulations. Emissions and noise will be minimized where possible; • Prohibit construction equipment and machinery from idling for extended periods of time through posting signage throughout the construction site with guidelines to minimize emissions. This can be integrated into the Signage and Wayfinding Action Plan; • Comply with by-law provisions imposed by the local area municipalities and Durham Region, and permit exemptions where necessary; • Complete construction during permitted hours, generally between 6 AM and 8 PM or between sunrise and sunset. • Construction equipment will comply with noise regulations mandated by the province and local area municipalities; • Provide adequate turning radii for heavy single unit trucks to access loading and unloading facilities in the rear of buildings; • Through the Haul Route Analysis and Traffic Management and Control Plan, establish detour routes and haulage routes along main roads where possible; and, • Road closures will be communicated prior to the road closure.	City of Toronto Durham Region City of Pickering Town of Ajax Town of Whitby City of Oshawa
	Detail Design / Construction	Implement a suite of flexible and responsive community support initiatives, including engagement, local procurement opportunities, construction mitigation and opportunities for local employment.	
Community Resources	Detail Design	Refine sidewalk design to explore options such as symmetrical sidewalks in Downtown Whitby and Downtown Oshawa.	City of Toronto Durham Region City of Pickering
	Detail Design	Location of local bus stops may be refined during detail design.	

Environmental Component	Project Phase	Future Commitment	Agencies to be Consulted
	Detail Design / Construction	Consult with staff from fire, police, ambulance, engineering, construction services, transportation services, and other applicable departments from City of Toronto, Durham Region, City of Pickering, Town of Ajax, Town of Whitby and City of Oshawa to develop an Emergency Response and Incidence Management Plan. Consultation with municipal staff will confirm that each jurisdictions rules and regulations are upheld.	Town of Ajax Town of Whitby City of Oshawa
	Construction	Determine if cycling infrastructure is safe to use during construction. If it is considered potentially unsafe, facilities will be temporarily closed and cyclists will be re-routed, where possible, until the infrastructure is safe to use.	
	Construction	Determine whether the use of sidewalks and other pedestrian infrastructure is safe to use during construction. Areas that are considered unsafe will be temporarily closed. Detour routes that are considered safe and accessible will be provided where possible and in well lit areas.	
	Construction	Community resources that front onto the corridor should be contacted to inform staff that access to facilities may be interrupted during project construction. Prior to project construction, the community facilities that will experience access issues will be identified.	
	Construction	Adjacent road closures and construction on adjacent crossings should be avoided, when possible.	
	Construction	Community resource operators should be notified at least two weeks in advance of any road closures that may impact them. The anticipated duration of the closure should also be specified.	
	Construction	A contact should be provided to accommodate questions and concerns from community resource staff regarding access to facilities during the construction period.	
	Construction	Implement a Signage and Wayfinding Action Plan that identifies appropriate signage, alternative access points and parking arrangements will be developed to maintain access to community resources, and other businesses and institutions, during project construction. The community resources that may experience access interruptions will be a priority.	
	Operations	Encourage connections to and further development of the active transportation network.	
	Operations	High traffic volumes coupled with high posted speeds in certain segments of the corridor suggest the need for separated cycling facilities to enhance safety. Physically separated cycling facilities have been included in the preliminary design in a context-sensitive manner consistent with active transportation plans in each municipality.	
	Construction	During construction, recommended mitigation measures by consolidated business classification include: • **Employment Area:** Provide enough space for heavy single unit trucks to make right and left-turns onto the route/arterial where construction is taking place. This can be accomplished by providing a minimum effective turning radius for heavy single unit trucks, especially on roads that connect to Highway 401 interchanges. If appropriate radii cannot be accommodated, appropriate detour routes must be provided for heavy single unit trucks. Consult with City of Toronto, Durham Region, City of Pickering, Town of Ajax, Town of Whitby and City of Oshawa to develop a Traffic Management and Control Plan that identifies appropriate routes for heavy truck traffic that is supported by a Haul Route Analysis; • **Power Retail & Malls:** Keep entry points into malls and power retail centres along the corridor operational and unobstructed. Ahead of construction, intersections that may experience temporary closures or interruptions to operations should be identified, as well as the potential timing and duration of the interruptions. Property owners and managers of the mall and power retail facilities must be contacted and made aware of potential obstructions or closures to main entry points. Arrangements should be made with concerned property owners and managers to address potential issues due to limited access. Deliveries into these facilities may be impacted and visitors may be confused about how to access these businesses – both factors should be considered in the Traffic Management and Control Plan; • **Main Street Retail & Services:** Storefronts should remain visible by implementing transparent fencing in place of plywood where it is possible and safe to do so. Main street retail and services should be considered in the Signage and Wayfinding Action Plan, especially in areas that comprise concentrations of main street retail, such as Downtown Whitby and Downtown Oshawa. The Signage and Wayfinding Action Plan should determine how to best direct customers to where parking is available in the absence of on-street parking, and help identify which businesses are operational during the construction period; and, • **Institutional:** The Signage and Wayfinding Action Plan must also cover institutions in Downtown Whitby and Downtown Oshawa, and other applicable areas. The Plan should communicate what facilities are operational and where to park if on-street parking is impacted.	
Local Businesses	Operations	During operations, mitigation and monitoring measures by business classification include: • **Main Street Retail & Services:** Relocate on-street parking spaces that are to be removed by the project. Where possible parking spaces should be maintained in close proximity to main street retail.	City of Toronto Durham Region City of Pickering

Environmental Component	Project Phase	Future Commitment	Agencies to be Consulted
	Detail Design	Work with municipal Economic Development staff, local Chambers of Commerce and Business Improvement Areas to support businesses during construction. Engage with local businesses during detail design to understand needs during construction and during operations of the DSBRT. Develop a plan to support businesses as the project moves forward.	Town of Ajax Town of Whitby City of Oshawa
	Detail Design	Review commercial property driveways and consider design refinements to support turning trucks while meeting design standards.	
	Detail Design	Prior to the start of construction, create Community Liaison Committees to meet and review the detail design, provide more feedback, and stay up to date on project process and the construction schedule.	
	Detail Design	Explore opportunities to reduce the Project footprint and minimize property impacts at signalized intersections and other locations where the design exceeds the existing or official plan ROW limits.	
Property	Detail Design	Follow Infrastructure Ontario's process for access or the possible acquisition of lands for the provincially owned properties below to support this project: • 2060 Ellesmere Road, Scarborough, ON • 25 Neilson Road, Scarborough, ON • 1916 Dundas Street E, Whitby, ON • 33 King Street W, Oshawa, ON	City of Toronto Durham Region City of Pickering Town of Ajax Town of Whitby City of Oshawa Infrastructure Ontario
INFRASTRUCTURE			
Utilities	Detail Design	Stormwater sewer systems are to be designed following guidelines and standards developed by local municipalities	MTO City of Toronto Durham Region City of Pickering Town of Ajax Town of Whitby City of Oshawa Private Utility Owners
	Detail Design	Detailed utility relocation plans will be developed during detail design and follow all applicable standards. Coordinate the proposed utilities relocation design with the applicable municipalities, transit agencies and potentially affected private utility owners. Potential utility conflicts shall be identified in consultation with each utility owner as part of detail design to develop applicable protection and/or relocation strategies prior to construction. Impacts to municipal servicing shall be consulted with the applicable municipality and required permits shall be obtained prior to construction.	
Municipal Storm Sewer System	Detail Design	Conduct complete review of existing Toronto Water's drainage and SWM system information to verify the wet weather flow management design criteria could be satisfied.	MECP TRCA CLOCA City of Toronto Durham Region City of Pickering Town of Ajax Town of Whitby City of Oshawa
	Detail Design	Conduct an analysis of available drainage and SWM capacity for road segments where widening is needed.	
Stormwater Management	Detail Design	Follow local stormwater management guidelines to meet the maximum allowable discharge flow rate, annual runoff volume targets, and water quality control targets set out by local stormwater management guidelines and requirements of stormwater quantity and quality controls.	
	Detail Design	Refine stormwater quality control strategies to propose site specific stormwater management measures, where needed, following guidelines developed by MECP and Conservation Authorities.	
	Detail Design	Prepare stormwater management reports for review and approval by local municipalities as required.	
	Detail Design	Evaluate the applicability of Permit to Take Water (PTTW) or Environmental Activity and Section Registry (EASR).	
Permit to Take Water (PTTW)	Construction	Implement and adhere to the requirements of any PTTWs and/or EASR.	
	Detail Design	Design temporary drainage and ESC measures to adhere to guidelines developed by Conservation Authorities and local municipalities.	
Erosion and Sediment Control	Detail Design	Develop Erosion Risk Assessment and ESC plans following *Erosion and Sediment Control Guide for Urban Construction* (2019) developed by TRCA.	
	Detail Design	Develop an ESC inspection program following TRCA's *Erosion and Sediment Control Guide for Urban Construction* (TRCA, 2019).	
	Construction	Regularly inspect the condition and functionality of ESC measures on the site and documentation of inspection activities are to be maintained up-to-date.	
	Construction	Implement and adhere to the requirements of the ESC Plan and ESC inspection program.	

Environmental Component	Project Phase	Future Commitment	Agencies to be Consulted
AIR QUALITY			
	Construction	Develop a Construction Phase Air Quality Management Plan (AQMP). The ECCC publication "*Best Practices for the Reduction of Air Emissions from Construction and Demolition Activities*" (Cheminfo Services Inc., 2005) and the MECP's Management Approaches for Industrial Fugitive Dust Sources Technical Bulletin (MECP, 2017) should be used as the guides when developing the AQMP. Prior to initiating ambient air quality monitoring activities, the AQMP and Air Quality Monitoring Plan will be submitted to Metrolinx for approval and submitted to the MECP for review and comment. The air quality mitigation measures outlined in the AQMP should include but not limited to: • Seeding, paving, covering, wetting disturbed soil surfaces; • Using wind screens or fences; • Covering truckloads of dust-producing material; • Reducing traffic speeds especially on unpaved surfaces; • Using of vehicle wheel and body washing facilities at the exit points of the site; • Reducing aggregate/sand drop height; • Only allowing wet cutting of concrete block, concrete, and/or asphalt surfaces; • Stop work activities temporarily during high wind conditions; • Following mitigation measures provided in Environment Canada's Best Practices for the Reduction of Air Emissions from Construction and Demolition Activities and the Ministry of Environment, Conservation and Parks' Technical Bulletin Management Approaches for Industrial Fugitive Dust Sources; and • Following mitigation measures from Environment Canada's Best Practices for the Reduction of Air Emissions from Construction and Demolition Activities (Cheminfo Services Inc., 2005).	
	Construction	Conduct construction air quality monitoring activities in accordance with the AQMP and Air Quality Monitoring Plan requirements, which may include: • Establish the baseline air quality conditions at AQIA Study Area prior to the commencement of the construction activities. At a minimum, three months of baseline monitoring program will be established at the AQIA Study Area; • Installing on-site meteorological and air quality (dust) monitoring station to monitor real-time conditions; • The siting of the air quality monitoring stations and meteorological tower should be chosen in accordance with "The Operations Manual for Air Quality monitoring in Ontario" (MECP 2019); • Define Trigger, Action and Threshold Dust Level and develop Actions Plan to respond to these elevated dust conditions; • Develop an Air Quality Incident, Complaint and Response Protocol; and • Report daily monitoring results, weather conditions, incidents, and mitigation activities.	MECP

Tailpipe Emissions from Construction Equipment and Vehicles	Construction	Prior to construction, specific construction plans will be developed for certain work zones that involve sensitive receptors where AAQC/standard exceedances are expected. The construction plans will focus on emission mitigation strategies for minimizing the air quality impacts at these specific receptor locations.
		Consider the following air quality control mitigations for construction equipment and vehicles:
		• Construction equipment and vehicles must comply with Canada's most stringent emissions standards;
		• Construction equipment and vehicles should be properly maintained and repaired to minimize exhaust emissions;
		• Excessive idling of vehicles and equipment (greater than five minutes) should be minimized and/or strictly adhere to municipal by-law on idling policies;
		• Using alternative-fuel or electric equipment where feasible;
		• Using solar panel to supply electricity instead of on-site diesel generators; and
		• Develop and implement construction Traffic Management Plans (TMPs). Examples of traffic management techniques may include the following:
		  ○ using traffic control officers and flaggers;
		  ○ using temporary signage and variable message displays;
		  ○ notifying the public of construction-related traffic congestion;
		  ○ designating construction staging areas and worker parking areas; and
		  ○ designating construction truck routes.
			MECP

Tailpipes NO_2 Emissions from BRT and Other Vehicles	Operations	Specific Operation NO_2 Mitigation Measures include: For BRT Vehicles	DRT TTC Durham Region

Environmental Component	Project Phase	Future Commitment	Agencies to be Consulted
		• Introducing electric (zero emission) or diesel-electric hybrid (low emission) transit buses in the bus fleet; • Using advanced active emissions control technology system such as Selective Catalytic Reduction (SCR) in diesel-powered buses; and • Using clean diesel fuel. For Other On-road Vehicles: • Encourage carpooling/ridesharing, remote work, using public transportation; • Diesel Retrofit – Diesel trucks with older engine replaced with a new diesel engine that meets the most current emissions criteria; and • Replace older model vehicles with newer zero emission or low emission vehicles.	City of Toronto
Tailpipe PM_{10} and $PM_{2.5}$ from BRT and other vehicles.	Operations	Specific Operations Particulate Matter (PM_{10} and $PM_{2.5}$) Mitigation Measures include: For BRT and Other Diesel Powered Vehicles. • Conducting routine preventive maintenance of diesel engines to minimize emissions; • Installing engine exhaust filters; • Installing diesel oxidation catalysts; and • Using clean diesel fuel.	DRT TTC
Tailpipes Emissions from BRT and Other Vehicles	Operations	General BRT Tailpipes Emissions Mitigation Measures: The tailpipe emissions may be reduced by best management practices, which include: • Switching from diesel to alternative fuels such as natural gas or dimethyl ether; • Blending of biological-based fuels i.e., biodiesel or hydrogenation-derived renewable diesel with conventional petroleum-based diesel; • Upgrading transit buses from conventional internal combustion engine technology to hybrid or electric technology can improve fuel economy or eliminate tailpipe emissions altogether; and • Conducting regular engine maintenance and inspection as well as minimizing bus idling time; TTC Board approved the TTC's Green Bus Technology Plan in 2017. Some sub-programs in the plan that are relevant to this Project include: • Clean diesel bus procurement; • HEV bus procurement; • eBus procurements; • Electrification infrastructure; and • Associated business transformation program. Mitigation Measures for Other On-road Vehicles include: • Encouraging carpooling/ridesharing, remote work and using public transportation; • Using electric, hybrid and alternative-fuel vehicles; • Replacing older model vehicles with newer zero emission or low emission vehicles; • Minimizing vehicle idling time; and • Conducting regular engine maintenance and inspection.	DRT TTC Durham Region City of Toronto
NOISE AND VIBRATION			
Noise	Construction	Review and confirm design for noise barriers identified to be constructed within ROW of the 17 identified PORs.	MECP City of Toronto Durham Region City of Pickering Town of Ajax Town of Whitby City of Oshawa
	Construction	A Noise and Vibration Management Plan (NVMP) during Detail Design is to be prepared prior to construction. NVMP will include specific mitigation measures related to laydown areas (once they are determined).	
	Construction	Temporary noise mitigation measures shall be investigated and necessary noise mitigation measures in the form of physical noise barriers, mufflers on equipment, etc. shall be implemented if monitoring results show noise levels during construction activities exceed the criteria.	
	Construction	Limit construction work to the time periods allowed by the municipalities' noise by-laws as summarized in **Section 3.9.1.1**.	
	Construction	Should there be a need to complete work outside of the hours allowed in the applicable noise by-laws, the Contractor is to seek any required exemptions and permits directly from the applicable jurisdiction, in advance of any work performed outside of the allowable time periods. If an exemption cannot be obtained, then construction will proceed in accordance with the requirements of the noise by-laws.	

Environmental Component	Project Phase	Future Commitment	Agencies to be Consulted
	Construction	The Contractor is expected to comply with all applicable requirements of the contract and local noise by-laws. Enforcement of noise control by-laws is the responsibility of the Municipality for all work.	
	Construction	Contracts shall include explicit indication that all construction equipment used on the project is to meet the sound level criteria from NPC-115 and NPC-118 and be well maintained and operating with effective muffling devices that are in good working order.	
	Construction	Maximize the separation distance between construction staging areas and nearby sensitive receivers to the extent possible to reduce noise impacts.	
	Construction	Any temporary roads for construction vehicle access are to be well maintained and free of pot-holes and ruts to avoid excessive noise from heavy vehicles travelling on uneven surfaces.	
	Construction	Should any complaints be reported from the public due to construction noise, the Owner will be notified, and the incident will be investigated. A complaints protocol is to be established for receiving, investigating and addressing construction noise complaints from the public, including a plan for how the public is to be notified of their options for logging a complaint.	
	Construction	Noise level monitoring shall be undertaken at identified Representative Noise Sensitive Receivers to appropriately identify and mitigate any exceedances for noise levels to comply with construction noise criteria set in **TABLE 3-36**.	
	Construction	Conduct pre-construction consultation with property owners.	
Vibration	Construction	Measure pre-construction background vibration within the ZOI according to the applicable By-laws (e.g., City of Toronto By-law No. 514-2008).	MECP City of Toronto Durham Region City of Pickering Town of Ajax Town of Whitby City of Oshawa
	Construction	Contractor shall be responsible for pre-construction inspection (e.g., photography of building foundation) of the impacted buildings inside the ZOI according to the applicable By-laws.	
	Construction	Establish a monitoring program to measure vibration during construction activities (close to the affected buildings) to ensure compliance with City of Toronto By-Law No. 514-2008 (City of Toronto, 2008), and applicable vibration criteria listed in Table 3.41 to identify the need for mitigation measures if required.	
	Construction	Monitoring will be undertaken to verify mitigation measure(s) effectiveness.	
	Construction	A Noise and Vibration Management Plan (NVMP) during Detail Design is to be prepared prior to construction. NVMP will include specific mitigation measures related to laydown areas (once they are determined).	
	Construction	For work that is to occur outside of regular hours, the Contractor will be responsible for identifying the implications of the vibration generated, and to make construction work plans available for review and coordinate with appropriate municipalities/region and MTO as required near MTO right-of-way.	
	Construction	Construction equipment with potential to cause off-site vibrations should be operated as far away from vibration-sensitive sites as possible. Where possible, activities that have potential to cause off-site vibrations should be phased such that as few as possible are occurring simultaneously.	
	Construction	Contractor shall be responsible for any damage caused by construction vibration.	
	Construction	Operate construction equipment on lower vibration settings, where possible.	
	Construction	Construction activities that have potential to cause off-site vibration during the night-time hours should be avoided.	
	Construction	Establish a complaints protocol for this Project for receiving, investigating and addressing construction vibration complaints received from the public.	

8.2 Environmental Mitigation and Monitoring Plan (EMMP)

An EMMP document will be developed so that the Project is implemented in a manner that does not result in negative impacts, in particular, on matters of provincial interest related to the natural environment or to cultural heritage value or interest, or on constitutionally protected Aboriginal or treaty rights. The EMMP shall include all mitigation measures, categorized by project phase, and shall identify the party responsible for implementation.

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