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Draft Report

Individual Environmental Assessment for the Teston Road Area, Transportation Improvements, Highway 400 & Bathurst Street

Report No. 190261800
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Executive Summary

Introduction

The Regional Municipality of York (York Region) has completed an Individual Environmental Assessment (IEA) (now referred to as a Comprehensive EA) study for transportation improvements in the Teston Road (Regional Road 49) area. The study area covers Highway 400 to Bathurst Street (Regional Road 38) and Kirby Road to Major MacKenzie Drive (Regional Road 25), within the City of Vaughan (see **Figure 1-1**).

Through the IEA study process, a 36-metre right-of-way with a full width four-lane urban (curbed) arterial road cross section is proposed in the longer term for Teston Road from Keele Street to Bathurst Street including 2.1 m sidewalks and 2.35 m cycle tracks on both the north and south sides of Teston Road, boulevards, utility zones, and tree zones with landscaping where possible. Due to localized constraints a modified initial configuration is proposed along Teston Road from Keele Street to Dufferin Street which includes a 3.0 m north side multi-use pathway. Property protection for an ultimate grade-separated GO Rail crossing on Teston Road east of Keele Street is also recommended with an initial at-grade rail crossing recommended until grade separation is warranted.

In December 2018, the Minister of the Environment, Conservation, and Parks approved the Terms of Reference (ToR) for the Teston Road Area Transportation Improvements IEA study. York Region retained Morrison Hershfield (MH) in early 2020 to conduct the IEA in accordance with the approved ToR. The approved ToR is included in **Appendix A**. The IEA study has examined solutions that will improve transportation throughout the study area through a comprehensive IEA process. Consultation with interested and/or affected parties is an essential part of this planning process and provides a mechanism for York Region to identify and respond to issues before decisions are made and documentation is filed with the Ministry of the Environment, Conservation and Parks (MECP). The purpose of this IEA is to generate a transportation solution that addresses a variety of transportation problems and opportunities in the study area. The project considered improvements for the movement of vehicles, pedestrians, cyclists, and transit.

Figure 1-1: Teston Road Study Area

The 2003 Teston Road Class Environmental Assessment, between Pine Valley Drive and Bathurst Street, recommended the "Do Nothing" option for the missing link on Teston Road between Keele Street and Dufferin Street. This was based on the concerns raised by the Ministry of Environment, the Ministry of Natural Resources and the Toronto and Region Conservation Authority related to the complexity and potential impacts of crossing the East Don River Tributary valley within the Oak Ridges Moraine and the constraints associated with the City of Toronto's Keele Valley Landfill and the Vaughan Township Landfill. As a part of the 2003 Environmental Assessment, York Region committed to undertaking an Individual Environmental Assessment for the missing link if the missing link connection was to be considered at a later date.

The 2016 York Region Transportation Master Plan (TMP) recommended the completion of the missing link on Teston Road between Keele Street and Dufferin Street. The extension of Teston Road between Keele Street and Dufferin Street is also included in the 2022 York Region TMP as part of the 2051 Recommended Road Network.

The study area for this IEA is bounded by Kirby Road to the north, Bathurst Street to the east, Major Mackenzie Drive West to the south, and Highway 400 to the west (**Figure 1-1**). This study area includes several north/south and east/west arterial roads as well as collector roads. The western extent of the study area includes Highway 400, a Controlled Access Highway under the jurisdiction of the Ministry of Transportation of Ontario (MTO), which traverses through the study area in a north/south direction. Highway 400 is considered regionally and provincially significant, serving as an important link between the Greater Golden Horseshoe (GGH) area and Simcoe County to the north. It also connects Highway 401 in southern Ontario to central and northern Ontario/western Canada via Highway 11 and Highway 69, respectively. Highway 400 includes two interchanges within the study area at Major Mackenzie Drive West and at Teston Road.

The future Highway 413 will terminate at Highway 400, north of Kirby Road. Highway 413 will connect Highway 400 to the Highway 401/407 interchange in Mississauga/Halton Hills, in Halton Region.

Study Process

The study was undertaken in accordance with the Ontario Environmental Assessment Act (1990), which defines the requirements for undertaking an Individual Environmental Assessment. The process has involved developing, assessing, and evaluating alternatives, leading to a Recommended Plan.

Consultation

The consultation program involved the public, community organizations, property owners, local businesses, institutions, approval agencies, and other groups with a special interest in the study. Four virtual open houses were conducted in Summer 2021, Fall 2021, Spring 2022 and Fall 2023. All four open houses featured pre-recorded presentations and a survey. Consultation materials were made available on www.york.ca/TestonRoad and will remain available until completion of the IEA.

Issues Arising from Consultations

The following summarizes major consultation issues and how they were addressed:

- **Natural Environment Effects – Valley Crossing:** The Ministry of Natural Resources and Forestry and Toronto and Region Conservation Authority raised concerns regarding the potential natural environment effects of a new Teston Road connection across the East Don River Tributary valley within the Oak Ridges Moraine. To address these effects the team has proposed a number of recommendations to compensate for loss of habitat, enhance the existing areas untouched by construction, provide onsite plantings, and provide for wildlife movement through the corridor.
- **Wildlife Passage:** Concerns were raised that the Teston Road embankments across the East Don River Tributary valley would create a barrier for wildlife movement. To address this, a wildlife passage has been incorporated into the designs. Both the bridge and the wildlife passage will provide movement corridors for wildlife and fencing along the embankment will direct wildlife away from the roadway.
- **Integration with North Maple Regional Park:** The City of Vaughan has plans to expand the existing North Maple Regional Park to Teston Road and eventually south of Teston Road as part of the long term plans for the Keele Valley Landfill. Discussions were held with City of Vaughan park planning staff to review opportunities for context sensitive designs that account for the future needs of the park and to review where access to the park can be provided directly from Teston Road. Further discussions and coordination will occur during detailed design.

- **Integration with development:** Meetings were held with landowners/consultants associated with the Block 27 and 1600 Teston Road development areas to discuss how the Recommended Plan will interface with the plans and infrastructure associated with these developments. Refinements were made to the Teston Road designs to better accommodate and integrate with these developments.
- **Landfills:** In order to understand and assess the impacts of alternatives on existing landfills, York Region met with both the City of Toronto and the City of Vaughan several times each and with the owner of the private landfill, to discuss the study. In general, avoidance of the landfills and associated infrastructure was considered highly desirable. The ultimate Recommended Plan respects all York Region policies and a 36.0 m right-of-way, however, an interim design has been created to avoid or minimize impacts to the landfills.
- **Property Requirements:** The alignment was developed to limit impacts on properties throughout the corridor (public and private lands). However, due to the right-of-way requirements of approximately 36.0 m, some property acquisition is required. Overall, concerns expressed along the corridor have been mitigated to a reasonable extent and will be further investigated during detailed design based on detailed property-by-property design reviews.

Problems and Opportunities / Needs and Justification

Growth in York Region is projected to continue with an estimated population of 1.79 million in 2041 and 900,000 jobs. With a growing resident and employee population, and consideration of the existing east-west discontinuity at Teston Road, the traffic load on east-west arterials will increase in the future. This applies to roadways, transit, and active transportation. In fact, the York Region TMP has already identified needs for improvements and widening along a number of the regional roads in the study area.

Analyses to understand travel demand have been undertaken for existing and future demand and are supported by York Region's Travel Demand Forecasting model (YRTDF model, EMME based) to evaluate future traffic conditions and growth in transit ridership.

Teston Road serves as a critical east-west arterial within the regional road network. Without improvements to Teston Road, including addressing the missing link between Keele Street and Dufferin Street, the preliminary analysis shows that east-west corridors are expected to operate under 'very congested' conditions in 2041, even with other planned improvements on nearby key arterials. Improvements at Teston Road would help to address peak period congestion leading to and from Highway 400, enable continuous east-west flows, and relieve burdens on surrounding north-south and east-west segments due to high traffic volumes. There is also an important need and opportunity to significantly reduce delay and inconvenience due to out-of-way travel associated with the current Teston Road discontinuity ('missing link') which affects all modes of travel including emergency and other services. There is also an important need and opportunity to improve access to existing and future residential and employment areas and various other land uses and amenities (e.g. North Maple Regional Park).

The purpose of the undertaking is therefore to improve the efficiency and continuity of the transportation network while also ensuring safety. The IEA Study includes a detailed traffic analysis model and considered available planning policies and other transportation and demographic data to inform the rationale for the undertaking. The problems and opportunities identified for the study area include:

- Future land-use change surrounding Teston Road from primarily rural, to residential and mixed use, will considerably increase future travel demand within the Study Area.
- The estimated 2041 A.M. peak hour traffic volumes in the westbound direction between Keele Street and Dufferin Street will exceed available capacity under the Future Do-Nothing scenario. The estimated 2041 A.M. peak hour traffic volumes in the southbound direction between Kirby Road and Major MacKenzie Drive generally exceed available capacity under the Future Do-Nothing scenario.
- The discontinuity on Teston Road between Keele Street and Dufferin Street is a barrier to local and regional east/west trips and adds traffic load to parallel east/west alternative routes such as the already congested Major Mackenzie Drive and Kirby Road with over-capacity conditions at multiple intersections.
- There is limited east-west accessibility along the Teston Road corridor to access existing and planned Highway 400 interchanges (i.e., Teston Road Interchange (existing), Major Mackenzie Drive Interchange (existing) and Kirby Road Interchange (potential)).
- The discontinuity on Teston Road between Keele Street and Dufferin Street is a barrier to residents from better access to amenities (e.g., schools, parks, recreational facilities, emergency and other public services, etc.).
- The discontinuity on Teston Road between Keele Street and Dufferin Street results in longer trip distances, congestion, and intersection delays which may increase greenhouse gas emissions and have negative impacts on climate change.
- The area of Teston Road between Keele Street and Dufferin Street is identified in York Region's TMP as having a separated cycling facility by 2041.
- Teston Road between Keele Street and Dufferin Street is identified in York Region's 2016 TMP to be served by frequent transit service by the year 2041.
- Westbound A.M. peak hour transit ridership and Transit Mode Share are both projected to increase significantly within the study area between 2016 and 2041. The opportunity may exist to further increase transit ridership and Transit Mode Share within the study area.
- Transport Demand Management (TDM) and Smart Commute strategies (e.g. parking fees, carpool priority, discounted transit passes, bike racks) to promote and increase walking, cycling and transit use should be evaluated to estimate potential mode shift for the study area.
- To improve network performance issues identified from the 2041 Do-Nothing scenario, localized intersection improvements using Transportation System Management (TSM) techniques should be considered (e.g., traffic signal improvements, channelization, etc.).

- Based on discussions with the Deputy Fire Chief of the City of Vaughan Fire and Rescue Service, there is a need for another fire station on the west side of the study area. The location of the station depends in part on the findings of the IEA.

- Future bus service will need to be accommodated to the planned Kirby Go Station on Kirby Road.

Existing Conditions

Natural Environment

Fish surveys were completed in 2021 and 2022, along with background surveys which identified:

- The overall IEA study area contains the headwaters of the East Don River, specifically the area within the McGill Area Environmentally Significant Area (ESA #73) within the Teston Road gap between Keele Street and Dufferin Street. The tributary within this location contains permanent water flow that originates from Maple Down Pond and Maple Ridge Pond, as well as natural wetland habitat west of Hunterwood Chase Road.
- The headwaters within the study area also contain various stream features such as historical ponds, ground water seeps and springs, and the presence of watercress.
- Fish were present in the headwater streams within the Teston Road gap between Keele Street and Dufferin Street, confirming that this area provides permanent fish habitat.

Terrestrial surveys were conducted for this project and have identified a total of 44 different ecological land classification (ELC) communities within the focal study area. Tree inventories were also conducted for the study area and identified a total of 746 individual trees within and outside the tree inventory study area. A total of 136 plant species were recorded, of which just over 20% were considered species of Conservation Concern by the TRCA. Four categories of provincially significant wildlife habitats have been identified in proximity to the project area including seasonal concentration areas of animals, rare vegetation communities or specialized habitat for wildlife, habitat for species of Conservation Concern, and animal movement corridors. In terms of species at risk present within the study area, 39 birds, three (3) mammals, and five (5) herptiles were identified as species of Regional Conservation Concern.

Geological Environment

A lobe of the Oak Ridges Moraine proper occupies the central part of the Study Area which is flanked on either side by the till plains of the area known as the South Slope of the Oak Ridges Moraine. Multiple tributaries of the Don River East Branch originate in the Study Area, flowing toward Lake Ontario, incised 10m to 20m into the landscape. The Study Area is located in the physiographic region known as the South Slope. In the vicinity of Study Area, the topography consists mostly of till with some clay and silt deposits and ground surface elevations ranging from 230 to 300 meters above sea level. The Study Area slopes gently towards the south-east.

The MECP Water Well Information system database identified approximately 940 water well records. Despite the relatively large number of wells in the MECP database, it is considered that the actual use of groundwater for domestic, agricultural, or industrial purposes is minimal because municipal/piped water supply is available throughout the study area. The Project is entirely contained within the CTC (Credit Valley, Toronto and Region, and Central Lake Ontario) Source Protection Region. According to the Source Protection Information Atlas, a Highly Vulnerable Aquifer (HVA) was found over the majority of the Teston Road right-of-way, from approximately 900m east of Keele Street eastwards to Bathurst Street. The Teston Road right-of-way is located within a Significant Groundwater Recharge Area (SGRA) located from the center line northerly, from 300m west of Keele Street to the center line of Keele Street, and from 35m east of Dufferin Street to 630m east of Dufferin Street.

The study area is near the headwaters of the East Don River. A fluvial erosion hazard study was completed for a tributary to the East Don River, located approximately 350m west of the intersection of Dufferin Street and Teston Road and identified two offline ponds that contribute flow to the channel near the upstream extents of the study reach.

Socio-Economic Environment

Existing land uses within the study area include residential, recreational, agricultural, institutional, retail commercial, open space, and industrial. There is a mix of provincial, municipal, and private property ownerships within the project limits, with the majority of the project limits located within the Greenbelt. The right-of-way of Teston Road is owned by York Region. Teston Road services many industrial and employment uses in the area, with several warehouses and auto and car centers just east of Keele Street.

Twenty one (21) sensitive receptor locations were selected to be representative of potential air quality impacts within the study are, including residential houses, schools, and community centers, among other things.

A climate vulnerability risk assessment (CVRA) was conducted as part of the study. Projected changes include increases in extreme heat events, decreases in freeze-thaw cycles, increased total annual precipitation and extreme/heavy precipitation, increases in freezing rain events, decreased average snowfall, increased rainfall intensity, and dryer seasons among other changes.

Cultural Environment

A variety of Indigenous groups have inhabited the project study area. Archaeological Services Inc. conducted a Stage 2 Archaeological Assessment and identified that approximately 83.5 percent of the Study Area (14.81 ha.) did not exhibit archaeological potential. There are presently two Late Woodland Indigenous sites within one kilometre of the current Study Area where associated ossuaries have not been identified: the McNair site (AlGu-8) and the McGaw site (AlGu-88).

A Cultural Heritage Report was conducted for the project study area which identified 18 known and 37 potential Built Heritage Resources (BHRs) and Cultural Heritage Landscapes (CHLs) within the study area.

Built Environment

The existing road network of Teston Road includes 18 signalized intersections, the Barrie GO rail corridor, and 17 transit routes. Teston Road is identified as a secondary arterial goods movement corridor based on York Region's proposed strategic goods movement network. Analysis of existing intersections have identified several turning movement operations at, or slightly above, capacity along with congested and failing conditions as a result of delays experienced during the 2041 AM peak hour 'Future Do Nothing' conditions within the study area.

Rodway drainage on Teston Road is serviced through a combination of roadside ditches and storm sewers. A total of ten (10) outlets have been identified with seven (7) of them representing either storm sewer or enclosed drainage systems, five (5) centerline culvert crossings, and two (2) side road culverts parallel to the railway crossing on Teston Road. There are no documented stormwater management facilities within the right-of-way, runoff from various sections of the existing road is directed into storm sewers, which outlet to the existing stormwater management facilities outside of the right-of-way. There are three (3) stormwater facilities currently servicing runoff from Teston Road. In additional to the storm sewer system, there are various sanitary and water servicing infrastructure within the right-of-way of Teston Road. HydroOne, Alectra, Bell, Rogers and Enbridge utility infrastructure are also present within the study area.

Based on the findings of the Contamination Overview Study (COS) report, ten (10) areas of potential environmental concern (APEC) were identified within the project subject area with twelve (12) potentially contaminating activities (PCAs) identified within the study area. There are currently three known landfills/waste disposal sites within the study area; the Keele Valley Landfill, the former Vaughan Township Landfill and the Disposal Services landfill.

Alternatives to the Undertaking

Ten types of Alternatives to the Undertaking were identified and considered in terms of their ability to address the identified problems and opportunities. Within each type of alternative, sub-alternatives were also identified.

- Future Do Nothing
- Travel Demand Management
- Travel Systems Management
- New Cycling/Pedestrian Infrastructure
- Improved and/or New Transit Services
- Improved Existing/Planned Transitways
- New Transitways
- Improved Existing Roadways
- New Roadways
- Combinations of the above

Alternatives that could not significantly address the problems and opportunities as either a stand-alone alternative or in combination with other alternatives, were not carried forward. The screening of the long list of alternatives led to the following alternatives identified to be carried forward:

- Future Do Nothing – carried forward for comparison only
- New Roadways
- Combination Alternatives
  - New Cycling and/or Pedestrian Infrastructure
  - Improved and/or New Transit Services
    - Expand transit system capacity by increasing service frequency
    - Creation of new routes on existing corridors
  - Improved Existing Roadways

The alternatives were further refined by analyzing the combination alternatives to determine their ability to address the problems and opportunities.

Overall, four Alternatives to the Undertaking were short-listed and carried forward for further assessment and evaluation to address the 'missing link' section of Teston Road between Keele Street and Dufferin Street:

1. **Future Do Nothing (Figure 1-2)** – planned 2041 transportation network excluding Teston Road Extension (Keele Street to Dufferin Street)
2. **Widen Kirby Road** (**Figure 1-3**) – this alternative proposes to widen Kirby Road (from Bathurst Street to Highway 400) from four to six lanes with new transit / HOV lanes and installation of a pedestrian / cycling crossing over the Don River along the potential Teston Road corridor (i.e. mid study area)
3. **Widen Kirby Road and Keele Street** (**Figure 1-4**) – this alternative proposes to widen Kirby Road (from Dufferin Street to Keele Street) and Keele Street (from Kirby Road to Teston Road) from four to six lanes and installation of a pedestrian / cycling crossing over the Don River along the potential Teston Road corridor (i.e. mid study area)
4. **Teston Road Extension** (**Figure 1-5**) – this alternative proposes to build a new four-lane Teston Road from Dufferin Street to Keele Street with pedestrian / cycling facilities and transit service

After detailed evaluation and receiving feedback via consultation activities, the Project Team confirmed Alternative 4: Teston Road Extension as the Preferred Alternative To the Undertaking. The IEA also includes a requirement to consider improvement alternatives for Teston Road between Dufferin Street and Bathurst Street which are discussed below.

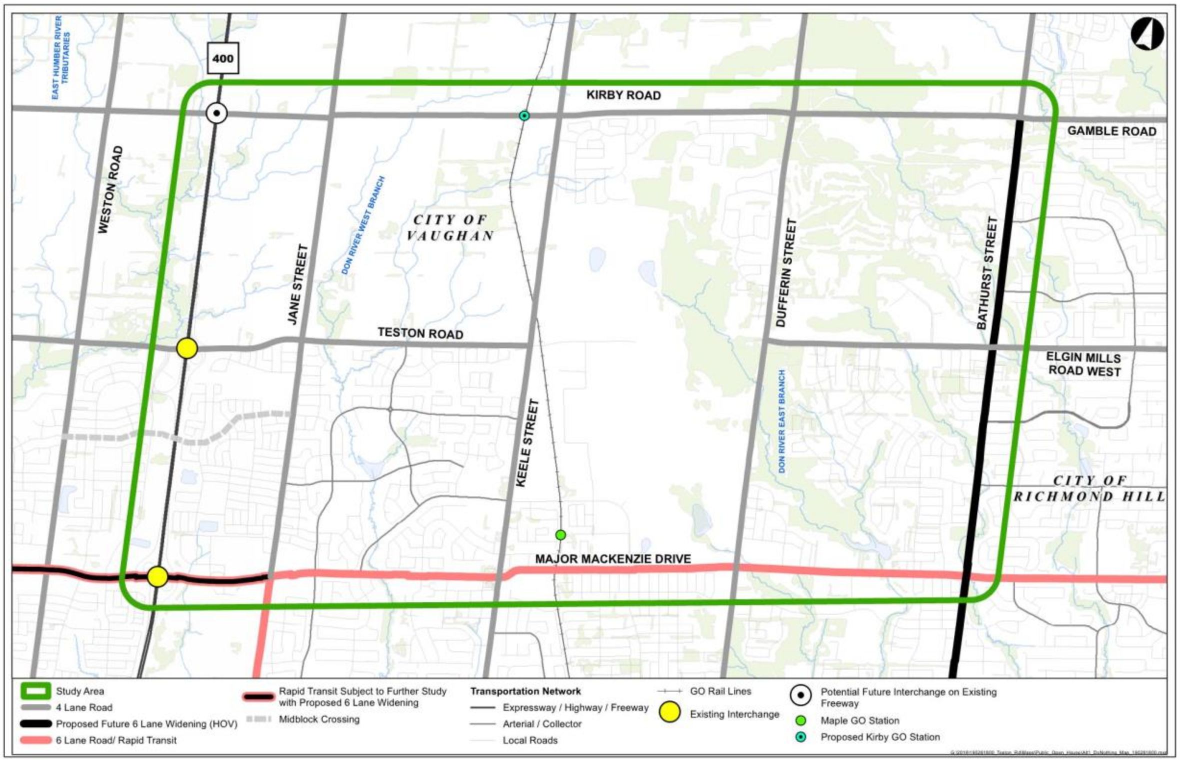

Figure 1-2: Future Do Nothing

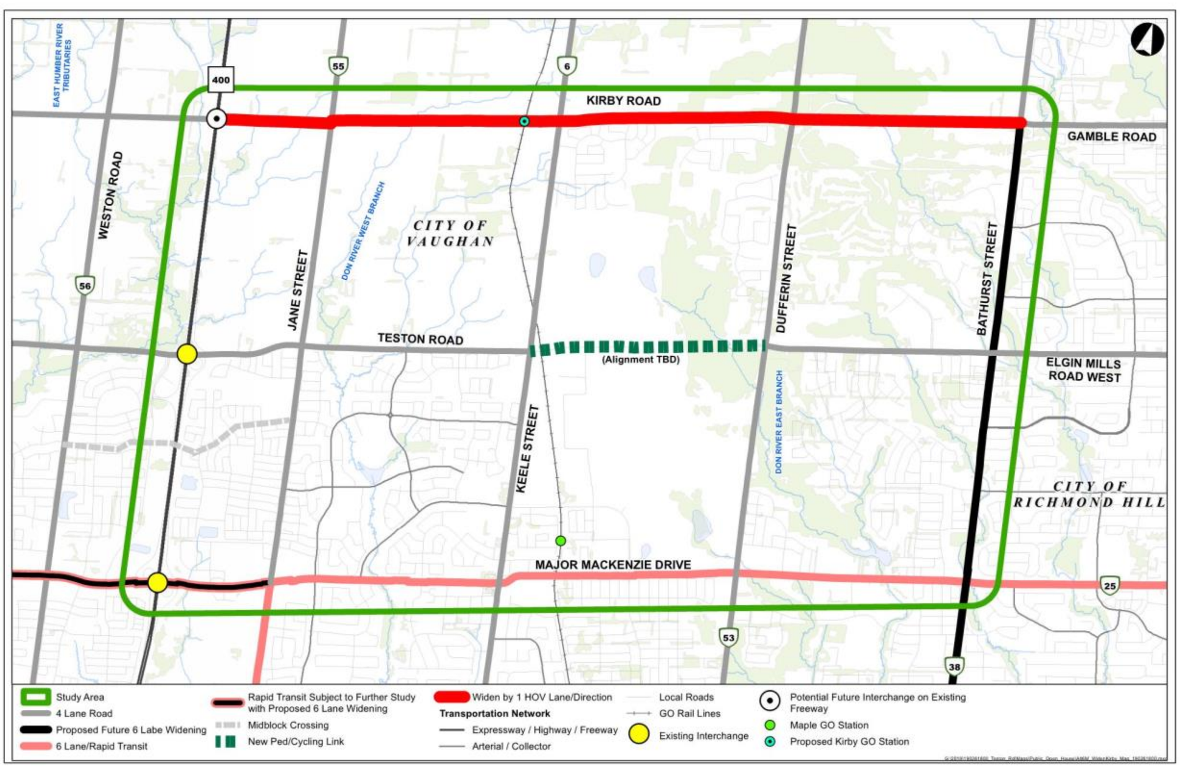

Figure 1-3: Widen Kirby Road

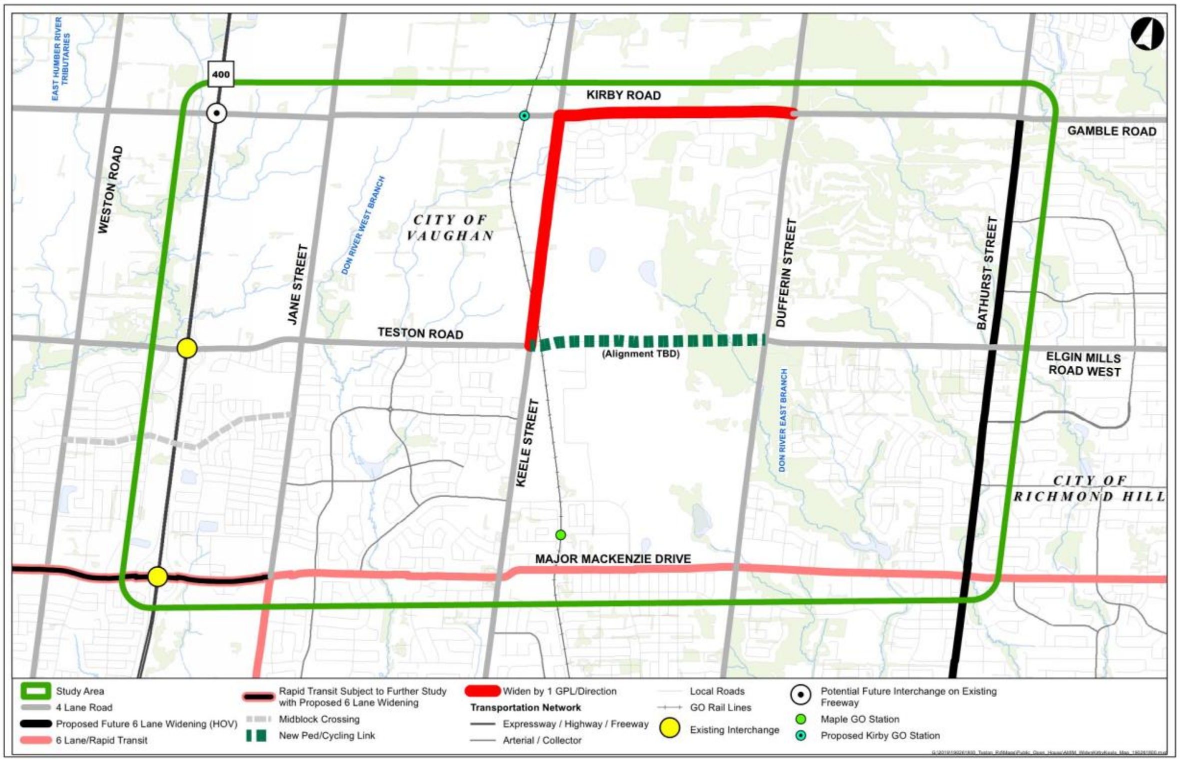

Figure 1-4 Widen Kirby Road and Keele Street

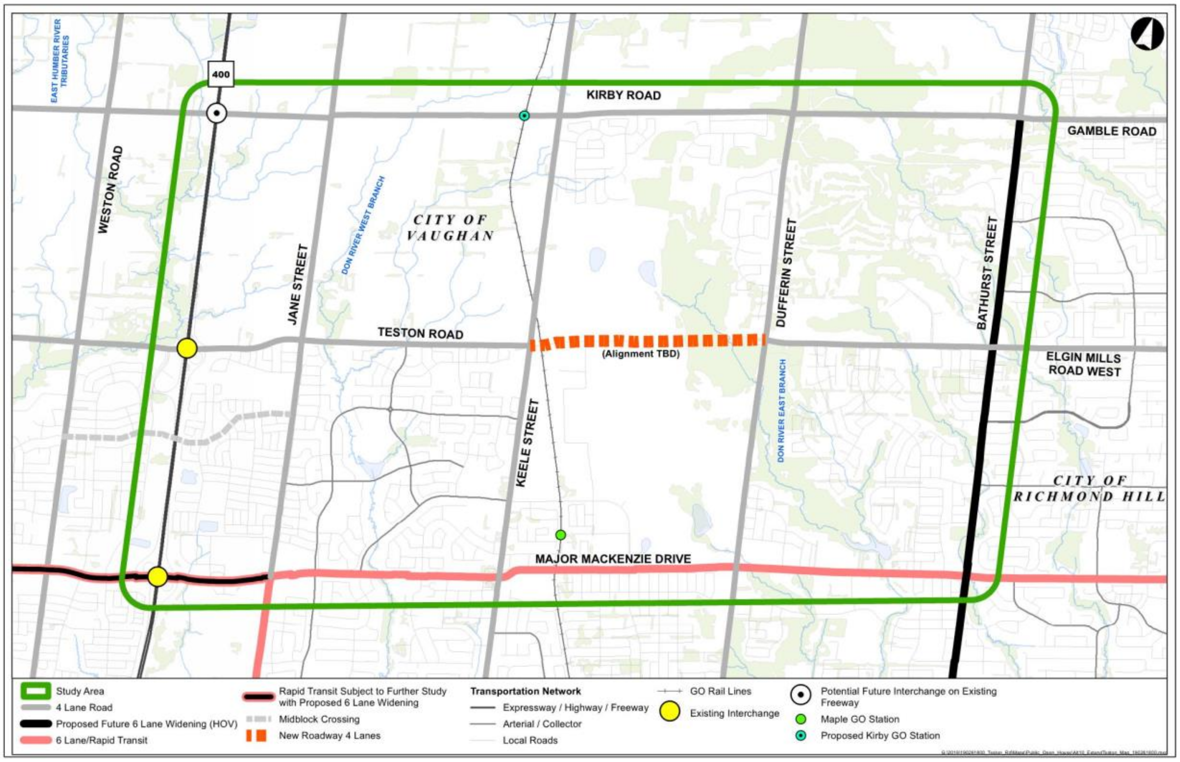

Figure 1-5: Teston Road Extension

Alternative Methods

Confirmation of the Preferred Alternative To the Undertaking, Alternative 4: Teston Road Extension (Keele Street to Dufferin Street) including Active Transportation and Transit Service improvements, provides the basis for generating and evaluating Alternative Methods, including corridors and alignments.

Following the selection of the preferred Alternative to the Undertaking, the study team generated alternative corridors to connect Keele Street and Dufferin Street in the vicinity of Teston Road.

The Alternative Corridors outline different methods of achieving the Preferred Alternative to the Undertaking. Twelve Alternative Corridors were generated (**Figure 1-6**).

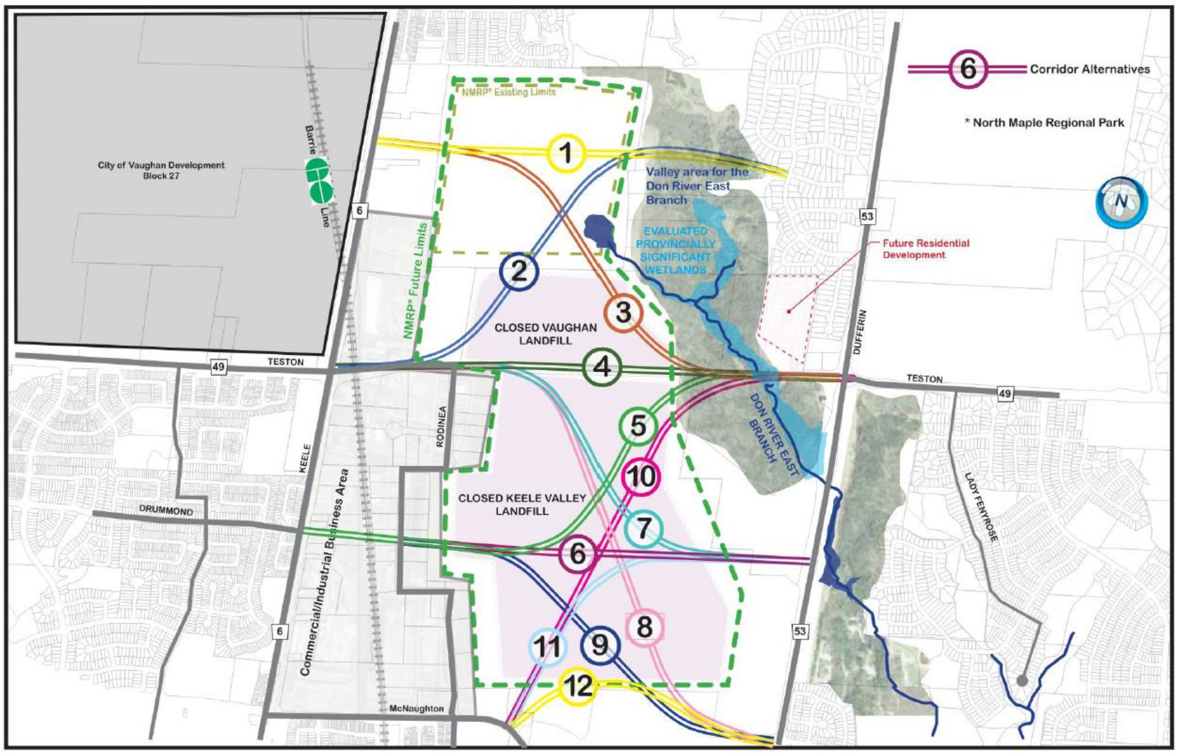

Figure 1-6: Alternative Corridors

The evaluation of the twelve corridors led to the selection of Alternative Corridor 4 which connects Keele Street to Dufferin Street at the existing intersections of Teston Road. This alternative provides the most direct east-west connection.

The other corridor alternatives did not provide a direct east-west connection and/or had significant and unacceptable impacts to the landfills, and most options had equal if not greater potential environmental effects compared to Corridor Alternative 4.

Following the selection of a preferred Corridor Alternative, different Alignment Alternatives were developed for this corridor. Eight alignments were initially generated, as illustrated in **Figure 1-7**. Three of these alignments (4C, 4F and 4H), were considered obviously less desirable, and were screened out for a more streamlined evaluation process.

The remaining five alignments were carried forward for more detailed evaluation.

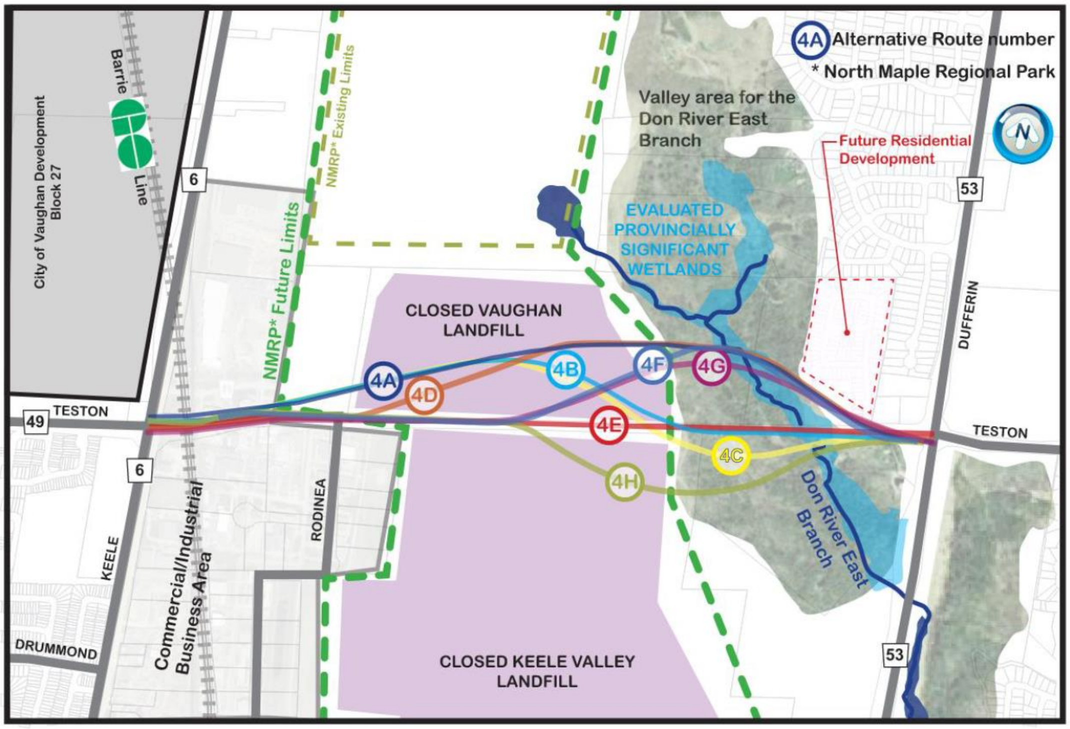

Figure 1-7: Alternative Alignments - Long List

Following initial screening, the short-listed alternatives were evaluated based on the prescribed methodology outlined in the IEA Terms of Reference. Following the evaluation the Project Team confirmed Alternative Alignment 4E as the Preferred Alternative Alignment (or Preferred Method). Alternative Alignment 4E was therefore carried forward to the next phase of the project.

In summary, Alternative 4E makes maximum use of the existing two-lane section of Teston Road, avoiding direct encroachment on the Vaughan Township and Keele Valley landfills. It has the best roadway geometry for safety and user experience and crosses the valley with a straight structure. Alternative 4E is outside of the Phase 3 area of North Maple Regional Park but still bisects the overall planned area of future park expansion. It has some risk of encroachment on Keele Valley Landfill infrastructure and the Vaughan Township Landfill gas collection system but avoids the private landfill site to the west. Alternative 4E also has less encroachment on the proposed residential subdivision west of Dufferin Street and is further away from nearby noise sensitive areas than some alternatives. Alternative 4E ranked higher overall than the other Alignment Alternatives (except for Future Do-Nothing) considering the natural environment.

Design Alternatives

The characteristics of the Teston Road corridor vary significantly over its entire length. To assist with the evaluation of Design Alternatives, the corridor was divided into the following sections, developed based on specific characteristics such as topography and land use. These sections are illustrated in **Figure 1-8** and include:

- Section 1: Teston Road from west of Keele Street to Rodinea Road including the GO rail crossing and a private landfill
- Section 2: Teston Road at Rodinea Road to the west edge of the Don River East Branch valley (the stretch of road that would pass between the Vaughan Township and Keele Valley landfills)
- Section 3: Teston Road from the west edge of the Don River East Branch valley to Dufferin Street, and
- Section 4: Teston Road from Dufferin Street to Bathurst Street.

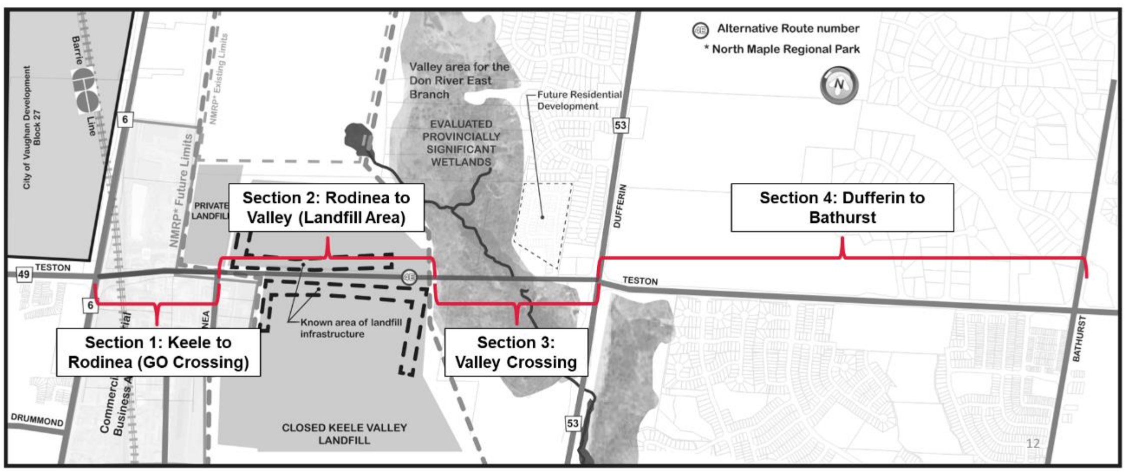

Figure 1-8: Recommended Design Project Sections

Section 1 – Teston Road – West of Keele Street to Rodinea Road

Section 1 comprises existing Teston Road from west of Keele Street to Rodinea Road. Teston Road east of Keele Street is a two-lane rural roadway with ditches and is generally comprised of industrial lands. The section includes an existing at-grade rail crossing for the Barrie GO line just 80m east of the above Teston Road / Keele Street intersection and a private landfill.

Cross-Section Alternatives

Two cross-sections were considered for the widening of Teston Road within Section 1. The first is a full width (36.0 m right-of-way) four-lane road with curbs, sidewalks and cycle tracks on both north and south sides which is the standard design for new four-lane arterial roads within York Region (**Figure 1-9**). The second is a narrower four lane cross-section with only a multi-use pathway on the north side of Teston Road (**Figure 1-10**). The full width cross-section was selected for longer term implementation with the narrower cross-section selected to be consistent with the more constrained Section 2 to the east (see below).

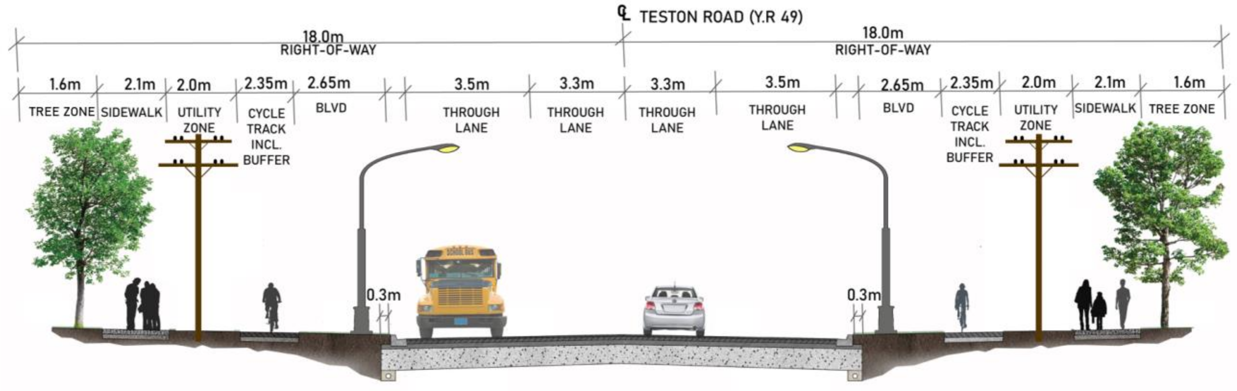

Figure 1-9: Full Width Cross-Section

GO Rail Crossing Alternatives

The considerations for Design Alternatives in the area of the GO Rail crossing included:

- At grade versus grade separated GO rail crossing
- Teston Road alignment
- Keele Street alignment
- Road-over-rail or road-under-rail if grade separated GO rail crossing

During the initial review of grade separation alternatives, it was determined that road-under-rail options should be screened out as these would be much more costly, more difficult to construct and maintain, and would be more disruptive to rail service during construction. As a result, all grade separated alternatives generated for this section were road-over-rail options.

Four alternatives were carried forward for a Grade-Separated GO Rail Crossing along with the Future Do Nothing alternative:

- Alternative 1: Existing Teston, Existing Keele, Overpass
- Alternative 2: Shift Teston North, Existing Keele, Overpass
- Alternative 3: Existing Teston, Shift Keele West, Overpass
- Alternative 4: Shift Teston North, Shift Keele West, Overpass
- Future Do Nothing

Based on a review of warrants, the short time frame for GO trains to pass, design constraints, and challenges within this section, it was determined that York Region would proceed in the interim with an At-Grade GO Rail Crossing with an improved Teston Road Alignment, shifting Teston Road to the north. Proceeding initially with an at-grade crossing will have no impacts on property and all accesses can be maintained. The IEA recommends the long-term property protection for a grade-separated GO Rail Crossing (Alternative 2).

Section 2 – Teston Road - Rodinea Road to the West Edge of the Valley

Section 2 is the section of road that passes between the Vaughan Township landfill and future North Maple Regional Park to the north and the Keele Valley landfill to the south, from Rodinea Road to the west side of the Don River East Branch valley area.

Two cross-sections were considered for the extension of Teston Road within Section 2. The first cross-section is a full width (36.0 m right-of-way) four-lane road section with curbs, sidewalks and cycle tracks on both north and south sides (**Figure 1-9**). The second is a smaller cross-section with only a multi-use pathway on the north side of Teston Road that could allow the roadway to pass between the landfills to the north and south with minimal impacts (**Figure 1-10**).

The full width cross-section was selected for longer term implementation with the narrower cross-section selected for initial implementation to minimize impacts to the landfills.

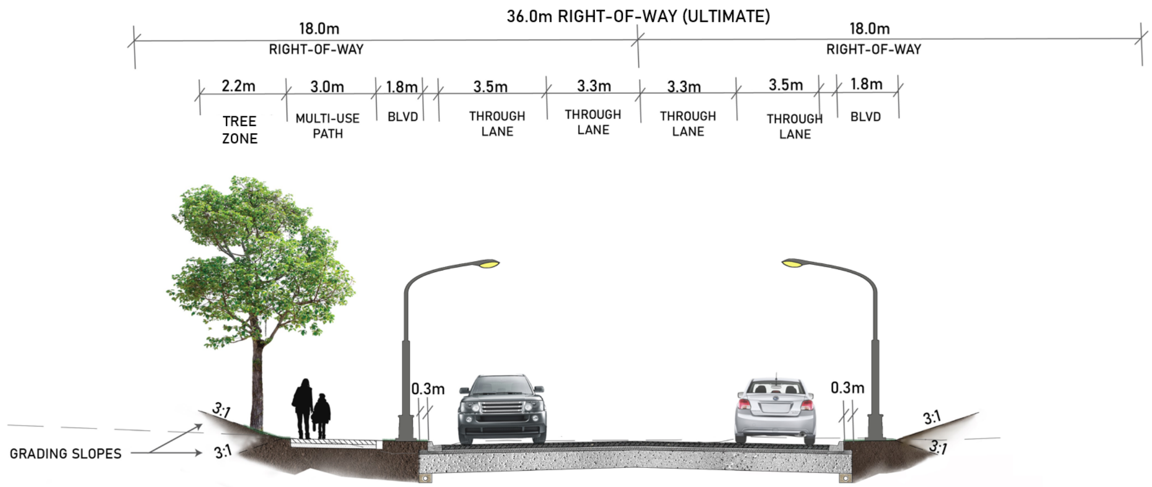

Figure 1-10: Interim Cross-Section

Section 3 – Teston Road - Don River East Branch Crossing to Dufferin Street

Section 3 includes the valley of the East Don River tributary from east of the Vaughan Township and Keele Valley Landfills across to the Teston Road and Dufferin Street intersection. The surrounding area is forested and includes significant natural habitat. The valley also possesses significant elevation changes which results in design challenges.

Cross-Section Alternatives

Two cross-sections were considered for the extension of Teston Road within Section 3. The first is a full width (36.0 m right-of-way) four-lane road with curbs, sidewalks and cycle tracks on both north and south sides (**Figure 1-9**). The second is a narrower four lane cross-section with only a multi-use pathway on the north side of Teston Road (**Figure 1-10**). The full width cross-section was selected for longer term implementation with the narrower cross-section selected for initial implementation to be consistent with the more constrained Section 2 to the west.

Bridge Alternatives

Four alternatives were considered for a bridge over the Don River East Branch within Section 3:

- Single span bridge
- Double span bridge
- Triple span bridge
- Future Do Nothing

Upon evaluation of the various bridge alternatives along with the Do Nothing alternative, the single span bridge was recommended to be carried forwarded. While all alternatives will have impacts to the valley from both temporary construction impacts and permanent impacts, the longer structures are more complex to construct, more expensive, and do not offer many additional benefits to travelers or to land use and the socio-economic environment. All three bridge alternatives can be designed to accommodate the meander belt, wildlife passage, and active transportation trails.

Section 4 – Teston Road Dufferin Street to Bathurst Street

Section 4 comprises existing Teston Road from Dufferin Street to Bathurst Street and is characterized mostly by residential development. This area already has an active two-lane road with a (mostly) rural cross-section with ditches, a wide paved median and supporting infrastructure.

The existing Teston Road right-of-way width varies within Section 4 which can accommodate the standard York Region four-lane curbed arterial roadway cross-section with sidewalks and cycle tracks on both north and south sides

To expand the existing roadway from two to four lanes, a total of 4.1m of widening is required. Widening alternatives that were considered for Teston Road within Section 4 include:

- Widen equally on each side of the existing road
- Widen on the south side only
- Widen on the north side only
- Future Do Nothing (keep road as two lanes)

All alternatives can be accommodated within the existing right-of-way.

The results of the evaluation demonstrate that widening on both sides of the existing road is the most preferrable and therefore recommended alternative for Section 4. It has the least impact on the natural environment (aside from the Future Do Nothing scenario) and socio-economic environment while also performing the best from a transportation perspective. It is somewhat more complex to construct but this is largely a temporary condition and will require construction staging to be designed to reduce impacts to users.

Project Description

Ultimately, a 36-metre right-of-way with a full width urban (curbed) arterial road cross section is planned for Teston Road from Keele Street to Bathurst Street. This includes four general purpose traffic lanes (one 3.5 m and one 3.3 m lane per direction), 2.1 m sidewalks and 2.35 m cycle tracks on both the north and south sides of Teston Road, boulevards, utility zones, and tree zones with landscaping where possible. The IEA will seek approval for this ultimate configuration so that it can be implemented when feasible in the future. Due to localized constraints a modified initial configuration is proposed along Teston Road from Keele Street to Dufferin Street which includes a 3.0 m north side multi-use pathway instead of the sidewalks and cycle tracks on both sides which are planned for the ultimate configuration.

Property protection for an ultimate grade-separated GO Rail crossing on Teston Road east of Keele Street is also recommended with an initial at-grade rail crossing recommended until grade separation is warranted.

Initial and ultimate phases of the project are proposed to have a design speed of 70 km/hr and a posted speed of 60 km/hr.

The functional design plans and profiles for the recommended alternative are shown in Sheets 1 through 15, available in **Appendix B.**

A summary of the project section recommendations follows:

Section 1 – Teston Road – West of Keele to Rodinea Road

Section 1 includes the existing Teston Road corridor from approximately 250 m west of Keele Street to Rodinea Road, a distance of approximately 700 m. The preliminary design for this section includes intersection improvements at Teston Road and Keele Street to accommodate a new urbanized (curbed) typically undivided four-lane Teston Road east of Keele Street, with an improved Teston Road alignment shifted slightly northerly from the existing Teston Road alignment which will eliminate the current S-curve. The roadway centreline profile generally follows the existing ground elevation and rises towards the east with gradients of up to 6.0%.

The design includes an at-grade crossing of Teston Road at the GO rail line with property protection for a future grade separated roadway overpass of the rail line (with Teston Road, the Teston Road / Keele Street intersection and adjacent sections of Keele Street all raised to accommodate the Teston Road / GO rail grade separation).

Due to the constraints within Section 2, which are discussed below, a 3.0 m multi-use pathway will be implemented on the north side of Teston Road until such time that sidewalks (2.1 m) and uni-directional cycle tracks (2.35 m) can be implemented throughout Sections 1 to 3.

Section 2 – Teston Road - Rodinea Road to the West Edge of Valley

Section 2 includes the proposed Teston Road corridor from Rodinea Road to the west side of the Don River East Branch valley, a distance of approximately 900 m. The preliminary design for Section 2 of the Teston Road corridor includes a new four lane urban (curbed) undivided roadway that passes between the private landfill and Vaughan Township landfill to the north and the City of Toronto's Keele Valley landfill to the south. The constrained cross section features a combination of two 3.5 m and 3.3 m lanes per direction and a 3.0 m multi-use pathway on the north side. The boulevards and utility zones have been reduced or eliminated to decrease the total width of the cross section. This will allow the roadway to fit between the landfills with minimum impacts to landfill infrastructure.

A westbound left turn lane will be provided on Teston Road at Rodinea Road. Existing access to the landfills and the existing gas flare facility, as well as City of Toronto's access to the purge wells, will be maintained. A future intersection on Teston Road may also be implemented to provide access to the North Maple Regional Park once the park expands this far south.

In the future, sidewalks and cycle tracks may be implemented on both the north and south sides of the roadway, although this is subject to decommissioning of the landfill monitoring infrastructure.

Section 3 – Teston Road - Don River East Branch Crossing to Dufferin Street

Section 3 includes the proposed Teston Road corridor from the west side of the Don River West Branch valley to Dufferin Street, a distance of approximately 735 m.

The preliminary design for Section 3 of the Teston Road corridor includes a new four lane urban (curbed) undivided roadway with a cross section that includes a combination of two 3.5 m and 3.3 m lanes per direction and a 3.0 m multi-use pathway on the north side. The roadway fill embankments through the valley of up to 14 m in height will be built to their ultimate width with two-to-one side slopes with benching which will be planted with native species.

A new 40 m bridge will be built over the Don River East Branch with vertical retaining and wing walls in all four quadrants to limit the encroachment into the valley. Approaching the bridge on both sides, the roadway will be elevated from the valley floor to ensure the roadway gradients are not too steep. The roadway profile across the valley will be built to maximum 6% gradients before connecting to the existing ground elevation approximately 115 m west of Dufferin Street. The bridge will be built with space to accommodate multi-use pathways (or a sidewalk and cycle track) on both the north and south sides.

Several proposed or potential trail crossings of Teston Road have been identified within the valley limits which are subject to future City of Vaughan plans associated with the development of North Maple Regional Park and other active transportation plans for the area such as the proposed north-south 'Super Trail'. A potential trail culvert crossing has been identified approximately 100 m east of the west valley edge. Potential trails through the 40 m bridge opening have been identified either on the floor of the valley or on platforms in front of the west and east bridge abutments above the river stone slope protection. A wildlife crossing culvert will also be constructed west of the river crossing to accommodate wildlife passage.

An eastbound left-turn lane will be provided at a new unsignalized intersection at the entrance to a new residential development (Teston Sands) located 175 m west of Dufferin Street. Some modifications will be made to the two existing residential accesses on the north side of Teston Road and at Richview Manor on the south side of Teston Road immediately west of Dufferin Street. A short section of 3.0 m wide multi-use pathway will be provided on the south side of Teston Road west of Dufferin Street.

In the future, sidewalks (2.1 m) and cycle tracks (2.35 m) may be implemented on both the north and south sides of the roadway, although this is subject to decommissioning of the landfill monitoring infrastructure to the west.

Section 4 – Teston Road - Dufferin Street to Bathurst Street

Section 4 includes the existing Teston Road corridor from Dufferin Street to Bathurst Street, a distance of approximately 2,050 m.

The preliminary design for Section 4 of the Teston Road corridor includes a widened four lane urban (curbed) undivided roadway with a cross section that includes a combination of two 3.5 m and 3.3 m lanes per direction as well as sidewalks (2.1 m), cycle tracks (2.35 m), boulevards and utility zones on both sides of the roadway within a (typically) 36.0 m right-of-way. A total of 4.1 m of road widening is required. Street plantings are proposed along both the north and south sides of Teston Road.

The intersection at Teston Road and Lady Fenyrose Avenue is proposed to have new traffic control signals and will include eastbound right-turn and westbound left-turn lanes and separate pedestrian and cyclist crossings on all three approaches. Via Romano Boulevard will remain signalized. Saul Court, Quail Run Boulevard and Torah Gate will remain as stop-controlled intersections at Teston Road. Bus stops will continue to be provided at the existing locations along Teston Road in Section 4. The active transportation facilities on the roadway will be transitioned to match the existing active transportation facilities east of Bathurst Street, in the City of Richmond Hill.

Environmental Effects, Mitigation Measures, and Commitments to Future Work

This section highlights key environmental implications resulting from the project as described above.

<u>Natural Environment</u>

A review of potential constraints related to terrestrial features, and fish and fish habitat was completed for the proposed Teston Road project. Background research and field studies coupled with agency consultation were used in the determination of habitat function and significance, which has resulted in identification of the following noteworthy features:

- Designated Natural Areas
- Significant Wildlife Habitat (SWH)
- Species at Risk (SAR) and SAR Habitat

- Rare Vegetation and Wildlife
- Significant Fish Habitat
- Environmentally Sensitive Areas (e.g., ground water upwellings, wetlands)

Through correspondence with the Ministry of Natural Resources and Forestry (MNRF) Aurora District, supplemented with background data review and field investigations, it was determined that the project area contains the headwaters for the East Don River and most tributaries support fish and fish habitat. Redside Dace have been recorded by Fisheries and Oceans Canada (DFO), the MNRF Natural Heritage Information Centre, and Land Information Ontario as occurring within multiple tributaries within the Don River East Branch. Preliminary field investigations have determined that suitable habitat for Redside Dace is present within the Don River East Branch.

Numerous terrestrial constraints have been identified within the project limits and will require appropriate mitigation and avoidance measures during construction to minimize the scale and permanency of impacts to the greatest degree possible. Despite implementation of mitigation and avoidance measures, the project will have permanent impacts on terrestrial wildlife and their habitat, therefore restoration and habitat compensation will be required to minimize and mitigate these impacts.

In consideration of the site conditions, including opportunities and constraints, the following outlines recommended site restoration and habitat compensation.

Recommendation 1 – Species at Risk

Species at Risk habitat compensation will be addressed as part of detailed design based on up-to-date site conditions and legislative requirements. Based on information gathered within the Technically Preferred Alternative limits, confirmed SAR habitat requiring compensation includes habitat for Bobolink and Eastern Meadowlark, and potential SAR habitat requiring compensation includes habitat for SAR bats.

Recommendation 2 – Wildlife Crossing

As wildlife movement corridors will be impaired by the project, including for White-tailed Deer, leading to increased susceptibility to road mortality and motorist collisions with wildlife, wildlife passages should be implemented in suitable locations, should be of sufficient size, and should be designed with features that facilitate wildlife movement across the roadway. A Wildlife Crossing Plan should be developed as part of detailed design. Wildlife crossing for deer, small mammals, turtles, and amphibians will be considered and incorporated into the detailed design. This will include wildlife fencing alongside the road within and adjacent to habitat for these species to tie in with wildlife crossings and encourage use by wildlife. There may be additional opportunities for wildlife crossing associated with a proposed trail connection.

Recommendation 3 – Significant Wetlands and Significant Wildlife Habitat

A Wetland and Significant Wildlife Habitat Restoration Plan should be developed to accurately characterize these areas, identify opportunities to minimize impacts, and to develop appropriate mitigation and restoration measures for any impacts in consultation with the MNRF. Impacts to Significant Wetlands and Significant Wildlife Habitat (SWH) will be assessed as part of detailed design based on up-to-date site conditions. Field investigations to confirm conditions in and boundaries of significant wetland features, as well as locations and limits of SWH will be completed as part of detailed design. Key considerations at detailed design, based on the results of these surveys, will be ensuring maintenance of wetland connectivity and appropriate restoration or compensation of wetlands. Enhancement measures implemented as part of the restoration plan should consider and complement confirmed SWH within the project limits, and may include turtle nesting areas, turtle basking areas, reptile hibernacula, bat houses, duck nesting structures, and more.

Recommendation 4 – Invasive Species Removal and Management

An Invasive Species Management Plan should be developed to document up-to-date conditions and removal and management plans. Invasive species such as Common Reed (restricted), Japanese Knotweed (restricted), and Goutweed have been recorded within and adjacent to the project limits. Field investigations to confirm locations and limits of invasive species will be completed as part of detailed design to inform appropriate removal and management measures. Legislation is periodically updated and will need to be consulted during the detailed design stage to identify any changes to restricted species or best management practices for their removal and disposal.

Recommendation 5 – Vegetation Restoration

A Vegetation Restoration Plan will be developed to reinstate lost vegetation within negative impact and harmful alteration areas within the project footprint. Development of a Vegetation Restoration Plan will include recommendations within TRCA's Seed Mix Guideline (2022) and be completed in consultation with the TRCA. Key measures will include planting of native species providing similar or superior benefit to wildlife than those being impacted. Where possible, restoration techniques on site should be in accordance with TRCA's Post-Construction Restoration Guidelines (2004). Also see Ecosystem Compensation Recommendations below.

Recommendation 6 – Storm Water Management

A preliminary Stormwater Management Plan was developed to meet stormwater management objectives in terms of water quantity, water quality, erosion and water balance. Improvements include the use of underground facilities for quantity control and water balance (via infiltration in selected areas away from the landfills) and oil and grit separator (OGS) units placed upstream of outlets for quality control. See Stormwater Management section below.

Recommendation 7 – Riparian Planting

Restoration and planting plans within and adjacent to wetlands and along the tributary should focus on improving riparian conditions and functions to improve habitat quality and water quality at the bridge as well as downstream. The section of the Don River tributary which falls within the project area is a clear, cold, headwater stream and would benefit from additional woody material and leaf litter contributions and riparian shading.

Recommendation 8 – Take Private Pond Off-line

There is an opportunity to take the existing pond [Duckweed Floating-leaved Shallow Aquatic (SAF1-3) community] off-line by rerouting the existing watercourse around the pond, improving habitat quality within the watercourse for fish, while still ensuring maintenance of wetland habitat within the pond for amphibians and other wildlife. This pond is located on private property therefore this recommendation will need to be addressed in conjunction with the adjacent property owner and developer. DFO should be consulted (i.e., through submission of a Request for Review) on any changes made to existing fish habitat, as a Fisheries Act Authorization may be required to complete this work. To maintain wetland functions, it is important to preserve water quality, quantity, and duration of seasonal inundation or water holding of wetlands. Alterations to water regimes could have negative impacts on wetland communities and their resident species (GEM Services Inc., 2019). If this recommendation is implemented, the detailed design plans will need to ensure that water quality, quantity, and seasonal inundation or water holding in the existing pond is maintained, to reduce the risk of permanent alterations to water regimes resulting in long-lasting and far-reaching impacts to wetland communities and associated wildlife.

Ecosystem Compensation Recommendations

Ecosystem compensation recommendations are quantified for permanent loss areas, in accordance with the TRCA's *Guideline for Determining Ecosystem Compensation* (2023). This approach to ecosystem compensation uses the basal area per ELC community impacted to determine the ratio of replacement required for that community, which can be used to calculate areas of compensation required relative to the area of each community impacted. Since it takes much longer to re-establish treed ecosystems as a result of their long development times and the impracticality of planting large, full-grown trees, this approach attempts to address the issue of lag-time in ecosystem establishment by recommending that the loss of a mature forest (i.e., a community with a higher basal area) requires replacement with a larger forest (i.e., replacement at a higher ratio) than a non-treed community. **Table 1-1** shows the ecosystem compensation ratios and results that are recommended to replace permanent loss areas resulting from the project, per ELC community, for all vegetated, non-cultural/non-constructed communities.

Table 1-1: Areas of Ecosystem Compensation Recommended per ELC Community - Vegetation Communities

ELC Classification	ELC Code	Basal Area (m^2/ha)	Replacement Ratio	Area of Permanent Loss (m^2)	Ecosystem Compensation Area Required (m^2)
Treed Hedgerow	CUH1-A	N/A	2:1	315	630
Native Forb Meadow	CUM1-A	5	1:1	33,808	33,808
Exotic Cool Season Grass	CUM1-B	5	1:1	1,620	1,620
Exotic Forb Old Field Meadow	CUM1-C	5	1:1	4,733	4,733
Hybrid Poplar Deciduous Plantation	CUP1-4	N/A	2:1	5	10
White Pine Coniferous Plantation	CUP3-2	N/A	2:1	72	144
Mixed Conifer Coniferous Plantation	CUP3-H	N/A	2:1	73	146
Native Cultural Woodland	CUW1-A	8	2:1	3,711	7,422
Native Deciduous Cultural Woodland	CUW1-A3	22	5:1	253	1,265
Exotic Cultural Woodland	CUW1-B	22	5:1	0	0
Fresh-Moist Hemlock Coniferous Forest	FOC3-1	32	5:1	544	2,720
Fresh-Moist Hemlock – White Pine Coniferous Forest	FOC3-A	50	5:1	0	0
Fresh-Moist Poplar Deciduous Forest	FOD8-1	32	5:1	2,410	12,050
Dry-Fresh Poplar Deciduous Forest	FOD3-1	32	5:1	5,476	27,380
Dry-Fresh Hardwood – Hemlock Mixed Forest	FOM3-1	38	5:1	5,030	25,150
Fresh-Moist White Pine – Sugar Maple Mixed Forest	FOMA-A	38	5:1	102	510
Jewelweed Mineral Meadow Marsh	MAM2-9	18	4:1	1,065	4,260
Narrow-leaved Cattail Mineral Shallow Marsh	MAS2-1B	18	4:1	149	596
Duckweed Floating-leaved Shallow Aquatic	SAF1-3	12	3:1	23	69

ELC Classification	ELC Code	Basal Area (m^2/ha)	Replacement Ratio	Area of Permanent Loss (m^2)	Ecosystem Compensation Area Required (m^2)
White Cedar – Conifer Mineral Coniferous Swamp	SWC1-2	40	5:1	176	880
			Total Area (m^2)	**59,565**	**123,393**
			Total Area (ha)	**6.00**	**12.34**

Note:
* N/A indicates that a basal area was not available for that ELC community from the MH Arborist Assessment, and a 2:1 replacement ratio was presumed given the cultural conditions associated with the site. A shaded basal area indicates that a basal area was not available for that ELC community, and a basal area from the most similar ELC community was assumed (e.g., basal area for MAS2-1B was presumed similar to MAM2-9, FOMA-A was presumed similar to FOM3-1, etc.). For all CUM communities, a basal area of 5 was applied per the *Guideline for Determining Ecosystem Compensation* (TRCA, 2023) which states that a vegetation community with few or no trees will have a basal area of 5 or less and can therefore be replaced at a 1:1 ratio.

As the foremost project impact will be fragmentation of intact forest and wetland habitats, including to the north and south of the project, and within Designated Natural Areas, priority for compensation should be given to replacing ecosystems adjacent to the project limits. However, given that there are numerous constraints directly at the project location making compensation in the immediate area impractical, including conflicts with new and ongoing developments, conflicts with existing developed areas or with current land uses (e.g., golf courses, cemeteries, and park spaces), and the need to maintain identified grassland habitat for SAR birds – Bobolink and Eastern Meadowlark, coupled with the large total area recommended to accommodate all required compensation areas (minimum of ~ 123,393 m^2 or 12.34 ha total) as shown in **Table 1-1**, one (1) or more off-site locations, as proximal as possible to the project, will need to be considered for implementation of ecosystem compensation measures at a largescale to account for permanent habitat losses. Thus, the focus on selecting suitable sites for ecosystem compensation should be on creating new, nearby continuous habitat tracts in locations lacking vegetation, that are located within designated natural areas.

<u>Stormwater Management</u>

The study area is located within the Toronto and Region Conservation Authority (TRCA) watershed. The proposed Teston Road improvements would result in an increase in pavement areas. The total increase in pavement area is approximately 20 ha, approximately 25% of the overall existing pavement area which will result in higher potential pollutant loading and peak flow.

Linear infrastructure projects often have limited space available within the right-of-way and multiple outlets with small catchment areas for each outlet. Therefore, it may be difficult to meet unit flow targets for linear infrastructure projects. Based on consultations with TRCA, TRCA had indicated that it would be acceptable to apply a best effort approach with post-to-pre control as a minimum. Improvements will include the use of new and existing underground and surface facilities for quantity control and water balance (via infiltration) and OGS units placed upstream of outlets for quality control.

<u>Soils/Contamination/Landfills</u>

Given the proximity of landfills and the associated monitoring infrastructure along a portion of the project, further coordination will occur throughout detailed design to ensure compliance with, or amendment to, existing approvals and to delineate underground infrastructure and address the potential for landfill waste to be present within the proposed right-of-way.

The project will not impede the operations of the Keele Valley landfill, its monitoring programs/requirements, or access to its infrastructure (including underground infrastructure).

<u>Air Quality</u>

An Air Quality Assessment study was undertaken to assess the local air quality impacts due to the proposed widening and extension. Based on the assessment of the future air quality conditions with the proposed project in place, the overall contribution from the roadway emissions to the combined contaminant concentrations was small and the majority were below the MECP guidelines. Mitigation measures aren't warranted due to the small number of days which are expected to exceed the guidelines, but additional measures such as planting vegetation will be considered to minimize particulate impacts. During construction, dust is the primary contaminant of concern and several mitigation measures for reducing emissions during construction will be implemented such as the use of non-chloride due suppressants and the use of wind barriers.

<u>Noise</u>

Results of the noise assessment show that noise levels resulting from the proposed project (without the potential future GO Rail grade separation) are expected to be very minor for the homes west of Keele Street and for the homes located between Dufferin Street and Bathurst Street. However, it is very likely that noise mitigation would be required in the vicinity of the Teston Road GO rail grade raise if this is undertaken in future.

While some sensitive receptors in the study area will see increases in noise levels, noise attenuation is either within guidelines or noise attenuation barriers are not feasible. For the sensitive receptors associated with the development of 1600 Teston Road, the developer constructed noise attenuation will reduce the future noise levels below MECP guidelines.

Archaeology

As a result of Stage 2 Archaeological Assessments, the late nineteenth to early twentieth century historical Euro-Canadian Oliver site was identified within the Teston Road study area, located within the valley lands west of Dufferin Street. As more than 80 percent of the Oliver site artifact assemblage does not pre-date 1870, it does not meet the requirements for Stage 3 assessment. There are presently two Late Woodland Indigenous sites within one kilometre of the current Study Area where associated ossuaries have not been identified: the McNair site (AlGu-8) and the McGaw site (AlGu-88). Following the policies laid out in the 2022 York Region Official Plan (York Region, 2023) and York Region Archaeological Management Plan (York Region, 2014), it has been determined that portions of the Study Area demonstrate ossuary potential and will require monitoring during construction.

Built Heritage Resources

Based on the results of the Built Heritage assessment, several resources were identified that will require consideration during detailed design and/or construction.

- Grading limits should be revised to reduce or eliminate potential impacts to 981 Teston Road and 1600 Teston Road to the extent practicable.
- If revising the proposed grading limits is determined to be infeasible, direct adverse impacts would be anticipated to 981 Teston Road. Given the potential cultural heritage value of this property, a resource-specific Heritage Impact Assessment (HIA) should be conducted to evaluate alternatives, assess potential impacts to the resource, and recommend appropriate mitigation measures if suitable avoidance measures cannot be implemented.
- Vibrations during construction activities may impact 814 Teston Road and 981 Teston Road as a result of their location in close proximity to the proposed alignment. To ensure potential heritage attributes are not adversely impacted during construction, a baseline vibration assessment should be undertaken during detailed design.

Property Impacts

To facilitate construction of the project approximately 4.3 hectares of public and private property will need to be acquired by York Region to construct the project and approximately 2.2 hectares of temporary easements are required for the construction of the project. No full buyouts are required to construct the project.

During detailed design, reductions to property and easement requirements will be examined.

Future Commitments

A number of future commitments will need to be addressed as part of future phases of the project. Additional surveys, approvals, and monitoring will all be required prior to, during and/or following construction. These include:

Additional Surveys

- Aquatic and Terrestrial Field Surveys
- Noise Impact Studies
- Stage 2 Archaeological Assessments for portions of the Keele Valley Landfill
- Heritage Impact Study
- Vibration Baseline Assessment
- Phase 2 Environmental Site Assessments for property acquisitions

Permit Requirements

- Request for Review – Fisheries and Oceans Canada
- O. Reg. 830/21 Requirements (Endangered Species Act) – Ministry of Environment Conservation and Parks
- O. Reg. 41/24 Requirements (Conservation Authority Act) – Toronto and Region Conservation Authority
- Environmental Compliance Approvals – Ministry of Environment Conservation and Parks

Monitoring

- EA Compliance Monitoring
- Archaeological Monitoring (Ossuary Protection)
- Vibration Monitoring (if required following baseline studies)

Consultation

The consultation program involved the public, community organizations, property owners, local businesses, institutions, approval agencies, and other groups with a special interest in the study. Four virtual open houses were conducted in Summer 2021, Fall 2021, Spring 2022 and Fall 2023. All four open houses featured pre-recorded presentations and a survey. Consultation materials were made available on www.york.ca/TestonRoad and will remain available until completion of the IEA.

Issues Arising from Consultations

The following summarizes major consultation issues and how they were addressed:

Natural Environment Effects – Valley Crossing: The Ministry of Natural Resources and Forestry and Toronto and Region Conservation Authority raised questions regarding the natural environment effects of a Teston Road connection. To address these effects the team has proposed a number of recommendations to compensate for loss of habitat, enhance the existing areas untouched by construction, provide onsite plantings, and provide for wildlife movement through the corridor. See recommendations above and within this report.

Wildlife Passage: Concerns were raised that the embankments and roadway would create discontinuity for wildlife movement. To address this, a wildlife passage has been incorporated into the designs. Both the bridge and the wildlife passage will provide movement corridors for wildlife and fencing along the embankment will direct wildlife away from the roadway.

Integration with North Maple Regional Park: The City of Vaughan has plans to expand the existing North Maple Regional Park to Teston Road and eventually south of Teston Road as part of the remediation plans for the Keele Valley Landfill. Discussions were held with City of Vaughan park planning staff to review opportunities for context sensitive designs that account for the future needs of the park and to review where access to the park can be provided directly from Teston Road. Further discussions and coordination will occur during detailed design.

Integration with development: Meetings were held with landowners/consultants associated with the Block 27 and 1600 Teston Road development areas to discuss how the Recommended Plan will interface with the plans and infrastructure associated with these developments.

Landfills: In order to understand and assess the impacts of alternatives on existing landfills, York Region met with both the City of Toronto and the City of Vaughan several times each and with the owner of the private landfill, to discuss the study. In general, avoidance of the landfills and associated infrastructure was considered highly desirable. The ultimate Recommended Plan respects all York Region policies and a 36.0 m right-of-way, however, an interim design has been created to eliminate impacts to the landfills.

Property Requirements: The alignment was developed to limit impacts on properties throughout the corridor (public and private lands). However, due to the right-of-way requirements of approximately 36.0 m, some property acquisition is required. Overall, concerns expressed along the corridor have been mitigated to a reasonable extent and will be further investigated during detailed design based on detailed property-by-property design reviews.

Preliminary Cost Estimate

Project costs were developed in accordance with the Region’s cost estimating process for implementing capital projects. The cost for design, construction, environmental mitigation measures, and contingencies in 2024 dollars is estimated at $120.4M.

While the construction of a four-lane Teston Road from Keele Street to Dufferin Street is identified in the Region's 10-year capital plan, the widening of Teston Road to four lanes from Dufferin Street to Bathurst Street is currently beyond the horizon of the Region's 10-year capital plan. The separated project costs for the major project components are:

Teston Road from Keele Street to Dufferin Street – $79.9M.

Teston Road from Dufferin Street to Bathurst Street – $40.5M.

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1. Introduction

The Regional Municipality of York (York Region) has completed an Individual Environmental Assessment (IEA) study for transportation improvements in the Teston Road (Regional Road 49) area. The study area covers Highway 400 to Bathurst Street (Regional Road 38) and Kirby Road to Major MacKenzie Drive (Regional Road 25), within the City of Vaughan (see **Figure 1-1**).

In December 2018, the Minister of the Environment, Conservation, and Parks approved the Terms of Reference (ToR) for the Teston Road Area Transportation Improvements IEA study. York Region retained Morrison Hershfield (MH) to conduct the IEA in accordance with the approved ToR. The approved ToR is included in **Appendix A**. The IEA study has examined solutions that will improve transportation throughout the study area through a comprehensive IEA process. Consultation with interested and/or affected parties is an essential part of this planning process and provides a mechanism for York Region to identify and respond to issues before decisions are made and documentation is filed with the Ministry of the Environment, Conservation and Parks (MECP).

Figure 1-1: Teston Road Study Area

1.1 Identification of the Proponent

York Region is the proponent for the Teston Road Area Improvements Individual Environmental Assessment.

York Region is located north of the City of Toronto and stretches to Lake Simcoe, it borders Durham Region on the east, and Peel Region on the west. The area consists of many hectares of protected Greenbelt and includes a diverse range of land uses. The Region consists of nine municipalities: the Towns of Aurora, East Gwillimbury, Georgina, King, Newmarket, and Whitchurch-Stouffville, and the Cities of Vaughan, Markham, and Richmond Hill. York Region is home to 1,258,200 residents as of the 2023 York Region Growth and Development Review.

York Region is an upper tier municipal government responsible for the planning, construction, operation, and maintenance of all regional roads. Regional roads are typically defined as main arterial roads that connect local municipalities.

1.2 Purpose of the Project

The purpose of this IEA is to generate a transportation solution that addresses a variety of transportation problems and opportunities in the study area. The project considered improvements for the movement of vehicles, pedestrians, cyclists, and transit.

1.3 Project Background

The 2003 Teston Road Class Environmental Assessment, between Pine Valley Drive and Bathurst Street, recommended the “Do Nothing” option for the missing link on Teston Road between Keele Street and Dufferin Street. This was based on the concerns raised by the Ministry of Environment, the Ministry of Natural Resources and the Toronto and Region Conservation Authority related to the complexity and potential impacts of crossing the East Don River Tributary valley within the Oak Ridges Moraine and the constraints associated with the City of Toronto’s Keele Valley Landfill and Vaughan Township Landfill. As a part of the 2003 Environmental Assessment, York Region committed to undertaking an Individual Environmental Assessment for the missing link if the missing link connection was to be considered at a later date.

The 2016 York Region Transportation Master Plan (TMP) recommended the completion of the missing link on Teston Road between Keele Street and Dufferin Street. The extension of Teston Road between Keele and Dufferin Streets is also included in the 2022 York Region TMP as part of the 2051 Recommended Road Network.

The study area for this IEA is bounded by Kirby Road to the north, Bathurst Street to the east, Major Mackenzie Drive West to the south, and Highway 400 to the west (**Figure 1-1**). This study area includes several north/south and east/west arterial roads as well as collector roads. The western extent of the study area includes Highway 400; a Controlled Access Highway under the jurisdiction of the Ministry of Transportation of Ontario (MTO), which traverses through the study area in a north/south direction. Highway 400 is considered regionally and provincially significant, serving as an important link between the Greater Golden Horseshoe (GGH) area and Simcoe County to the north. It also connects Highway 401 in southern Ontario to central and northern

Ontario/western Canada via Highway 11 and Highway 69, respectively. Highway 400 includes two interchanges within the study area at Major Mackenzie Drive West and at Teston Road. The future Highway 413 will terminate at Highway 400, north of Kirby Road. Highway 413 will connect Highway 400 to the Highway 401/407 interchange in Mississauga/Halton Hills, in Halton Region.

1.4 Report Organization

The remainder of this report is organized as follows:

Section 2: Study Process: Describes the legislative and planning processes, including the approved IEA Terms of Reference that provide an outline for the study including the necessary consultation to gather comments from the public and stakeholders throughout the Study.

Section 3: Consultation: Documents the consultation undertaken for the Study in accordance with the requirements outlined in the Terms of Reference for this Individual Environmental Assessment.

Section 4: Problems and Opportunities/Need and Justification: Describes the problems and opportunities as they relate to the York Region Official Plan and TMP. The project problems and opportunities are summarized based on current and projected travel demands within the study area and associated screenlines.

Section 5: Existing & Future Environmental Conditions: Describes the existing, and where feasible, the future environmental setting within the study area, including an overview of the existing environment conditions: natural, social, cultural, built, and economic.

Section 6: Alternatives to the Undertaking: Describes alternative solutions that represent functionally different ways of addressing the identified problems and opportunities.

Section 7: Identification & Evaluation of Alternative Methods: Outlines the process for the development of alternative solutions, including an overview of the rationale for the selection of the long-listed and short-listed solutions. The evaluation process for the selection of the preliminary preferred alternative is described.

Section 8: Identification & Evaluation of Alternative Designs: Outlines the process for the development of the alternative designs and an assessment of their transportation performance and effects on the components of the environment. The evaluation process for the selection of the preliminary preferred design alternative is described as well as any refinements undertaken.

Section 9: Project Description/Recommended Plan: Describes the Recommended Plan for the Teston Road Area Transportation Improvements. The Recommended Plan documents the typical cross-sections, horizontal and vertical alignment of the roadway, general arrangements for the new and modified structures within the study area and documents other relevant elements such as intersection designs, development connections, pedestrian and cycling facilities and storm water management.

Section 10: Impact Assessment: Identifies the potential and net impacts of the project on the environmental conditions, recommended mitigations measures and municipal, provincial, and federal approvals or permits that may be required for implementation of the Recommended Plan.

Section 11: Future Commitments: Outlines the next steps committed to by York Region, including additional studies/investigations; finalizing needed property acquisitions; construction and implementation timing; developing design details; monitoring requirements; and securing federal, provincial, and municipal permit approvals.

References: Provides a list of references used throughout the proceeding sections.

Appendices: Below is a list of appendices included with this report for additional information.

- **Appendix A:** Terms of Reference
- **Appendix B:** Preferred Design Plan (Interim) & Preferred Design Plan (Ultimate), Including Interim Landscape Design
- **Appendix C.1:** Consultation Record
- **Appendix C.2:** Indigenous Consultation Record
- **Appendix D:** Transportation Memos No. 1, No. 2 & No. 3
- **Appendix E:** Natural Environment Report
- **Appendix F:** Arborist Report
- **Appendix G:** Environmental Noise Report
- **Appendix H:** Air Quality Assessment
- **Appendix I:** Stage 2 Archaeological Assessment Report
- **Appendix J:** Cultural Heritage Assessment Report
- **Appendix K:** Drainage & Stormwater Management Report
- **Appendix L:** Hydrogeology Report
- **Appendix M:** Contamination Overview Study
- **Appendix N:** Phase 1 Environmental Site Assessment Reports
- **Appendix O:** Soil Investigation Report
- **Appendix P:** Fluvial Geomorphology Report
- **Appendix Q:** Climate Change Report
- **Appendix R:** Geotechnical and Pavement Design Report
- **Appendix S:** Structural Design Report
- **Appendix T:** Evaluation Table for Alternative Methods
- **Appendix U:** Evaluation Table for Alternative Designs
- **Appendix V:** Design Criteria

2. Study Process

Most public sector transportation projects in Ontario require completion of either an Individual Environmental Assessment (IEA), or a Streamlined Environmental Assessment (e.g., Class EA) before being implemented. These processes are defined and governed by the *Ontario Environmental Assessment Act RSO 1990 (*EA Act or EAA*).*

The Streamlined EA process applies to projects that are more routine in nature and have predictable and manageable outcomes. These types of projects follow a self-assessment and decision-making process by the project proponent. Conversely, IEAs are completed for those projects which may be more complex in nature and have the potential for significant environmental effects. Given the scope, complexity, and scale of this Project, an IEA is required to meet the requirements of Ontario's EAA.

2.1 Ontario Environmental Assessment Act, R.S.O. 1990

The purpose of the EA Act is to help protect and conserve Ontario's environment by ensuring that projects subject to the Act follow a planning process leading to environmentally sound decision-making. An environmental assessment involves identifying and planning for environmental issues and potential effects prior to implementing a project. The process also allows for opportunities for public involvement in the decision-making process of the project. The planning and assessment are summarized in an Environmental Assessment Report (EAR) prepared by the proponent of the project and is subject to review by the public and government agencies. Per the EA Act, "environment" is broadly defined to include the natural, social, economic, cultural, and built environments.

2.2 Individual Environmental Assessment

The first stage of an IEA involves the preparation and approval of a Terms of Reference (ToR). The ToR establishes the framework (or 'roadmap') for planning and decision-making during the EA process. The ToR further outlines how the EA will be conducted and helps inform the public, Indigenous communities and peoples, and government agencies on what will be considered. York Region completed the ToR for this study in 2018 and received approval from the Minister of Environment, Conservation and Parks on December 20, 2018, for this Project. This IEA study for the Teston Road Area Transportation Improvements Project will follow the process outlined in the ToR and meet the requirements of the EAA, as documented in the 2018 approved ToR (**Appendix A** and **Figure 2-1**).

In 2023 MECP undertook revisions to the EA Act which included changes to the IEA process. These processes are now referred to as Comprehensive Environmental Assessments. However, for the purposes of continuity, this report refers to the process as an Individual Environmental Assessment or IEA.

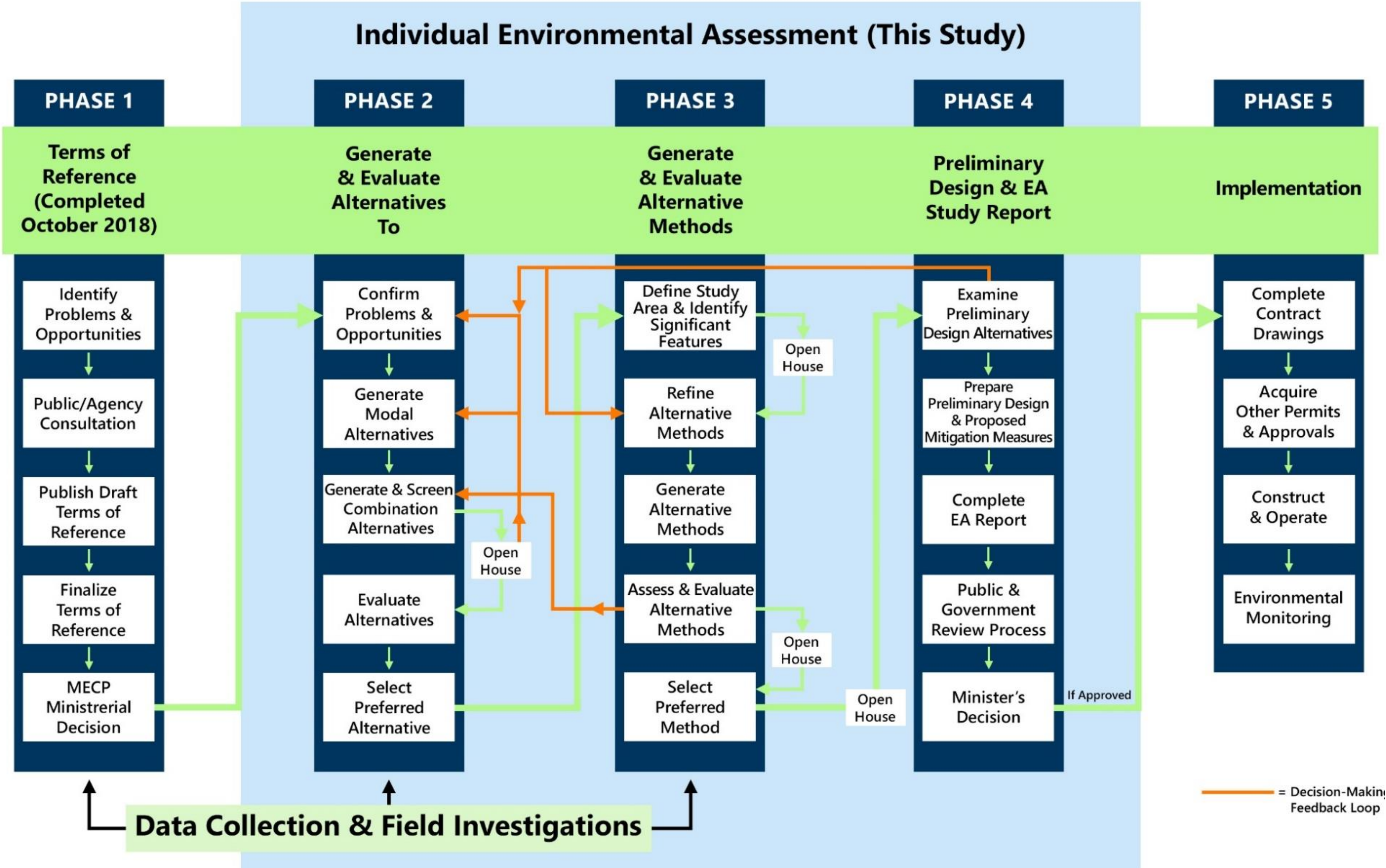

Figure 2-1: Teston Road IEA Study Process

2.2.1 Terms of Reference Commitments

Per Section 7.1 of the MECP Approved ToR “The IEA Report will include a comprehensive list of all commitments made during the ToR process and during the IEA study to guide future environmental work and consultation as well as effects and compliance monitoring. A table will be included in the IEA to list all commitments and where those commitments can be found in the IEA Report. In addition, the IEA Report will demonstrate how ToR commitments were addressed during the IEA study.” **Table 2-1** highlights the commitments as outlined in the approved ToR, as well as the corresponding section of this report where the commitments have been met.

Table 2-1: IEA Terms of Reference Table of Commitments

Terms of Reference Section	Commitment	IEA Report Section
Identification of the Proponent		
Section 1.3 of the ToR and in accordance with Section 6(2)(a) of the EAA.	Identification of the Proponent is required.	**IEA Section 1.1: Identification of the Proponent**
Purpose of the Undertaking		
Section 2.2: Need and Justification for the Proposed Undertaking	A more detailed traffic analysis model and review is required as part of the IEA to confirm the need and justification for transportation improvements, to confirm and identify any additional problems and opportunities and determine the effectiveness of potential transportation solutions.	**IEA Section 4: Problems & Opportunities**
Section 2.3: Summary and Purpose of the Undertaking and the IEA Study	Work supporting the need for any proposed undertaking(s) and a description of the proposed undertaking(s) will be documented in a **Transportation Planning Needs Report**, including a comprehensive network analysis, which will be made available for government agency review.	**IEA Section 4: Problems & Opportunities** **Appendix D: Transportation Memos** ▪ **Transportation Analysis Memo #1** ▪ **Transportation Analysis Memo #2** ▪ **Transportation Analysis Memo #3** **IEA Section 6: Alternatives to the Undertaking**
	During the IEA study that follows the ToR approval a significant amount of additional technical work will be undertaken to define and document transportation problems and opportunities. This analysis will form the rationale for any proposed improvements and the rationale for the 'Undertaking'. Work will be based on the most recent available planning policies, population, employment, growth, economic and travel data.	
	The IEA will consider a range of alternatives to address transportation capacity challenges within the Preliminary Study Area.	
Section 3: Description of and Rationale for the Proposed Undertaking		
Section 3: Description of and Rationale for the Proposed Undertaking	During the IEA study the purpose of and rationale for the Undertaking and the identification of Alternatives To will be further developed	**IEA Section 6: Alternatives to the Undertaking**
	Alternatives To and Alternative Methods will then be generated and assessed.	**IEA Section 7: Alternative Methods**
	A preferred Alternative Method(s) will then be selected.	**IEA Section 7.6: Confirmation of Preferred Alternative Method**

Terms of Reference Section	Commitment	IEA Report Section
Section 4: Description of the Environment & Potential Effects		
Section 4.1: Preliminary Study Area	The Preliminary Study Area was refined throughout the development of the ToR. Traffic analysis completed during the IEA may encompass a revised study area as alternatives are generated and assessed. The Preliminary Study Area will then be confirmed and refined.	**IEA Section 5.1: Study Area** **Figure 5-1** **Appendix D: Transportation Memos** ▪ **Transportation Analysis Memo #1**
Section 4.2: Preliminary Description of the Environment	Further environmental investigations, including updated and more detailed secondary source reviews and field investigations, will occur during the IEA study to inventory the existing environment as defined by the EAA and as set out in the ToR.	**IEA Section 5: Existing & Future Environmental Conditions**
	The IEA will include a comprehensive network analysis and environmental impact assessment to determine a preferred transportation strategy for Teston Road.	**IEA Sections 4-10** **Appendix D-Q: Various Reports**
Section 4.2.1: Socio-Economic Environment	A future IEA will reference all applicable policies of the plans and describe how the proposed project adheres to the policies and should any alternative be within the Oak Ridges Moraine Conservation Plan (ORMCP) a full analysis of the proposal shall be completed against all applicable policies in the ORMCP.	**IEA Section 5.2: Planning Policy Context**
	As part of the IEA, detailed socio-economic environmental investigations will be undertaken. Appendix A of the ToR provides further detail on socio-economic factors, criteria, rationale, and data sources to be used during the IEA.	**IEA Section 5.4: Socio Economic Environment**
Section 4.2.2: Cultural Environment	As part of the IEA, detailed cultural environmental investigations will be undertaken. Studies may include, but are not limited to: ▪ Additional Stage 1 Archaeological review, ▪ Stage 2 (3 or 4) Archaeological studies as required, ▪ Heritage Impact Assessment etc. Appendix A of the ToR provides further detail on cultural factors, criteria, rationale, and data sources to be used during the IEA.	**IEA Section 5.5: Cultural Environment** **Appendix I: Stage 2 Archaeological Assessment Report** **Appendix J: Cultural Heritage Assessment Report**

Terms of Reference Section	Commitment	IEA Report Section
Section 4.2.3: Natural Environment	As part of the IEA, detailed natural environmental investigations will be undertaken. Appendix A of the ToR provides further detail on environmental factors, criteria, rationale, and data sources to be used during the IEA.	**IEA Section 5.3: Natural Environment** **Appendix E: Natural Environment Report**
Section 4.3: Types of Potential Environmental Effects	The types of potential environmental effects that will be assessed during the preparation of the IEA include, but are not limited to, those that are summarized in **Table 4-1**.	**IEA Section 2.2.2**
Section 4.3.1: Climate Change	Climate change will be considered for all aspects of the Environment: Natural, Cultural and Socio-Economic.	**IEA Section 5.4.7: Climate Change** **Appendix Q: Climate Change Report**
	At a minimum the project/alternatives impact on climate change will consider any greenhouse gas emission from a project or landscape change that affects the removal of carbon dioxide from the atmosphere or the storage of carbon on the landscape that potentially contributes to global climate change.	**IEA Section 10.4.4: Climate Change** **Appendix Q: Climate Change Report**
	Climate change and extreme weather events can have a significant impact on transportation infrastructure. The frequency, severity and/or duration of climate change stressors will be reviewed and assessed in terms of their potential impact on the project/alternatives – examples of these stressors are temperature extremes, precipitation (rain & snow) and wind speed.	**IEA Section 5.4.7: Climate Change** **Appendix Q: Climate Change Report**

Terms of Reference Section	Commitment	IEA Report Section
Section 5: Description of & Rationale for the Alternatives to the Undertaking		
Section 5: Identification of Alternatives to the Undertaking	The Alternatives To considered in the IEA study will include but are not limited to: Future Do Nothing – 'Future Do Nothing' is considered the future status quo, where the transportation system would be limited to maintenance of current transportation infrastructure and the implementation of already approved Provincial, Regional, and local Municipal initiatives other than the potential project that is the subject of the IEA study. The 'Future Do Nothing' alternative is carried forward to provide a comparison to other Alternatives To the Undertaking and Alternative Methods of Carrying Out the Undertaking: ▪ **Travel Demand Management (TDM):** TDM strategies include measures to improve the current transportation system by managing travel demand. TDM strategies aim to reduce overall demand on the network by shifting demand to off-peak periods and promoting alternative transportation options, such as transit, cycling and walking. ▪ **Transportation Systems Management (TSM):** TSM improves transportation system efficiency and optimizes the use of existing and planned infrastructure through a range of strategies, policies, and initiatives. Measures may include systems to prioritize transit, ITS (intelligent transportation system) strategies, carpooling, High Occupancy Vehicle (HOV) lanes, autonomous/driverless & connected vehicles, providing real-time information (i.e., traffic and transit delays via smart phone apps) to users, Reserved Bus Lanes (RBL), ride-sharing services, Park and Ride facilities and intersection improvements. ▪ **Improved and/or New Transit Services:** Expanding the capacity of the transit system increasing service frequency, creating new routes on existing corridors and building bus rapidways on existing corridors.	**IEA Section 6: Alternatives to the Undertaking**

Terms of Reference Section	Commitment	IEA Report Section
	▪ **Improved and/or New Roadways/Transitways:** The provision of improved capacity and operations on existing facilities and/or accommodating required capacity in new corridors may increase the performance of the transportation network. Congestion may be relieved through additional capacity on existing roadways/ transitways or by introducing capacity in new corridors for roads, transitways or both. ▪ **Combinations of the Above:** In addition to the individual Alternatives To, the IEA proposes evaluating alternatives that combine some or all of the options under consideration to add capacity and reduce demand.	
Section 5.2: Evaluation of Alternative(s) to the Undertaking	A detailed rationale for the selection of the preferred Alternative(s) To will be provided in the IEA report.	**IEA Section 6.3: Analysis & Evaluation of the Alternatives** **IEA Section 6.6: Confirmation of the Preferred Alternative to the Undertaking**
	Stakeholders will be provided the opportunity to review and provide comments on the factors and criteria used to identify a preferred Alternative To the Undertaking or preferred combination of Alternatives To the Undertaking.	**IEA Section 3: Consultation** **IEA Section 6.5: Consultation During Alternatives to the Undertaking Process**
	The **Reasoned Argument evaluation approach** is proposed for both Alternatives To and Alternative Methods. During the IEA study, the decision-making process will be clearly documented to support a traceable process and to ensure that it is clear to those who may be affected by the decisions.	**IEA Section 6: Alternatives to the Undertaking** **Figure 6-1: Alternatives to Generation and Evaluation Process**
	The evaluation will be summarized in tables, supplemented by text in the IEA Report to ensure the process is clear, traceable, and replicable.	**IEA Section 6.3: Analysis & Evaluation of the Alternatives** **Table 6-2: Alternatives to the Undertaking Evaluation Criteria**

Terms of Reference Section	Commitment	IEA Report Section
	Stakeholder input received regarding the work plans will be documented in the IEA. Data necessary to support the evaluation of Alternatives To and Alternative Methods will be collected through consultation with ministries, agencies, and other stakeholders, from secondary sources, prediction models and site-specific field investigations	**IEA Section 3: Consultation** **IEA Section 6.5: Consultation During Alternatives to the Undertaking Process**
	Refinements to the Alternatives To will be integrated where warranted and a final set of Alternatives To will be brought forward to the evaluation process.	**IEA Section 6.6: Confirmation of the Preferred Alternative to the Undertaking**
Section 6 - Description of and Rationale for Alternative Methods		
Section 6	Based on the results of the evaluation of Alternatives To, the Preliminary Study Area will be refined to ensure that a range of Alternative Methods are generated. The study area does not limit the potential to examine environmental effects outside of its boundaries.	**IEA Section 7: Alternative Methods**
Section 6.1: Process for Refining the Study Area	The following types of inputs will be considered and used to guide the generation of study area limits: ▪ Identified transportation problems and opportunities. ▪ Significant natural, socio-economic, and cultural environmental features (as identified through secondary source data and consultation). ▪ Current government land use planning policies and initiatives. ▪ Existing transportation infrastructure.	**IEA Section 7: Alternative Methods**
Section 6.2: Generating and Evaluating Alternative Methods	Alternative Methods will be generated specifically for the identified preferred Alternative To.	**IEA Section 7: Alternative Methods**
	The “Future Do Nothing” scenario will be carried forward to represent a base case for comparison to the preferred Alternative Method(s).	**IEA Section 7.3.3: Evaluation**
Section 6.4: Evaluation and Selection of Alternative Methods	The first step identifies the advantages and disadvantages of the various alternatives under consideration. At this stage, each environmental feature is examined to determine the extent of potential effect. Net effects, or the effects on the environment (as required under the OEAA) that remain after standard mitigation measures have been applied, will be identified.	**IEA Section 6: Alternatives to the Undertaking** **IEA Section 7: Alternative Methods**

Terms of Reference Section	Commitment	IEA Report Section
	Building on the information obtained from the impact assessment stage, this stage involves a comparative analysis of the advantages and disadvantages of the Alternative Methods under consideration to select a preferred Alternative Method(s). At this stage, the relative importance of the environmental features and significance of the effects are determined.	**IEA Section 7: Alternative Methods** **IEA Section 10: Environmental Effects, Mitigation Measures & Commitments to Future Work**
Section 6.3: Guiding Principles and Considerations to Generate Alternative Methods	The Alternative Methods will then be reviewed with stakeholders and Indigenous Communities through the consultation and engagement process. Consultation and engagement are critical to developing a representative set of Alternative Methods. Local residents add valuable information to the data gathered by the Project Team.	**IEA Section 3: Consultation** **IEA Section 7.5: Consultation During Alternative Methods Process** **Appendix C.1: Consultation Record**
	Refinements to the Alternative Methods will be integrated where warranted and a final set of Alternative Methods will be brought forward to the evaluation process.	**IEA Section 7: Alternative Methods** **IEA Section 7.6: Confirmation of Preferred Alternative Methods**
Section 6.5: The Undertaking - Concept Design	Technical studies for the various components of the environment will be undertaken to assess potential effects and develop detailed mitigation measures. At a minimum, a Reasoned Argument evaluation method will be employed to facilitate identification of the advantages and disadvantages of concept design alternatives considered during the IEA.	**IEA Section 7.3: Alternative Alignments** **Appendices**
	Consideration will be given to application of context sensitive design principles during this stage.	**IEA Section 9: Project Description/Recommended Plan** **Appendix B: Preferred Design Plan**
	The identification of mitigation measures will be developed in the context of all relevant technical guidelines. Appropriate technical and economically feasible mitigation measures will be developed for specific characteristics and sensitivities of the environmental features and the related significance (e.g. magnitude, duration, certainty) of the potential effect.	**IEA Section 10: Environmental Effects, Mitigation Measures & Commitments to Future Work**

Terms of Reference Section	Commitment	IEA Report Section
	Mitigation measures will be developed in consultation with appropriate agency staff and stakeholders to confirm the environmental analyses, issues, and effects, and subsequently to review the assessment of effects and proposed mitigation measures. Mitigation measures will also include recommendations for a monitoring program.	**IEA Section 10: Environmental Effects, Mitigation Measures & Commitments to Future Work** **IEA Section 11: Future Commitments**
Section 7 – Commitments and Monitoring		
Section 7.2: Environmental Effects and IEA Compliance	During the IEA, York Region will commit to developing a monitoring program that will address environmental effects associated with the construction, operation, and maintenance of the preferred Alternative Method.	**IEA Section 10: Environmental Effects, Mitigation Measures & Commitments to Future Work** **IEA Section 11: Future Commitments**
	The monitoring program will include adaptive environmental management strategies which will allow for the early identification of undesirable environmental effects and the development and implementation of an intervention strategy aimed at addressing such effects before they become problems	**IEA Section 11: Future Commitments**
Section 8 – Consultation Plan for the IEA		
Section 8.2.1: Public Notification	As appropriate, stakeholders will be notified by letter/email of project activities. York Region will publish advertisements for study commencement, each round of Public Open Houses and the formal Environmental Assessment Report submission in the current local newspapers, (e.g. The Vaughan Citizen and The Richmond Hill Liberal), once a week for two separate weeks. Study updates will also be provided on the York Region's website and on York Region's Facebook and Twitter channels, and other such media sites.	**IEA Section 3: Consultation** **Appendix C.1: Consultation Record**

Terms of Reference Section	Commitment	IEA Report Section
Section 8.2.2: Public Open House and Follow-Up Activities	The first and second Open Houses held during the IEA will provide information on the Alternatives To and Alternative Methods, respectively. A third Public Open House will be held to present outcomes of the Evaluation and Selection of the Preferred Alternative Method(s) and the last Open House will present the Preferred Concept Design[1], Impacts and Proposed Mitigation Measures.	**IEA Section 3.2: Open Houses** **Appendix C.1: Consultation Record**
	Summary Reports for Public Open Houses, follow-up activities and other consultation events will be prepared and posted on the project web page.	**IEA Section 3.2: Open Houses** **Appendix C: Consultation Record**
Section 8.2.3: Project Web Page	York Region will maintain a project web page, www.york.ca/TestonRoad, and post all current and pertinent information regarding the project such as: notices of study commencement, notices of public events, project documents for information/review, the project process/schedule, and opportunities for involvement. At key decision points, the web page will also include the ability to provide comments to facilitate feedback from interested parties. Residents and stakeholders will be invited to provide comments and submit questions about the project via the roads.ea@york.ca email address.	**IEA Section 3.3: Project Website and Social Media** **Appendix C.1: Consultation Record**
Section 8.2.4: Regulatory Agency Consultation	Meetings will be held with potentially affected provincial ministries, agencies and federal departments and conservation authorities. Notification letters distributed early in the IEA study will solicit participation in the study. Ministries and agencies will be kept apprised of project activities through scheduled meetings and will be sent notices regarding all consultation activities.	**IEA Section 3.4: Agency & Municipal Consultation** **Appendix C.1: Consultation Record**
	Agencies and other stakeholders will be provided a minimum of 45 calendar days to comment on the draft IEA Report.	**IEA Section 3: Consultation** **Appendix C.1: Consultation Record**

[1] ToR used the term Concept Design. This IEA report refers to it as a Preliminary Design. The terms are interchangeable.

Terms of Reference Section	Commitment	IEA Report Section
Section 8.3 – Engaging Indigenous Communities	York Region will consult with Indigenous Communities both on the need for an undertaking as well as identification and assessment of Alternatives To and Alternatives Methods	**IEA Section 3.6 – Indigenous Peoples Consultation** **Appendix C.2 – Consultation Record**
	Notices (Notice of Commencement, etc.) will be sent to all identified Indigenous Communities via mail throughout assessment and evaluation of Alternative Methods to determine issues and the relative significance of identified features.	**IEA Section 3.6 – Indigenous Peoples Consultation** **Appendix C.2 – Consultation Record**
	Where requested, York Region will offer presentations to the Chief and Elected Council of each affected Indigenous Community (or such other groups, staff or committees as requested by the Chief) prior to each round of Open Houses.	**IEA Section 3.6 – Indigenous Peoples Consultation** **Appendix C.2 – Consultation Record**
	Indigenous Communities will be provided the opportunity to review and comment on the draft IEA Report a minimum of 45 calendar days prior to submission to the Minister for formal review and approval of the undertaking.	**IEA Section 3.6 – Indigenous Peoples Consultation** **Appendix C.2 – Consultation Record**
Section 8.5 – Pre-Submissions Review of the Draft Environmental Assessment Report	The IEA Report will also include an executive summary, technical reports, and maps in accordance with the requirements of Ontario Regulation 334 under the OEAA.	**IEA: Executive Summary** **Appendices** **Figure 1-1**
	A draft IEA Report will be made available to the public and provincial government agencies, municipalities, and Indigenous Communities for review prior to formal submission to the MECP. The documentation will be available at government offices, public libraries and on the project web site for a minimum period of 45 calendar days.	**IEA Section 3: Consultation** **Appendix C.1: Consultation Record**

2.2.2 Types of Potential Environmental Effects

The approved ToR (**Section 4.3** and **Appendix A**) generated an outline of Potential Environmental Effects as guidance for the environment effects assessment process during the IEA process. **Table 2-2**, recreated from the ToR, lists the effects that are to be examined during the IEA. **Section 10** of this report documents how the Recommended Alternative may both positively and negatively affect the environment. **Section 10** also outlines how any potential negative effects are to be mitigated.

The ToR also specifies that climate change will be considered as part of the assessment of alternatives and for the selected preferred alternative (if applicable) during the IEA study. MECP's Guide "Considering Climate Change in the Environmental Assessment Process (October 2017)" should be followed. The IEA should include the consideration of:

- The impacts of the Undertaking on climate change
- The impacts of climate change on the Undertaking
- Various means of identifying and minimizing the negative impacts during a project.

Table 2-2: Types of Potential Environmental Effects from the ToR

Socio-Economic	Cultural	Natural
▪ Temporary or permanent construction related disturbance (i.e., odours, noise, dust, fumes etc.) ▪ Removal/alteration of planned or proposed development ▪ Link existing and proposed development/communities ▪ Displacement of businesses, residences and/or community facilities ▪ Improved access/linkages to businesses, residences and/or community facilities ▪ Temporary or permanent disruption to businesses, residences and/or community facilities ▪ Alteration to roadways (i.e., potential widening) ▪ Disturbance/alteration to existing utilities and engineered landfill controls ▪ Disruption to or limiting the implementation of a continuous major recreational trail network ▪ Enhancing or connecting major recreational trail networks ▪ Temporary or permanent disruption to agricultural operation(s) ▪ Reduction in travel time ▪ Relief to highly congested roads through additional transportation capacity ▪ Improved local and regional air quality ▪ Local and regional air quality impacts ▪ Greenhouse gas emissions ▪ Noise	▪ Alteration/displacement of known and not yet known archaeological sites ▪ Discovery/documentation of not yet known archaeological sites ▪ Disruption or loss of built heritage sites ▪ Potential protection/preservation of cultural heritage/archaeological sites ▪ Disturbance to lands with significant archaeological potential ▪ Disturbance/alteration to Indigenous sites	▪ Temporary and/or long-term degradation/reduction in groundwater quality and/or quantity ▪ Temporary and/or long-term degradation/alteration and/or reduction in surface water quality and/or quantity ▪ Discovery/documentation of natural features ▪ Temporary or permanent loss of/disturbance to aquatic features or loss of functions including flora, fauna, and habitat ▪ Temporary or permanent loss of/disturbance to wildlife and/or terrestrial species and habitat including flora, fauna, wildlife passage and the genetic connectivity of plants ▪ Potential protection and preservation of natural resources opportunities ▪ Short-term construction related effects (i.e., dust, noise, fumes etc.) ▪ Source water impacts ▪ Impacts on nearby landfill sites ▪ Impacts due to increase lighting, traffic, and noise

2.3 Impact Assessment Act, 2019

The purpose of Canada's federal *Impact Assessment Act, 2019* is to provide a process for assessing the environmental, health, social and economic effects of designated projects with a view to preventing certain adverse effects and fostering sustainability. Additionally, the Act serves to:

- Promote cooperation and coordinated action between federal and provincial governments with respect to environmental assessments.
- Ensure that impact assessments of designated projects consider all effects — both positive and adverse — that may be caused by the carrying out of designated projects.
- To promote communication and cooperation with Indigenous peoples of Canada with respect to impact assessments.

Under the Act, an assessment is required for "designated projects", which are determined in one of two ways:

- Projects designated by the "Physical Activities Regulations" or Project List. Projects are designated by type and prescribed thresholds, and range from the construction, operation, decommissioning and abandonment of mines and metal mills to renewable energy and large-scale transportation projects, among others.
- Ministerial discretion. The IAA gives the Minister of Environment and Climate Change discretion to designate projects not included in the Regulations, where the Minister is of the opinion that the physical activity "may cause adverse effects within federal jurisdiction or adverse direct or incidental effects, or public concerns related to those effects warrant the designation."

Under Section 82 of the *Impact Assessment Act (IAA),* 2019:

- "An authority must not carry out a project on federal lands, exercise any power or perform any duty or function conferred on it under any Act of Parliament other than this Act that could permit a project to be carried out, in whole or in part, on federal lands or provide financial assistance to any person for the purpose of enabling that project to be carried out, in whole or in part, on federal lands, unless (a) the authority determines that the carrying out of the project is not likely to cause significant adverse environmental effects; or (b) the authority determines that the carrying out of the project is likely to cause significant adverse environmental effects and the Governor in Council decides, under subsection 90(3), that those effects are justified in the circumstances."

Upon review of the Physical Activities Regulations, this Project does not include physical activities identified therein, and as such, is not a "Designated Project". In addition, this Project does not involve physical activities - that is, construction activities such as grading, excavation, and/or vegetation clearing and removal for example, taking place on federal lands, including a National Park or Protected Area. For the purposes of this Report, it is assumed that the Minister of Environment and Climate Change will not designate the Project. Accordingly, the Teston Road Area Transportation Improvements Project will not require assessment under the IAA.

3. Consultation

Consultation is an essential component of the IEA process and reflects York Region's commitment to engaging potentially affected or interested stakeholders including but not limited to technical agencies, members of the public, property owners, municipalities, and Indigenous Communities.

This section of the IEA report will summarize York Regions adherence to Section 8 of the ToR as it relates to Consultation. Specifically, this section will summarize:

- Notification Of Project Activities
- Public Open Houses
- York Regions Project Website

Interested parties including potentially affected provincial ministries, agencies and federal departments and conservation authorities

Consultation Materials can be found in **Appendix C.1**.

3.1 Notice of Study Commencement

The Notice of Study Commencement was issued to introduce and invite participation in the study and to request any preliminary comments or information. The notice announcing the commencement of the study was published on August 13, 2020, and August 20, 2020, in the King Connection, Richmond Hill/Thornhill Liberal and Vaughan Citizen. The notice was also posted to the project website.

Letters and emails were provided to interested parties including government agencies, interest groups, residents, and members of the public. A stakeholder list was developed during the Terms of Reference phase of the project and carried over into the IEA. The list has been continuously maintained and updated throughout the project as interested parties requested to be informed of the project. Currently the list includes approximately 230 email and letter mail contacts. The emails/letters introduced the project and invited participation in the study.

The notice of study commencement letters can be found in **Appendix C.1**.

3.2 Open Houses

The varied interests of the surrounding community have been considered through the study processes and have assisted in verifying the existing conditions; the development of design alternatives; and the refinement of the preferred design.

Four public open houses were organized at key points in the study process as described in the Sections below. Details related to the notification of each round of open houses are additionally provided below. The information presented at the open houses, the comments received, and survey results can be found in the Open House summary reports in **Appendix C.1**.

3.2.1 Public Open House No. 1

The first Public Open House was held virtually due to the ongoing COVID-19 pandemic. The notification program undertaken included newspaper notices, social media posts, local roadside signage and targeted invitation letters.

Notices of the Open House were published in the Richmond Hill Liberal and the Vaughan Citizen on July 22, 2021, and August 5, 2021. Invitations were sent on July 21, 2021, to a variety of interested parties including Indigenous communities, government agencies, and members of the public. Targeted social media ads were also utilized and posted on both Facebook and Twitter, inviting residents to participate in the online survey and referenced the online presentation.

Several roadside signs were deployed along major roads in the region including the link to the project website and timeframe for responses. This included signage on Teston Road, Keele Street, Dufferin Street, and Major Mackenzie Drive.

This Public Open House was held to provide the public with an opportunity to review and comment on the public consultation process, an introduction to the study background, process, and schedule; problems, opportunities, and constraints; alternatives to the undertaking; the evaluation of alternatives; next steps for the project. All content was made available at the following website: www.york.ca/TestonRoad. All project consultation materials remain available on the project website.

The Open House was conducted in a virtual format with presentation slide decks, narrated videos, and a survey. The survey responses were collected over a 30-day timeframe from July 26, 2021, to August 24, 2021. The initial survey comment period was intended to last 22 days. However, the comment period was extended to 30 days given the number of comments received. In total the survey received 178 responses.

In general comments received were supportive of the progress to date, evaluation process, and recommended alternatives as presented in the Open House. Significant topics of concern are highlighted in **Table 3-1**.

Table 3-1: Summary of Open House No. 1 Comments Received

Major Topics or Comments	Summary of Comments Received
Supportive Comments	▪ The lack of a continuous Teston Road is major cause of surrounding area traffic issues. Your Team recognizes this more than others. Please construct as soon as possible.
Interest in Open House	▪ Multiple comments expressing interest in the open house, some requested more information around how to participate. Many requests to join the project mailing list.
Surrounding Area Transportation Concerns	▪ Recommended the extension of Teston Road from Dufferin Street to Keele Street as soon as possible and extension of Gamble Road. from Bathurst Street to Dufferin Street and to widen Dufferin Street between Major Mackenzie Drive and King Vaughan Road. ▪ Suggested that this project and the Kirby Road extension proceed to address traffic problems on Major Mackenzie Drive. Also recommended an additional ramp from Highway 400 to Teston Road to reduce the volume of traffic on Major Mackenzie Drive. ▪ Supportive of the project but raised concerns on traffic impacts to the surrounding area, in particular the Highway 400 interchange at Teston Road.
Environmental Concerns	▪ Concerned with the impacts to the environment resulting from increased traffic. These include poor air quality and increased noise and vibration. Also recommended a new interchange be constructed at Highway 400 and Kirby Road to alleviate traffic congestion.
Traffic	▪ Expressed an interest in the types of traffic calming methods, noise mitigations requirements (i.e., noise barriers) and the need for additional traffic signals at existing unsignalized intersections within the study area). ▪ Inquired about traffic signal plans and the eventual ROW cross-section on Teston Road. Also asked if the increased in traffic noise would lead to noise barrier fencing along the lots of Quail Run Boulevard.
Noise	▪ Concerns regarding increased noise and what could be done to mitigate any increases. ▪ Concern over increased noise in the Teston Road area.
Cost	▪ Interest in the cost of Alternative 4 and the expected funding from the government.

3.2.2 Public Open House No. 2

The second Public Open House was held virtually due to the ongoing COVID-19 pandemic. The notification program undertaken included newspaper notices, social media posts, local roadside signage and targeted invitation letters.

Notices of the Open House were published in the Richmond Hill Liberal and the Vaughan Citizen on November 25, 2021, and December 2, 2021. Additionally, invitations were sent to a variety of interested parties including Indigenous communities, government agencies, and members of the public. The emails/letters were sent on November 27, 2021, containing information regarding the project website, open house purpose, and online survey response period. Targeted social media ads were also utilized and posted on both Facebook and Twitter, inviting residents to participate in the online survey and referenced the online presentation. The first batch of ads was released on November 29, 2021, the second on December 8, 2021, and the third on December 14, 2021. The final was released on December 19, 2021, to coincide with the final day of survey availability.

Several roadside signs were deployed along major roads in the region including the link to the project website and timeframe for responses from November 30, 2021, to December 20, 2021. This included signage on Teston Road, Keele Street, Dufferin Street, and Major Mackenzie Drive.

This Public Open House was held to provide the public with an opportunity to review and comment on the study background, process, and schedule; alternative corridors; alternative alignments for the Preferred Corridor; the evaluation of alternative alignments; and next steps for the project. All content was made available at the following website: www.york.ca/TestonRoad. All project consultation materials remain available on the project website.

The second Public Open House was conducted in an online format with presentation slide decks, narrated videos, and a survey. The slide decks and videos were split into two parts: a project summary and main presentation. The total survey responses also display public interest and attendance to the virtual event. The survey responses were collected over a 30-day timeframe from November 29, 2021, to December 20, 2021. In total the survey received 105 responses.

In general comments received were supportive of the progress to date, evaluation process, and recommended alternatives as presented in the Open House. Significant topics of concern are highlighted in **Table 3-2**.

Table 3-2: Summary of Open House No. 2 Comments Received

Major Topics or Comments	Summary of Comments Received
Supportive Comments	▪ The lack of a continuous Teston Road is major cause of surrounding area traffic issues. Your Team recognizes this more than others. Please construct as soon as possible.
Interest in Open House	▪ Multiple comments expressing interest in the open house, some requested more information around how to participate. Many requests to join the project mailing list.
Surrounding Area Transportation Concerns	▪ Supportive of the project, but also suggested the extension of Gamble Road to Kirby Road. In addition, they also mentioned banning heavy trucking on Eglin Mills Road from Young Street to Dufferin Street. ▪ Suggestion to connect King-Vaughan Road to Jefferson Side Road and Kirby Road to Gamble Road in addition to the Teston Road connection.
Noise	▪ Concern over increased noise in the Teston Road area and quality of life impacts during construction.
Timing	▪ Inquired about the start of operation.

3.2.3 Public Open House No. 3

The third Public Open House was held virtually due to the ongoing COVID-19 pandemic. The notification program undertaken included newspaper notices, social media posts, local roadside signage and targeted invitation letters.

Notices of the Open House were published in the Richmond Hill Liberal and the Vaughan Citizen on March 17, 2021, and March 24, 2021. Additionally, invitations were sent to a variety of interested parties including Indigenous communities, government agencies, and members of the public. The emails/letters were sent on March 18, 2022, containing information regarding the project website, open house purpose, and online survey response period. Targeted social media ads were also utilized and posted on both Facebook and Twitter, inviting residents to participate in the online survey and referenced the online presentation. The first batch of posts was released on March 21, 2022, the second on March 30, 2022, and the third on April 6, 2022. The final was released on April 10, 2022, to coincide with the final day of survey availability.

Several roadside signs were deployed along major roads in the region including the link to the project website and timeframe for responses from March 21, 2022, to April 11, 2022. This included signage on Teston Road, Keele Street, Dufferin Street, and Major Mackenzie Drive.

This third Public Open House was held to provide the public with an opportunity to review and comment on the recommended alternative to the undertaking; recommended alternative alignment; and next steps for the project. All content was made available at the following website: www.york.ca/TestonRoad. All project consultation materials remain available on the project website.

The Public Open House was conducted in an online format with presentation slide decks, narrated videos, and a survey. The slide decks and videos were split into two parts: a project summary and main presentation. The total survey responses also display public interest and attendance to the virtual event. The survey responses were collected over a 21-day timeframe from Mach 21, 2022 to April 11, 2022. In total the survey received 103 responses.

In general comments received were supportive of the progress to date, evaluation process, and recommended alternatives as presented in the Open House. Significant topics of concern are highlighted in Table 3-3.

Table 3-3: Summary of Open House No. 3 Comments Received

Major Topics or Comments	Summary of Comments Received
Surrounding Area Transportation Comments	▪ Suggested the project would reduce traffic on Major Mackenzie Drive around Highway 400.
Impact Assessment	▪ The Canadian Environmental Impact Assessment Agency confirmed the project would not require a Federal environmental assessment.
Environmental Concerns	▪ Want to look at the background reports to see which alternative is least intrusive to the environment. ▪ Environmental impacts from single-span bridge should be weighted higher in decision making.
Infrastructure	▪ Support for above grade crossing. ▪ Consideration for cycling infrastructure.

3.2.4 Public Open House No. 4

The fourth Public Open House was held virtually due to the ongoing COVID-19 pandemic. The notification program undertaken included social media posts, local roadside signage and targeted invitation letters.

Notices were sent to a variety of interested parties including Indigenous communities, government agencies, and members of the public. The emails/letters were sent between November 29, 2023, and December 2, 2023. The notices contain information regarding the project website, open house purpose, and online survey response period. Targeted social media ads were also utilized and posted on both Facebook and Twitter, inviting residents to participate in the online survey and referenced the online presentation. The first batch of posts was released on December 5, 2023, the second on December 11, 2023, and the third on December 21, 2023.

Several roadside signs were deployed along major roads in the region including the link to the project website and timeframe for responses from November 30, 2023, to December 27, 2023. This included signage on Teston Road, Keele Street, Dufferin Street, and Major Mackenzie Drive.

This third Public Open House was held to provide the public with an opportunity to review and comment on the preferred concept design; impacts and proposed mitigation measures; and next steps for the project. All content was made available at the following website: www.york.ca/TestonRoad. All project consultation materials remain available on the project website.

The Public Open House was conducted in an online format with presentation slide decks, narrated videos, and a survey. The slide decks and videos were split into two parts: a project summary and main presentation. The total survey responses also display public interest and attendance to the virtual event. The survey responses were collected over a 21-day timeframe from December 1, 2023, to December 22, 2023. In total the survey received 83 responses.

In general comments received were supportive of the progress to date, evaluation process, and recommended alternatives as presented in the Open House. Significant topics of concern are highlighted in **Table 3-4**.

Table 3-4: Summary of Open House No. 4 Comments Received

Major Topics or Comments	Summary of Comments Received
Project Timeline	▪ Supportive of the project and expressed desire to finish the project as quickly as possible. ▪ Inquired about the start of the project.
GO Rail Overpass	▪ Expressed interest in the construction of the grade separated GO rail crossing during the project's construction to minimize future disruptions.
Active Transportation Infrastructure	▪ Desire for separated bike lanes and active transit facilities on both sides of Teston Road.
Public Transit	▪ Implementation of a bus stop on Dufferin Street, North of Major Mackenzie Drive. ▪ Suggestion for a YRT route westbound through Elgin Mills to Teston Rd, past Keele St.

3.3 Project Website & Social Media

A proactive and flexible approach to public consultation was adopted to ensure the interests of stakeholders and the community were taken into consideration. Consultation and the exchange of information was undertaken throughout the IEA process using a variety of consultation and engagement methods.

To enhance the community engagement program, the Region created a project specific webpage to facilitate communication of key project milestones. Notification of Public Open Houses were posted on York Region's website (www.york.ca/TestonRoad), with materials posted as described in **Appendix C.1**. The web information conforms to the *Accessibility for Ontarians with Disabilities Act*.

Residents and stakeholders were invited to provide comments and submit questions about the project via the transportation@york.ca email address.

3.4 Agency & Municipal Consultation

Technical agencies were notified of the commencement of this EA through the mailing of the Notice of Study Commencement. One on one meetings were held with key technical agencies, provincial ministries, and the conservation authority. These include the Ministry of Environment, Conservation, and Parks (MECP), Metrolinx, The City of Toronto, The City of Vaughan, The Ministry of Transportation (MTO), The Ministry of Natural Resources and Forestry (MNRF), and the Toronto and Region Conservation Authority (TRCA).

3.4.1 Metrolinx

One of the proposed improvements for the Teston EA is the Barrie GO Rail crossing, discussions are ongoing regarding the at-grade or above-grade improvements to the GO line. Three meetings were held with Metrolinx over the course of the study, a summary of each meeting is provided in **Table 3-5**.

Table 3-5: Summary of Consultation with Metrolinx

Meeting Date	Date	Meeting Summary
Project Update Meeting	May 20, 2021	The study team provided a brief overview of the study process, progress to date, alternatives to the undertaking, schedule, and next steps. Metrolinx provided an overview of the process for review and how to work with them on design requirements. Discussions began regarding the feasibility of grade separation for the Barrie GO line.
Alternative Methods Meeting	October 5, 2021	The study team provided results and feedback gained from OH#1 and an overview of the alternative method generation and evaluation. Metrolinx noted their preference for road-over-rail tracks, and the potential consideration for Metrolinx electrification requirements during detail design. Other requirements discussed that will occur during detail design include a new rail crossing agreement and the requirement of detail design reviews for any work within 30 feet of the corridor.
Alternative Design Meeting	February 14, 2022	The study team provided updates on progress to date, results from the second open house and the alternative designs for the section of roadway near the Barrie GO railway. Metrolinx inquired about the status of the designs, the study team generated profiles, alignments, and grading limits at a high level, but more detail will be added further along.

3.4.2 City of Toronto

The existing Keele Valley Landfill in the study area is property of the City of Toronto, so the City was one of the key stakeholders during the EA study. Their concern with section two of the study area was discussed during the five meetings held with the City over the course of the study, as outlined in **Table 3-6**.

Table 3-6: Summary of Consultation with the City of Toronto

Meeting Date	Date	Meeting Summary
Start-Up meeting	June 17, 2020	The study team provided a brief overview of the projects purpose, potential risks, study process, schedule, and next steps. The discussion of roles and responsibilities of attendees were established.
Project Update Meeting - OH#1	May 27, 2021	The study team provided a brief overview of the study process, progress to date, alternatives to the undertaking, schedule, and next steps. Some of the challenges discussed include impacts to the landfills, inability to move infrastructure, and wells in the study area.
Alternative Methods Meeting	October 7, 2021	The study team provided results and feedback gained from OH#1 and an overview of the alternative method generation and evaluation. The city noted several things regarding the landfill site including substantial additional cost to put a road through the landfill, potential odors in low lying areas from the controlled gas emissions, and potential impacts to the systems associated with the KVL potentially being a showstopper for the project.
Alternative Designs Meeting	February 15, 2022	The study team provided updates on progress to date, results from the second open house, the preferred alternative method, and the four sections of design alternatives. Some things that the City and Golder noted include: ▪ There is a utility crossing from the Vaughan landfill that will traverse under the new road, this will require replacement. ▪ Requested that the design maintain existing landfill accesses. ▪ Road salt may cause issues during landfill leachate testing. ▪ The location of two maintenance holes south of the service road that access a methane gas pip may cause odor to be a concern along active transportation facilities. ▪ Access to the Purge Well system is required every 2 weeks for pick-up trucks and large rigs.
Landfill Discussion Meeting with MECP, City of Toronto, and City of Vaughan	June 27, 2023	The study team provided a brief overview of progress to date, and the recommended design alternatives. Toronto inquired about the retaining wall on the north side of Teston due to concerns with their monitoring systems. The city also emphasized they do not want any disturbances or effects to their infrastructure as it is required to maintain their compliance.
Update Meeting – OH#4	October 27, 2023	The study team provided a brief overview of progress to date, and the recommended plan for the section's concerning the landfill and valley bridge. The location of the city's gas collection wells and manholes were discussed, as well as the potential impacts of gas migration from the landfills.

3.4.3 City of Vaughan

Since the study area is within the City of Vaughan, the City was one of the key stakeholders during the EA study. Ten meetings were held with the City of Vaughan over the course of the study. A summary of each of the meetings is provided in the **Table 3-7**.

Table 3-7: Summary of Consultation with the City of Vaughan

Meeting Date	Date	Meeting Summary
Start Up Meeting	June 16, 2020	The study team provided a brief overview of the projects purpose, potential risks, study process, schedule, and next steps. The discussion of roles and responsibilities of attendees were established.
EMME Model	July 15, 2020	Discussion and distribution of information regarding the most current transportations problems and opportunities for EMME travel demand modeling.
Project Update Meeting	January 22, 2021	The study team provided an update on the project schedule, transportation model, data gathering, and work progressing on the problems and opportunities. City of Vaughan provided updates regarding the development of the North Maple Regional Park and the city's transportation planning.
Project Update Meeting Open House No. 1	June 10, 2021	The study team provided a brief overview of the study process, progress to date, alternatives to the undertaking, schedule, and next steps. Discussions were held regarding the challenges and opportunities of each alternative.
Alternative Methods Meeting	September 28, 2021	The study team provided results and feedback gained from OH#1 and an overview of the alternative method generation and evaluation. The city noted a desire for increased pedestrian/cyclist safety when evaluating alternatives as well as a preference for Alternative 4E from a transportation perspective and based on the Regional Park plans.
Alternative Designs Meeting	February 11, 2022	The study team provided updates on progress to date, results from the second open house, the preferred alternative method, and the four sections of design alternatives. Discussions were held regarding the four sections of the study area. Some of the challenges discussed include the GO rail crossing, active transportation crossings, and topography challenges. The city requested the study team speak with the Block 27 Landowners Group about thee land necessary for the eventual Keele Street realignment.
Update Meeting	May 16, 2022	The study team provided updates on the project since the last meeting. The study team noted that direct engagement with property owners have been planned. Discussions were held regarding the four sections of the project regarding active transportation along Teston, park access, grade separated and at grade active transportation crossings at the park, widening at section four, and separated cycle track and sidewalks along section four.
Update Meeting	November 11, 2022	The study team provided updates on the project since the last meeting. The city noted their preference for early implementation of the Teston Road/GO Rail Grade separation.

Meeting Date	Date	Meeting Summary
Update Meeting	May 15, 2023	The study team provided updates on the project since the last meeting. Some things the city noted include: ▪ Interested in conversations about the level of active transportation demand on the south side of Teston in Section 1 ▪ Suggested active transportation facilities in Section 3 hang below the bridge rather than along vehicular traffic ▪ Expressed interest for stormwater management techniques with more naturalized features ▪ The Industrial businesses in the area have requested some sort of active transit facilities to allow them to catch transit service at Keele
Landfill Discussion Meeting with MECP, City of Toronto, and City of Vaughan	June 27, 2023	The study team provided a brief overview of progress to date, and the recommended design alternatives. The city of Vaughan noted that a master plan for water/wastewater infrastructure is being finalized. The City inquired about the valley structure details, future stormwater management meetings, potential for streetscaping, and the future timeline of the project. The city also noted that there is no proposed infrastructure from the City along Teston.
Update Meeting Open House No. 4	October 30, 2023	The study team provided an overview of the content that would be presented at the fourth and final open house. The active transportation facilities and pedestrian crossings were discussed. The city also inquired about impacts to underground infrastructure.

3.4.4 Ministry of the Environment, Conservation & Parks

The Ministry of the Environment, Conservation, and Parks (MECP) was consulted throughout the study. Several MECP technical groups were consulted to discuss the projects air quality, noise impact, climate change impacts, structural engineering, and the site’s landfills. A summary of each meeting is provided below in **Table 3-8**.

Table 3-8: Summary of Consultation with MECP

Meeting Date	Date	Meeting Summary
Waste Startup Meeting	October 19, 2020	The study team provided a brief overview of the projects purpose, potential risks, study process, schedule, and next steps. Discussion of concerns regarding the landfills on site. MECP provided some information regarding the process and their knowledge of the study area.
All Groups Startup Meeting	November 6, 2020	The study team provided a brief overview of the projects purpose, potential risks, study process, schedule, and next steps. Some of the challenges discussed include groundwater impacts, stormwater runoff impacts, noise examinations, Indigenous community consultation, climate change assessment, and virtual consultations.

Meeting Date	Date	Meeting Summary
Start Up Meeting with SAR Group	January 12, 2021	The study team provided a brief overview of the projects purpose, potential risks, study process, schedule, and next steps. MECP noted that there are few studies in this area, but they will provide comments on proposed methods for future studies.
Alternative Methods Meeting	October 5, 2021	The study team provided results and feedback gained from OH#1 and an overview of the alternative method generation and evaluation. Some topics of discussion included the topography of the landfill, engagement with Indigenous communities, and the inclusion of the regional park in the design.
Project Update Meeting	February 4, 2022	The study team provided updates on progress to date, results from both open houses, and next steps. MECP suggested the study team review the potential to carry another alternative to ensure all problems and opportunities are addressed.
Alternative Designs Meeting	February 22, 2022	The study team provided updates on progress to date, results from the second open house, the preferred alternative method, and the four sections of design alternatives. Each discipline provided comments on the project, some things noted include: ▪ **Air Group:** Visibility concerns when the gas flare facility is operating and producing flame plumes close to the roadway. ▪ **York District:** Contingency plans should be created for encountering impacted soils due to the age of the Vaughan landfill.
Recommended Designs Meeting	May 24, 2023	The study team provided updates on the project schedule, the recommended alternative design, and the preliminary impact assessment and proposed mitigation measures for each section of the project. MECP expressed interest in future meetings with members of their technical group.
Technical Specialists Meeting	June 19, 2023	The study team provided updates on the project schedule, the recommended alternative design, and the preliminary impact assessment and proposed mitigation measures for each section of the project. Each discipline provided their inputs on the project, some things noted include: ▪ **Noise:** Ensure assessment of construction noise impacts is covered. ▪ **Climate Change:** Approval of a standalone appendix speaking to climate change elements, anything that can be done to minimize emissions is beneficial. ▪ **Air Quality:** Air quality impact assessment should emphasize the mitigation measures required during construction, especially where contaminated soils are concerned. A contingency plan is recommended. ▪ **Engineering:** Highlighted heavy industrial land use along Rodina and the historical use of potentially contaminated fill should be taken into consideration.

Meeting Date	Date	Meeting Summary
Landfill Discussion Meeting with MECP, City of Toronto, and City of Vaughan	June 27, 2023	The study team provided a brief overview of progress to date, and the recommended design alternatives. MECP inquired about the depth of excavations in the landfill, other infrastructure through this corridor, and the potential long-term care requirements of the landfills to mitigate undue risks to road users.

3.4.5 Ministry of Natural Resources & Forestry

The Ministry of Natural Resources and Forestry (MNRF), previously the Ministry of Northern Development, Mines, Natural Resources and Forestry (NDMNRF) has an interest in section three of the study, which requires construction through the valley lands. The valley likely contains Species at Risk bat habitat and will require offsetting plans and restoration and planting plans within an adjacent to the wetlands. A summary of each meeting is provided below in **Table 3-9**.

Table 3-9: Summary of Consultation with the MNRF

Meeting Date	Date	Meeting Summary
Meeting	November 23, 2021	The study team provided a brief overview of progress to date, project background, results from OH#1, alternatives to the undertaking and project schedule. NDMNRF expressed interested in the project due to the presence of coldwater habitat and significant wildlife habitat. NDMNRF provided background reports on the areas of natural scientific interest in the valley and the wetland delineation documentation.
Update Meeting	June 8, 2023	The study team provided updates on the project schedule, the recommended alternative design, and the preliminary impact assessment and proposed mitigation measures for each section of the project. Discussions were held regarding section three of the project area including the length of the bridge, type of bridge, additional wildlife passages, stormwater management and road salt. MNRF also made suggestions to acquire additional land east of the valley to revegetate the area. It was also noted that MNRF would prefer if the online pond in the area is removed.

3.4.6 MTO

One meeting was held with the Ministry of Transportation (MTO) on October 25, 2021. No further meetings were held with MTO as the project does not impact any current or future conditions. A summary of each meeting is provided below in **Table 3-10**.

Table 3-10: Summary of Consultation with MTO

Meeting Date	Date	Meeting Summary
Meeting with MTO	October 25, 2021	The study team provided a brief overview of progress to date, project background, results from OH#1, alternatives to the undertaking and project schedule. Some developments that MTO noted include the approved block 34 East, federal assessment for the GTA West project, and the potential for an interchange at Kirby Road and an interchange at the King-Vaughan Townline. MTO also noted options to modify the existing button hooks ramps are limited.

3.4.7 TRCA

The Toronto and Region Conservation Authority (TRCA) is interested in the protection of the Don River tributary which runs through the valley lands. Section three of the Teston Road study area is comprised of Valley lands, which are under the interest of the TRCA. Five meetings were held with TRCA staff over the course of the study. A summary of each meeting is provided below in **Table 3-11**.

Table 3-11: Summary of Consultation with TRCA

Meeting Date	Date	Meeting Summary
Start up meeting	June 30, 2020	Provided a brief overview of the projects purpose, potential risks, study process, schedule and next steps. The discussion of roles and responsibilities of attendees were established.
Project Update Meeting	June 2, 2021	The study team provided a brief overview of the study process, progress to date, alternatives to the undertaking, schedule, and next steps. Some topics of discussion included TRCA submissions, environmental preliminary field work, source water conditions and impacts, and a review plan detailing what and when TRCA might be consulted on.
Alternative Methods Meeting	October 4, 2021	The study team provided results and feedback gained from OH#1 and an overview of the alternative method generation and evaluation. TRCA provided available geotechnical resources, floodplain information, and information on roadway ecology.
Alternative Designs Meeting	February 18, 2022	The study team provided updates on progress to date, results from the second open house, the preferred alternative method, and the four sections of design alternatives. Some things that TRCA noted include: • Leachate plumes in the landfill study area, any additions of infrastructure to the area could disrupt groundwater flow and the plumes • Expressed desire to minimize fill into the river

Meeting Date	Date	Meeting Summary
		• Removal of the upstream dam will cause the river shape to shift, a larger space between piers could facilitate movement and reduce bridge maintenance • A creek crossing in section four
Recommended Designs Meeting	May 24, 2023	The study team provided updates on the project schedule, the recommended alternative design, and the preliminary impact assessment and proposed mitigation measures for each section of the project. TRCA made suggestions regarding section three of the project including potential opportunity for low impact development features, separate wildlife crossings, and edge management. TRCA also noted that the culvert west of Saul Ct in section four has high groundwater pressure and is highly sensitive.
Project Update Meeting	October 11, 2023	The study team provided updates on progress to date and next steps. TRCA expressed concerns regarding the 40m span valley bridge, including potential flood impacts, additional wildlife crossings, and outfalls.

3.5 Interested Stakeholders

3.5.1 1600 Teston Road

Four meetings were held with the 1600 Teston Road Property owners. The 1600 Teston Road development is a plan of subdivision located in section three of the project study area. These meetings were held to provide project updates to the developers as well as create open discussions between the property owners and the study team. Main topics of discussion included grading between the development and the road, stormwater management, access, and pond removal. A summary of the meetings held with the 1600 Teston Road Developer can be found in **Table 3-12**.

Table 3-12: Summary of Consultation with 1600 Teston Road Developer

Meeting Date	Date	Meeting Summary
Start Up Meeting	June 6, 2022	The study team provided a brief overview of the projects purpose, progress to date, preferred alternative, and next steps. The planned property grading was discussed along with the planned stormwater management pipes for the development. The developer shared during the meeting the plan draft general plan, highlighting stormwater management.
Project Update Meeting	December 8, 2022	The 1600 Teston Road developer received draft plan approval from the city and discussed the assumptions made by the developer which were higher than the study team's proposed profile elevation. Compromises were discussed regarding the different elevation. Stormwater management flows were also discussed. MH provided the developers with the most up to date design files to allow them to review and advise on options for their elevation, grading, and stormwater management.

Meeting Date	Date	Meeting Summary
Project Update Meeting	December 20, 2022	A brief review of the previous meeting's discussions was undertaken. The developer noted their challenge with meeting the elevation of the future Teston Road due to uncontrolled flows. Survey elevations from the 1600 Teston Road developers were shared with the project team due to discrepancies with MH's surveys. The size of the retaining walls were discussed along with the stormwater management facility.
Project Update Meeting	May 26, 2023	The study team provided an overview of progress to date. The 1600 Teston road developers noted that they have revised their grading plan to match the proposed elevation and are about to file their second submission of the draft plan. The artificial pond on the developer's property were discussed, with an intent to remove the artificial pond.

3.5.2 Block 27 Landowners

Three meetings were held with the Block 27 Landowners on June 14 and October 6, 2022, and on June 9, 2023. The Block 27 development is a new residential community located in the northeast quadrant of the Keele Street and Teston Road intersection in Section 1 of the project study area. These meetings were held to provide the developers with project updates and create discussions between the property owners and the study team. Main topics of discussion included the GO Rail at grade and above grade separation, potential land takings, and stormwater management. A summary of the meetings held with the Block 27 Landowners can be found in **Table 3-13**.

Table 3-13: Summary of Consultation with the Block 27 Landowners

Meeting Date	Date	Meeting Summary
Start Up Meeting	June 14, 2022	The study team provided a brief overview of the projects purpose, progress to date and next steps. The raised vs at grade GO rail crossing and the potential land required were discussed. Block 27 noted the development plan includes a north-south collector road west of Keele.
Project Update Meeting	October 6, 2022	The study team provided an overview of the revised design drawings for the Keele Street and Teston Road alignments, which would have implications for the grading and elevation of the development. The raised profile of the street was discussed, with the project team noting that Metrolinx is being consulted. Drainage infrastructure impacts due to the grading were also discussed.
Project Update Meeting	June 9, 2023	The study team presented the changes to the design including the separate cycle track and sidewalk, and the alignment revision at the Teston Road and Keele Street intersection. The development group noted that a street was shifted to avoid conflicts with future work.

3.5.3 York Major Holdings

A meeting was held with York Major Holdings, who own the Richview Manor at 10500 Dufferin Street and the Disposal Services Landfill located north of Teston Road, east of Keele Street. The meeting was held to present the property impacts to York Major Holding's properties. A summary of the meeting held with the York Major Holdings can be found in Table 3-14.

Table 3-14: Summary of Consultation with York Major Holdings

Meeting Date	Date	Meeting Summary
Property Impact Meeting	May 23, 2024	The study team presented the property impact plan for the Richview Manor and discussed impacts to parking. York Major Holdings shared information regarding the Disposal Services Landfill and discussions were held regarding the monitoring wells on site.

3.5.4 Property Owners

Property owners within 1km of Teston Road were informed via letter at each project milestone. The distribution includes approximately 1,000 addresses.

Additionally, in early 2024, all impacted property owners were notified by letter of the potential impacts to their property and the extents of those impacts. Meetings were held with property owners at their request to discuss matters specific to their property.

3.6 Indigenous Peoples Consultation

Indigenous Communities, as identified during the ToR were advised of the project status at all significant milestones (i.e., Commencement, Open Houses, and Submission) via letters sent from the Region, as outlined in **Table 3-15**. Additionally, the MECP and the Ministry of Indigenous Affairs were contacted to ensure appropriate community outreach. Meetings with Indigenous Communities were held at the request of those communities wishing to meet with the Region to discuss the study. To-date no requests have been received.

Indigenous Communities were invited to participate in the field work for a Stage 2 Archaeological Assessment in 2022/2023**.** Both Huron-Wendat and Mississaugas of the Credit participated in the field work for the Stage 2 archaeological assessments. To-date, Indigenous Communities have not expressed concern with the project.

The list of Indigenous Communities contacted at each milestone of the EA study is provided below:

- 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 Council
- Mississaugas of the Credit
- Mississaugas of Scugog Island First Nation
- MNO Credit River Métis Council
- MNO Toronto & York Region Métis Council
- Métis Nation of Ontario Williams Treaty First Nation

Table 3-15 summarizes the communication with Indigenous Communities held during the EA study.

Table 3-15: Summary of Consultation with Indigenous Communities

Milestone	Date	Indigenous Community	Purpose
Notice of Study Commencement	August 2020	All	To introduce the study, gauge whether or not the Indigenous community has any interest in the study and request any preliminary comments.
	August 24, 2020	Huron -Wendat First Nation	Confirmation of reception and formal request to be engaged in any archaeological assessment.
Open House No. 1	August 16, 2021	All	To notify the community about progress to date and future milestones. Open House #1 presentation materials were attached.
	August 17, 2021	Huron-Wendat First Nation	Noted the Chief has changed and asked if this project is related to the Teston Road EA from 250m west of Pine Valley Drive. Requested participation in all archaeological work and access to draft reports.
Open House No. 2 & No. 3	May 19, 2022 – June 1, 2022	All	To update communities on the archaeological assessment and the preferred alternative to the undertaking and inform them of the available information on the project website.
	May 19, 2022	Mississaugas of the Credit First Nation	Noted that the main contact has moved on from their role and provided new contacts.
	May 24, 2022	Mississaugas of the Credit First Nation	Asked to be kept updated on the archaeological studies and requested to participate.
Stage 2 Test Pit Survey	December 13-14, 2022	Huron-Wendat First Nation, Mississaugas of the Credit First Nation, Curve Lake First Nation	On-Site Indigenous Field Liaison's from Huron-Wendat and the Mississaugas of the Credit First Nation were on site. Curve Lake First Nation was provided ongoing updates on the survey via email. No concerns expressed during pit survey.
	April 13, 2023	Curve Lake First Nation	No On-Site Indigenous Field Liaison on this day. Curve Lake First Nation was provided ongoing updates on the survey via email.
	May 23, 2023	Mississaugas of the Credit First Nation, Curve Lake First Nation	On-Site Indigenous Field Liaison from Mississaugas of the Credit First Nation was on site. Curve Lake First Nation was provided ongoing updates on the survey via email. No concerns expressed during test pit survey.
	May 24-26, 2023	Curve Lake First Nation.	No On-Site Indigenous Field Liaison on this day. Curve Lake First Nation was provided ongoing updates on the survey via email.

Milestone	Date	Indigenous Community	Purpose
Open House No. 4	November 29, 2023	All	To update communities on the stage 2 archaeological assessment and the preferred design alternative for the corridor and to inform them of the available information on the project website.
	December 1, 2023	Hiawatha First Nation	Responded that they have no questions or concerns.
Distribution of Stage 2 Report	December 1, 2023	All	York Region circulated a copy of the Stage 2 report to all interested parties and provided an update on the status of the overall project. No concerns/comments were received on the Stage 2 report.

4. Project Problems and Opportunities

Defining problems and opportunities (or need and justification) is a key step that sets the stage for the range and types of alternatives to be considered and provides a baseline for the transportation evaluation criteria (or factors) to be used to select among alternatives. To identify the problems and opportunities, this section provides a summary of Need and Justification included in the IEA Terms of Reference and discusses specific planning goals for the study area from the TMP as well as the travel demand analysis that was undertaken for the study area and provides the Problem and Opportunity Statement for the project.

4.1 Terms of Reference Summary (2018)

The 2018 Terms of Reference (ToR) outlines a framework for the preparation of the Individual Environmental Assessment (IEA) for the Teston Road Area Transportation Improvements including defining the purpose of the Undertaking and the IEA Study.

York Region was ranked as the fastest growing large municipality from 2006-2011 in Canada (2011 Canada Census). Growth is projected to continue with an estimated population of 1.79 million in 2041 and 900,000 jobs. With a growing resident and employee population, and consideration of the existing east-west discontinuity at Teston Road, the traffic load on east-west arterials may be exacerbated in the future. This applies for roadways, transit, and active transportation. In fact, the York Region TMP has already identified needs for improvements and widening along the majority of the regional roads in the study area.

Analyses to understand travel demand have been undertaken for existing (2016) and future (2041) demand and are supported by York Region's Travel Demand Forecasting model (YRTDF model, EMME based) to evaluate future traffic conditions and growth in transit ridership. The future travel demand analysis includes consideration of all planned and proposed network improvements within and adjacent to the traffic conditions study area. This area is larger than the IEA study area to ensure consideration of all nearby major transportation infrastructure and linkages.

Teston Road serves as a critical east-west arterial within the regional road network. Without improvements to Teston Road, including addressing the missing link between Keele Street and Dufferin Street, the preliminary analysis shows that east-west corridors are expected to operate under 'very congested' conditions in 2041 even with other planned improvements on nearby key arterials. Improvements at Teston Road would address congestion leading towards Highway 400, enable continuous east-west flows, and relieve burdens on surrounding north-south and east-west segments due to high traffic volumes.

The purpose of the undertaking is therefore to improve the efficiency and continuity of the transportation network while also ensuring safety. The IEA Study includes a detailed traffic analysis model and considered available planning policies and other transportation and demographic data to inform the rationale for the undertaking.

4.2 York Region Transportation Master Plan (2022)

The York Region Transportation Master Plan (TMP 2022) builds upon the direction given in the Official Plan but focusses on the transportation network and the various modes of transportation provided or planned throughout York Region. The TMP sets six objectives for planning and implementing the transportation network. The objectives focus on transit, active transportation, the road network, and employment areas. **Table 4-1** identifies the initiatives within three of those objectives that apply to the Teston Road Area Transportation Improvements Project.

Table 4-1: TMP Objectives & Applicable Major Initiatives (TMP 2022)

Objective	Major Initiatives
Objective 1: Make the best use of infrastructure and services	▪ Improve transit frequency and coverage ▪ Improve connectivity to 400-series highways
Objective 2: Encourage all types of travel	▪ Accelerate active transportation infrastructure that connects communities to transit spines, major destinations, and Regional Centres ▪ Support the last mile ▪ Complete gaps in sidewalks ▪ Provide safe and convenient walking/cycling opportunities to mobility hubs
Objective 3: Provide a resilient and adaptable transportation network	▪ Build missing links and new roads ▪ Utilize technology to improve efficiency of the road network ▪ Expand high occupancy vehicle/transit network ▪ Develop the finer grid road network ▪ Build context sensitive multi-modal corridors ▪ Incorporate flexibility in corridors ▪ Maximize the person carrying capacity through corridor evolution

Section E3.3 of the TMP addresses the need to complete several missing links within the regional road network, including Teston Road between Keele Street and Dufferin Street. The TMP ensures that any future crossing of natural heritage systems in the Teston Road area, would be subject to an environmental assessment that demonstrates the need and justification for the project through an analysis of alternative solutions and consideration of potential environmental effects. The completion of missing links is also supported by active transportation policies throughout the TMP as these would provide additional connections for active transportation users.

The TMP also identifies existing and future road network conditions, transit network, and pedestrian and cyclist facilities. These conditions play a crucial role in identifying the problems and opportunities, generating reasonable alternatives, and evaluating those alternatives in this study.

4.3 Transportation Assessment

4.3.1 Travel Demand Analysis

To identify problems and opportunities within the study area, the existing traffic characteristics were determined. Understanding existing and future travel demands are critical in assessing transportation infrastructure needs for auto travel and transit modes. The need for additional east-west capacity must be assessed based on existing baseline capacity and consideration of alternative east-west corridors within the study area. Link, select link, and screenline analyses have been undertaken to determine existing and future travel demands.

4.3.2 Model Review

York Region provided Travel Demand Forecasting Subarea Model for years 2016, 2031 and 2041 (with and without implementation of the GTA West project) during the AM peak hour of a typical day. The GTA West corridor is a proposed new four-to-six lane 400-series highway and transit corridor across York, Peel and Halton regions. The IEA study area is situated within the City of Vaughan. Determined during the ToR stage, the study area is bounded by Kirby Road to the north, Bathurst Street to the east, Major Mackenzie Drive West to the south, and Highway 400 to the west. The limits of the subarea models for the purposes of the traffic analysis were extended to include Yonge Street, Pine Valley Drive, King Vaughan Road, and Rutherford Road to capture transportation connectivity within and in proximity to the IEA study area (refer to Table 4-1).

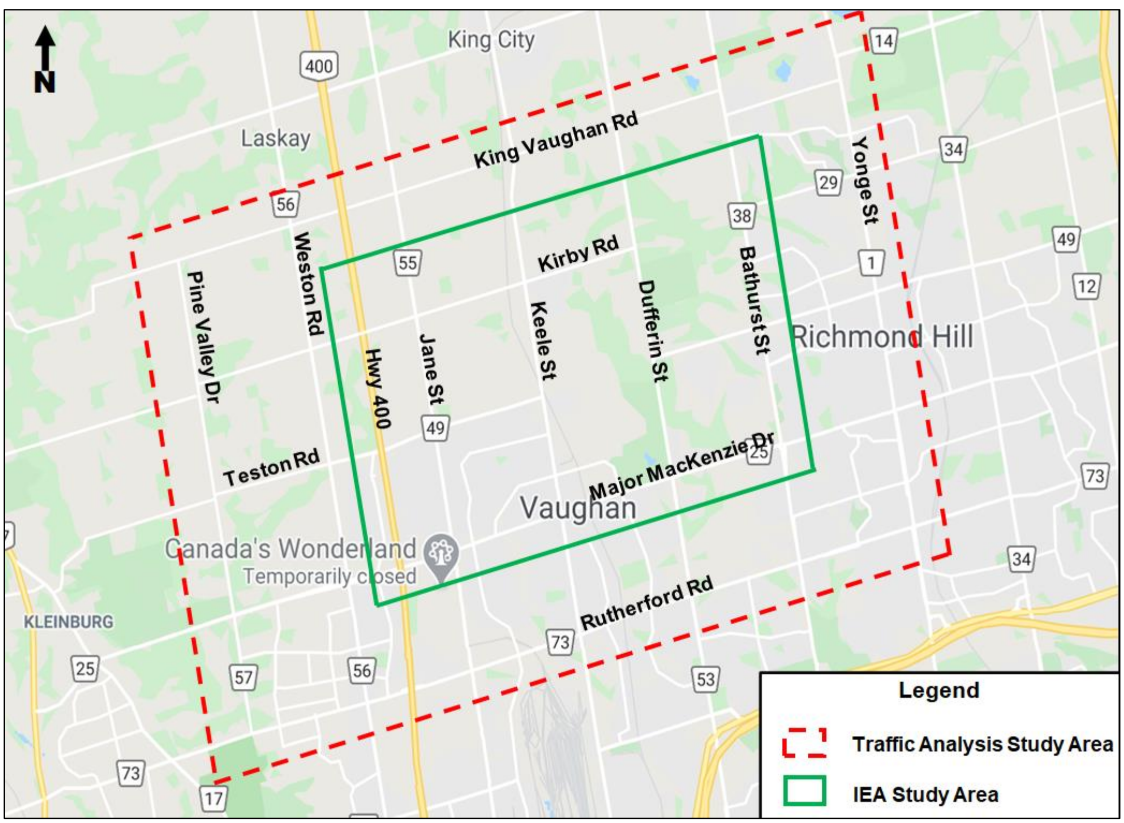

Figure 4-1: Traffic Analysis Study Area vs IEA Study Area

4.3.3 2016 Link Analysis

The existing roadways in the study area range from multi-lane arterial roadways (e.g., Major Mackenzie Drive) to single lane facilities (e.g., Kirby Road). Each roadway type has a finite capacity – the number of vehicles that can be carried in a lane in a given hour.

The existing travel demand is based upon York Region Travel Demand Forecasting Model Update Report (2014) with adjustments based on road classifications, posted speed limit, number of signalized intersections and geometric aspects (refer to Table 36 in the Transportation Technical Report).

The 2016 traffic volumes reported from the model during the morning peak hour are applied to the capacity of the roadway to determine the quality of performance. Roadway performance is typically expressed in terms of the Volume to Capacity (V/C) ratio, whereby a V/C ratio that exceeds 0.90 is typically considered "congested condition" and improvements are generally warranted. The link analysis in **Figure 4-2** provides information as to the origin and destination of traffic flows across a series of road links and illustrates the 2016 V/C ratios for each key roadway. It shows that numerous sections exhibit over-capacity conditions.

The link analysis indicates that under 2016 AM conditions Kirby Road, Teston Road and Major Mackenzie Drive are operating at free flow conditions in the eastbound direction, while unstable and congested conditions exist in the westbound direction due to the predominant westbound traffic during the morning peak hour.

All north-south arterial roads are operating at free flow conditions in the northbound direction, while the majority of southbound movements experience very congested conditions particularly south of Teston Road due to the predominant southbound traffic during the morning peak hour. A similar reversed traffic pattern is expected during the afternoon peak hour, with predominantly eastbound and northbound directions of traffic flow.

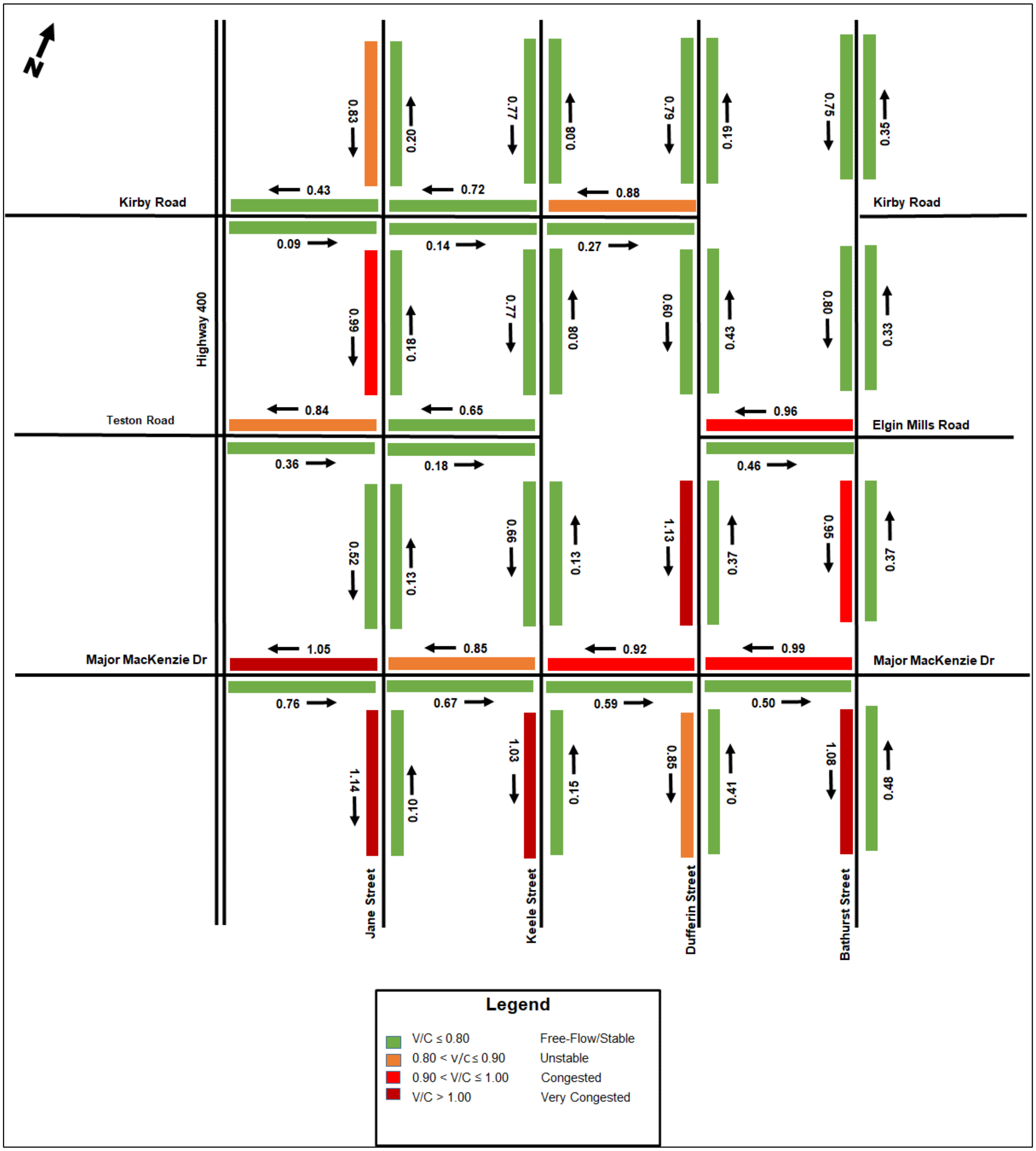

Figure 4-2: Link Analysis - AM Peak Hours

4.3.4 2016 Sceenline Analysis

Travel demands were also assessed at strategic screenlines across the traffic analysis study area. A screenline is an imaginary boundary which extends across a series of roadways and is typically located where travel constraints exist such as rivers, rail corridors, and greenspaces. The 2016 peak direction (westbound and southbound) travel demands at five screenlines were compared with the available capacity to determine roadway performance. **Figure 4-3** illustrates the location of these five screenlines.

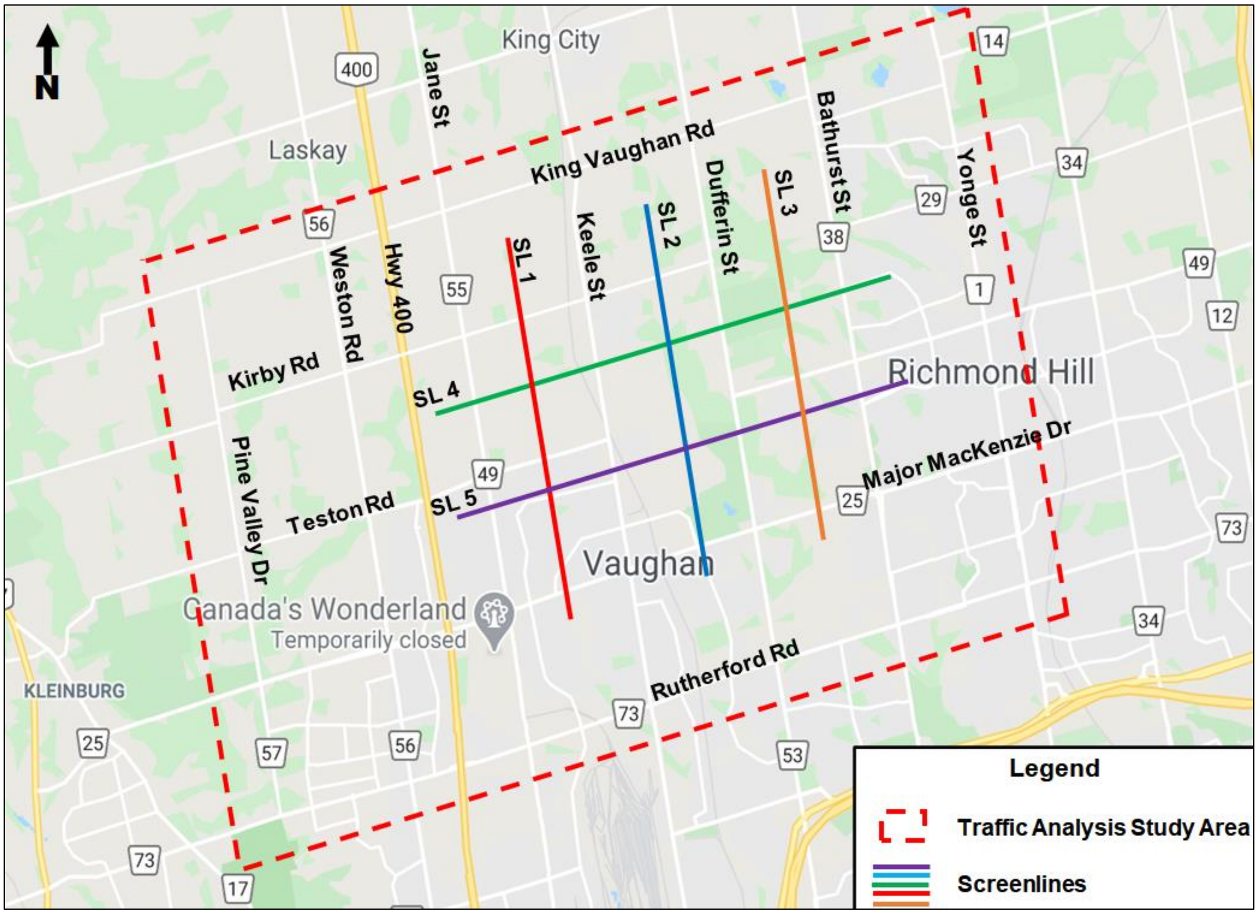

Figure 4-3: Study Area Screenlines

4.3.4.1 2016 Roadway Screenline Analysis

The roadway screenline analysis assesses the travel demands for each key roadway at the five screenlines in the study area. This is captured as the 2016 AM peak hour/peak direction volumes and the V/C ratio. **Table 4-2** indicates that the overall V/C for Screenlines SL2 and SL3 exhibit values of 0.91 (congested) and 0.98 (congested), respectively, suggesting that the demand exceeds the available capacity.

4.3.5 20231 Subarea Model

The analysis of future conditions applies the Region's 2031 model which includes all planned/proposed network improvements identified in the York Region's 2020 10-year Capital Program:

- Road widening from two to four lanes at Dufferin Street (Major Mackenzie Drive-Teston Road), Teston Road (Pine Valley Drive-Weston Road and Bathurst Street-Yonge Street).
- Road widening from four to six lanes at Bathurst Street (Highway 7-Major Mackenzie Drive), Major Mackenzie Drive (Highway 50-Jane Street).
- Widening of Highway 400 (Major Mackenzie Drive-King Road) from six to eight lanes.

The GTA West freeway, Kirby Road and Teston Road extensions are not part of the roadway network in this horizon year.

Figure 4-4 illustrates the 2031 V/C ratios for each key roadway. The figure indicates that virtually all westbound and southbound movements along arterial roads are functioning with a V/C ratio that exceeds 0.90 (congested) suggesting that the demand well exceeds the proposed capacity.

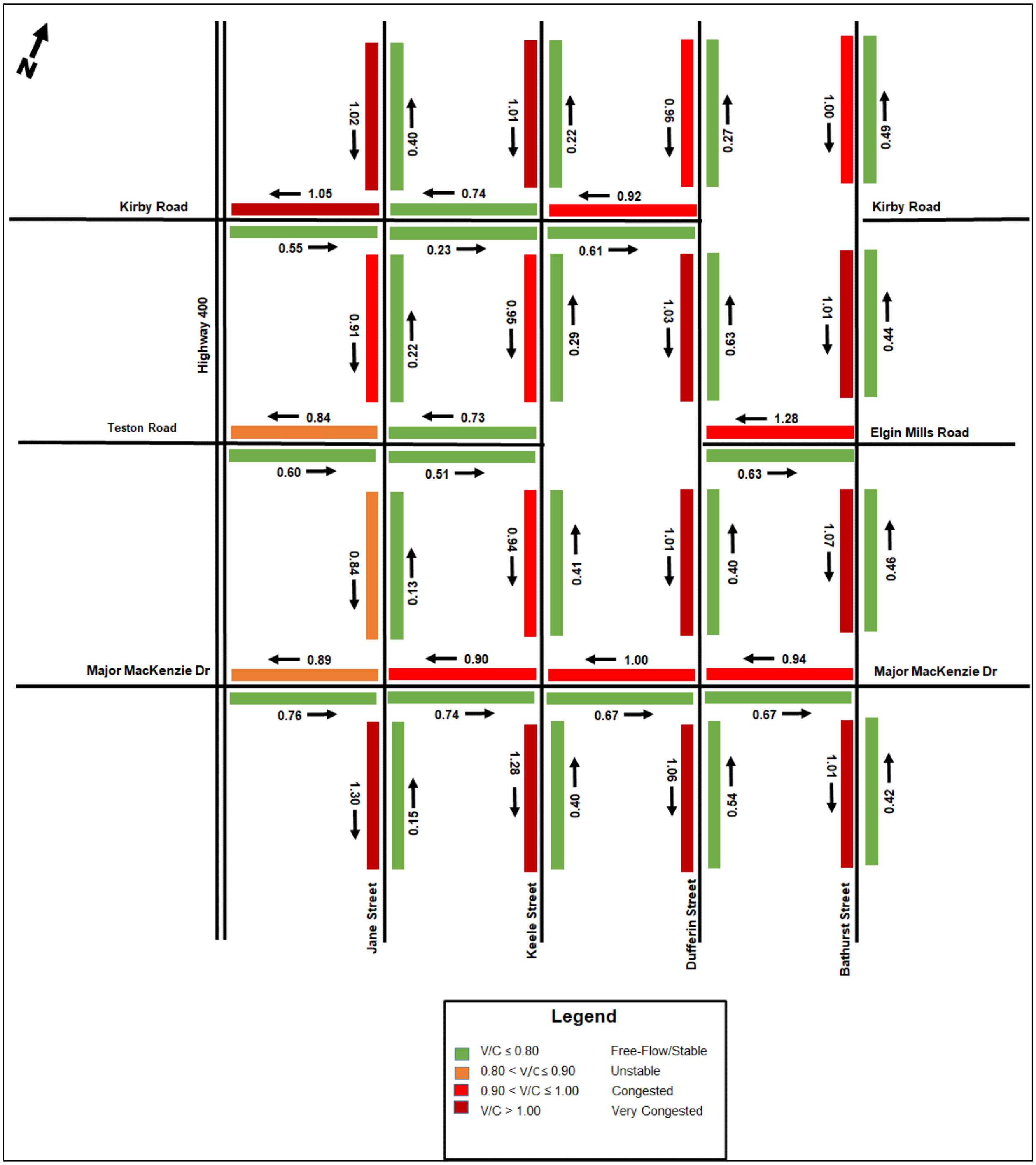

Figure 4-4: 2031 Link Analysis - AM Peak Hour

4.3.5.1 2031 Roadway Screenline Analysis

The V/C ratio for each key roadway at the five screenlines in the study area for the year 2031 is summarized in **Table 4-2** and shows that virtually all major arterial roads crossing Screenlines SL2, SL3, SL4 and SL5 are functioning with a V/C ratio that exceeds 0.90 (i.e., volume exceeds capacity).

4.3.5.2 2031 Transit Screenline Analysis

The corresponding 2031 projected A.M. peak hour transit demand as transit mode share at each screenline developed in the model is summarized in **Table 4-3**. Compared against the transit mode share in 2016, by 2031, transit trips are expected to increase significantly along Major Mackenzie Drive, Bathurst Street, Jane Street, and Keele Street.

4.3.5.3 2031 EMME Network with 2041 Demand

A link analysis was conducted for the year 2041 using York Region's 2041 projected travel demand (Origin-Destination Matrix) and 2031 planned/proposed network improvements identified in the York Region's 2020 10-year Capital Program, as described previously.

As shown in **Figure 4-5**, it can be observed that virtually all the V/C ratios in the westbound and southbound directions would exceed the threshold limit of 1.00 by 2041. The analysis results suggest that network improvements would be required to accommodate future travel needs for the 2041 horizon year.

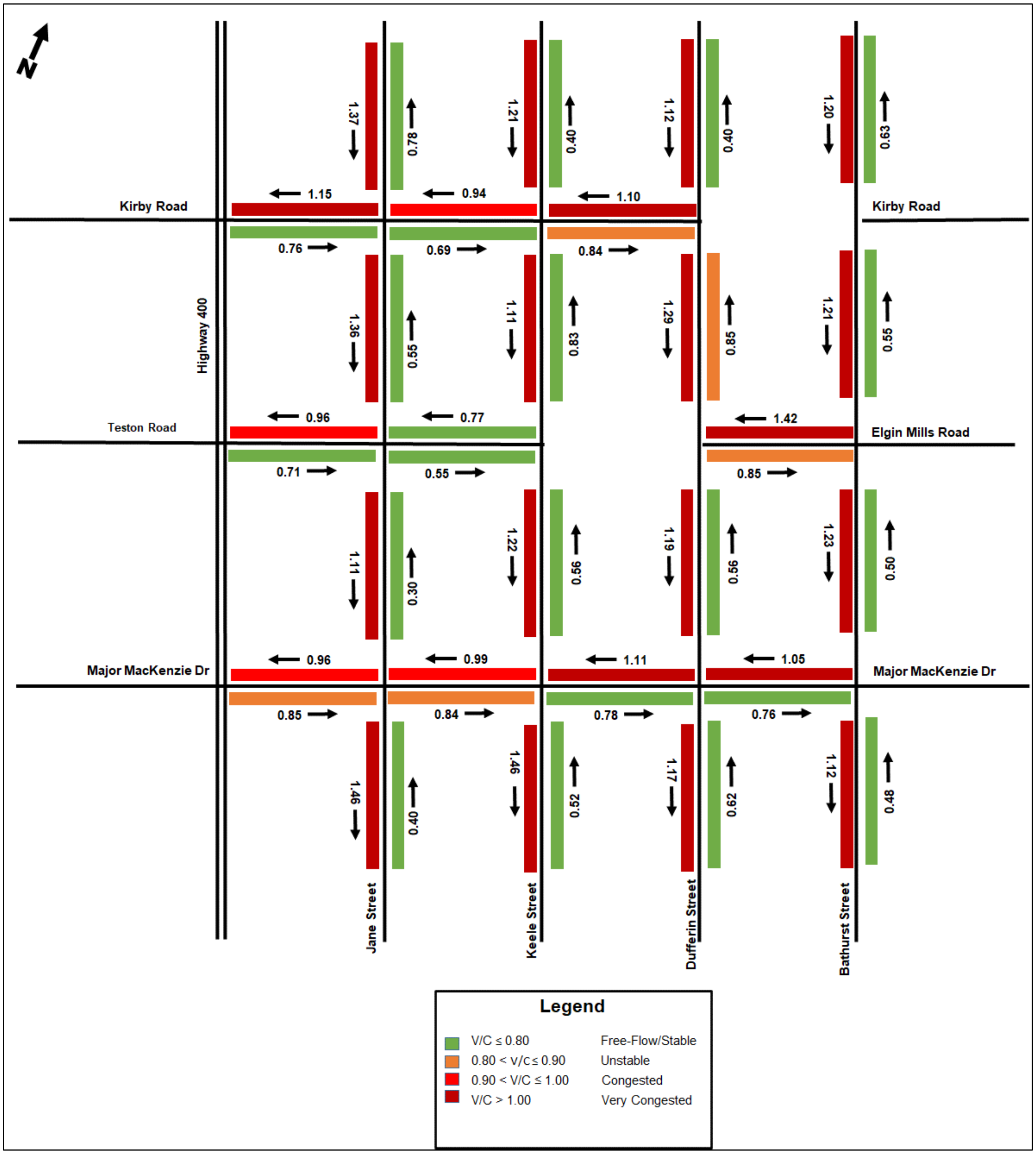

Figure 4-5: 2041 Link Analysis with 2031 Road Improvements - AM Peak Hour

The Screenline analysis indicates that all major arterial roads crossing Screenlines SL2, SL3, SL4 and SL5 are functioning with a V/C ratio that exceeds 1.00 (i.e., volume exceeds capacity). These analysis results suggest that the 2031 network cannot accommodate future travel needs for the 2041 horizon year and network improvements would be required. V/C ratios for each screenline and underlying section are detailed in **Table 4-2**.

4.3.6 2041 Subarea Model

The planning horizon identified in the ToR is to 2041, so in addition to the planned/proposed network improvements up to 2031 described previously, the Region's 2041 EMME model includes all additional planned/proposed network improvements identified in the York Region's 2016 TMP for the year 2041 (i.e., base case) condition:

- Road widening from two to four lanes at Jane Street, Dufferin Street, Kirby Road, and Teston Road.
- Road widening from four to six lanes at Bathurst Street.
- Road extensions at Kirby Road between Dufferin Street and Bathurst Street and Teston Road between Keele Street and Dufferin Street (Teston Road extension will be excluded from the 2041 network while evaluating various future alternatives).
- Highway 400 improvements with a new Kirby Road/Highway 400 interchange, and a new mid-block connection across Highway 400 (Canada Drive-America Avenue Bridge).

4.3.6.1 2041 Network With & Without GTA West (Highway 413)

In August 2020, MTO confirmed the preferred route for the GTA West (Highway 413) Multimodal Transportation Corridor. To address some uncertainty regarding the GTA West project, analysis was undertaken as part of the Teson Road Area Improvements IEA for the horizon year 2041 with and without the proposed GTA West freeway as part of the roadway network. A select link analysis was conducted for both options to identify the origins and destinations of forecast vehicles using Teston Road in the 2041 model during the A.M. peak hour.

4.3.6.2 2041 Model Without GTA West

As mentioned above, the dominant traffic volumes during the morning peak hour are in the westbound and southbound directions. The analysis indicates that virtually all southbound movements along arterial roads exhibit over-capacity conditions and are very congested. The 2041 forecast indicates that vehicle flows along Teston Road remain significant with unstable flow conditions (>0.8 V/C) in the westbound direction.

The V/C ratio the five screenlines in the study area for the year 2041 without the GTA West freeway were also assessed. The overall V/C for Screenlines SL1 to SL4 exhibits values of 0.90 or less. However, Screenline SL5 is over-capacity (i.e., V/C of 1.11) suggesting that all southbound traffic flows south of Teston Road are expected to be very congested by the year 2041.

Study area travel demand is somewhat higher in the scenario "with GTA West" in comparison to "without GTA West" and therefore, further scenario analysis including the GTA West corridor for this IEA is considered to be the most conservative approach. Based on the assessment of the GTA West corridor, the 2041 option **without** GTA West freeway will be excluded from further traffic analysis.

4.3.6.3 2041 Model With GTA West

Figure 4-6 illustrates the 2041 V/C ratios with GTA West freeway for each key roadway. The figure indicates that virtually all southbound movements along arterial roads exhibit over-capacity conditions (>0.90), particularly south of Teston Road (although on average approximately 5% better than without GTA West). However, all westbound movements along Kirby Road, Teston Road and Major Mackenzie Drive are functioning with a V/C ratio of 0.90 and less (although on average approximately 5% worse than without GTA West).

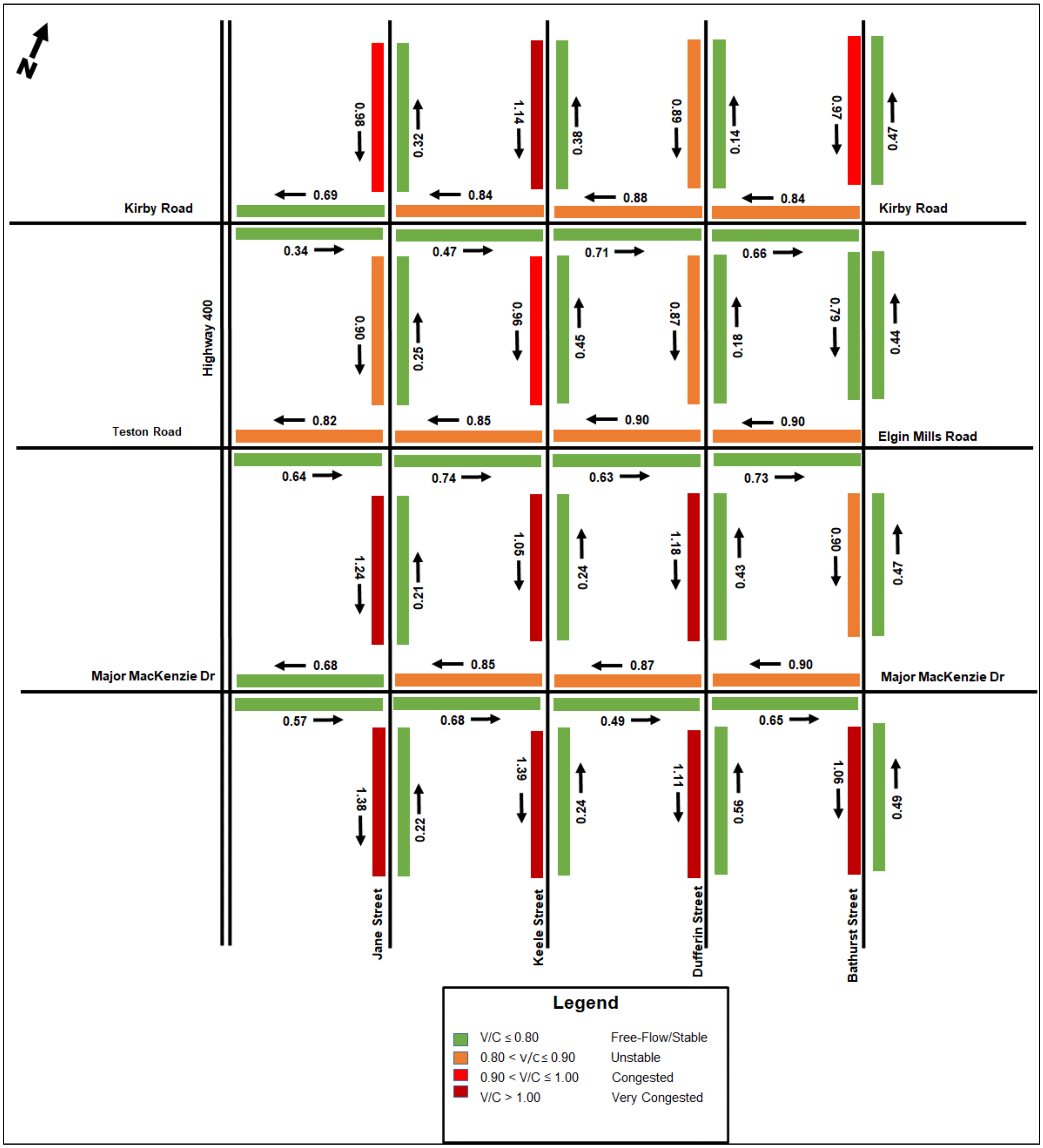

Figure 4-6: 2041 Link Analysis with GTA West - AM Peak Hours

The V/C ratio for each key roadway at the five screenlines in the study area for the year 2041 with the GTA West freeway is detailed in **Table 4-2**. The overall V/C for Screenlines SL1 to SL4 exhibits values of 0.89 or less suggesting that the proposed capacity would accommodate future demand. However, Screenlines SL5 is over-capacity (i.e., V/C of 1.06) suggesting that all southbound traffic flows south of Teston Road are expected to be very congested by the year 2041.

The corresponding 2041 projected A.M. peak hour transit demand represented as transit mode share at each screenline is summarized in **Table 4-3**. The summary of results indicates that, by 2041, transit trips are expected to increase significantly along all arterial roads, particularly along Major Mackenzie Drive. At SL2 westbound, 2041 A.M. peak hour transit passenger trips are projected to increase from 3% Transit Mode Share in 2016 to 11% Transit Mode Share by 2041.

4.3.7 Future Do Nothing Scenario

A link analysis was conducted for the Future Do Nothing Option using the 2041 traffic volumes reported from the model during the morning peak hour. The 2041 V/C ratios for each key roadway indicate that virtually all westbound movements on parallel arterial roads north and south of Teston Road and all southbound movements along north-south arterial roads are expected to exceed capacity (see **Figure 4-7**).

Comparing Assigned Traffic Volumes in the EMME model for 2041 with Teston Road Extension and 2041 Future Do Nothing scenarios, the forecasted volumes indicate that the equivalent of two lanes of traffic capacity in each direction of travel would have to be found in one or more adjacent roadway corridors or be accommodated through some other mode of travel (i.e., transit) or other alternative solution if the Teston Road Extension segment were not available. In addition, the discontinuity on Teston Road between Keele Street and Dufferin Street results in longer trip distances which may increase greenhouse gas emissions and potentially have negative impacts on climate change.

The V/C ratio for each key roadway at the five screenlines in the study area for the 2041 Future Do Nothing Option shows that the overall V/C for Screenlines SL1, SL3 and SL4 exhibit values of 0.90 or less. However, Screenlines SL2 and SL5 exhibit values of 1.15 and 1.05, respectively, further suggesting that the demand well exceeds the available capacity.

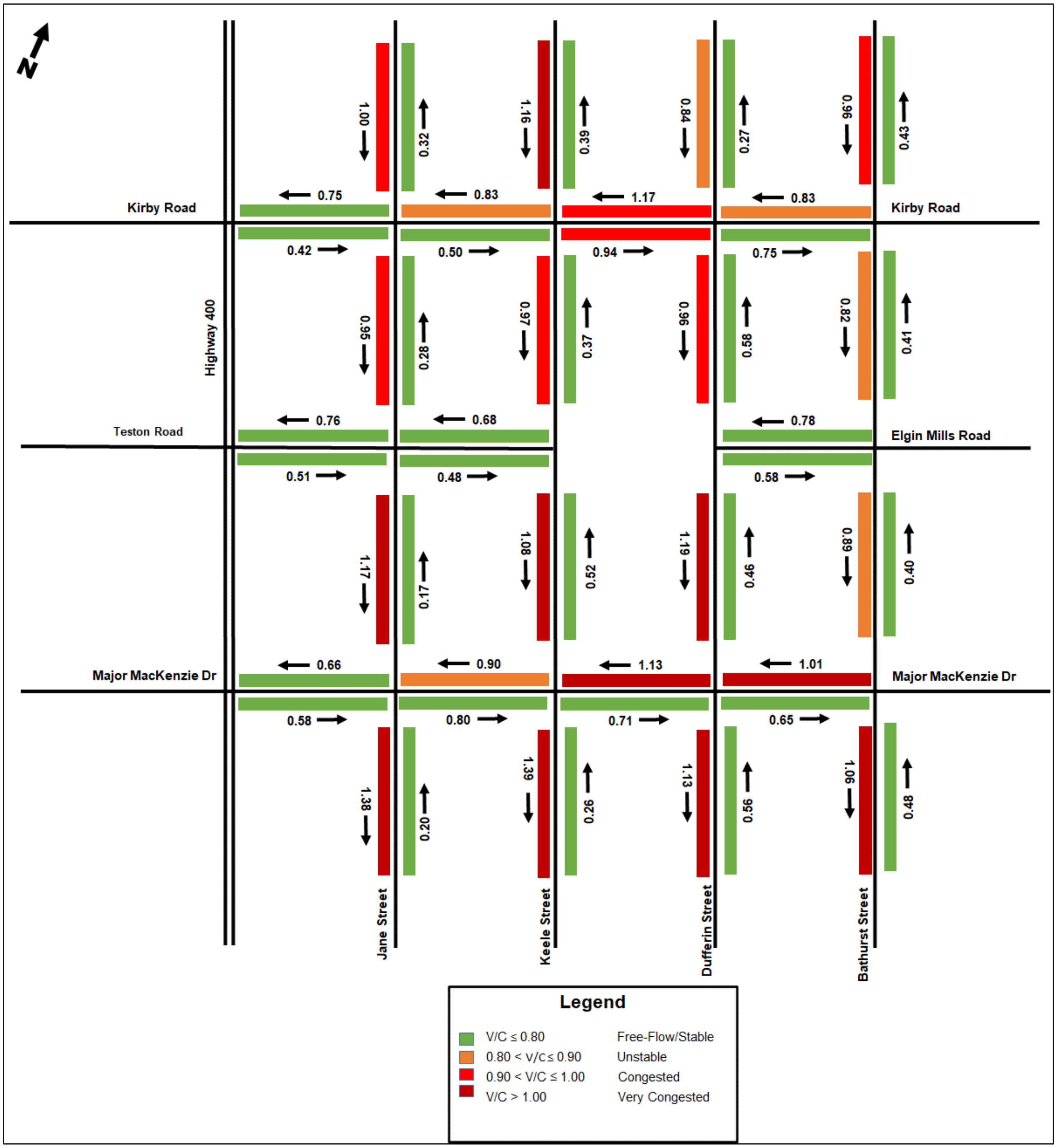

Figure 4-7: 2041 Link Analysis for Do-Nothing Option - AM Peak Hour

4.3.7.1 Projected Intersection Traffic Volume (2041)

Projected turning movement volumes for the projected AM peak hour were developed for the 2041 Future Do Nothing Option based on the EMME model projections above. This scenario included all network modifications (i.e., road widenings) along study area roadways. In addition, an operational performance analysis was completed for the 2041 Future Do Nothing scenario to provide an assessment of the projected traffic volume condition at study area intersections. This analysis included all network modifications (i.e., road widenings) anticipated for build-out by 2041.

This analysis shows that the projected traffic volumes cannot be accommodated within the background 2041 Future Do Nothing scenario. Numerous failing (i.e., Level of Service (LOS) score of F) turning movements were reported along with some locations reporting failing conditions for the whole intersection.

4.4 Conclusion

Table 4-2 provides a summary of the V/C ratios across each scenario assessed in the screenline analysis. It confirms that with the conservative 2041 EMME Model with GTA West scenario, traffic volumes at Screenline 5 (north to south) demonstrate congested and over-capacity conditions even with all road improvements detailed above in the York Region 2020 10-year Capital Program and 2041 network improvements.

Table 4-2: Roadway Screenline Analysis Summary

Section	V/C (2016 Baseline)	V/C (2031 EMMA Model)	V/C (2031 EMME Model with 2041 Demand)	V/C (2041 EMME Model without GTA West)	V/C (2041 EMME Model with GTA West)	V/C (2041 EMME Model for Future Do Nothing)
Screenline 1						
Major Mackenzie Dr	0.85	0.90	0.99	0.87	0.85	0.90
Teston Rd	0.65	0.73	0.77	0.83	0.85	0.68
Kirby Rd	0.72	0.74	0.94	0.69	0.84	0.83
Screenline Total	0.74	0.80	0.89	0.79	0.84	0.80
Screenline 2						
Major Mackenzie Dr	0.92	1.00	1.11	0.90	0.87	1.13
Kirby Rd	0.88	0.92	1.10	0.78	0.88	0.83
Teston Rd				0.84	0.91	0.78
Screenline Total	0.91	0.98	1.11	0.84	0.89	0.87

Section	V/C (2016 Baseline)	V/C (2031 EMMA Model)	V/C (2031 EMME Model with 2041 Demand)	V/C (2041 EMME Model without GTA West)	V/C (2041 EMME Model with GTA West)	V/C (2041 EMME Model for Future Do Nothing)
Screenline 3						
Major Mackenzie Dr	0.99	0.94	1.05	0.89	0.90	1.01
Teston Rd	0.96	1.28	1.42	0.86	0.90	0.78
Kirby Rd				0.76	0.84	0.83
Screenline Total	0.98	1.05	1.16	0.84	0.88	0.87
Screenline 4						
Jane St	0.99	0.91	1.36	0.99	0.60	0.95
Keele St	0.77	0.95	1.11	1.00	0.96	0.97
Dufferin St	0.60	1.03	1.29	0.90	0.87	0.96
Bathurst St	0.80	1.01	1.21	0.81	0.79	0.82
Screenline Total	0.79	0.98	1.22	0.90	0.86	0.90
Screenline 5						
Jane St	0.52	0.84	1.11	1.32	1.24	1.17
Keele St	0.66	0.94	1.22	1.13	1.05	1.08
Dufferin St	1.13	1.01	1.19	1.21	1.18	1.19
Bathurst St	0.95	1.07	1.23	0.92	0.90	0.89
Screenline Total	0.78	0.97	1.19	1.11	1.06	1.05

Table 4-3 provides a summary of the total passenger trips for the morning peak hour and the change in transit mode share under different time horizons/scenarios. It confirms that transit trips are expected to increase significantly along all arterial roads under future conditions, including the conservative 2041 EMME Model with GTA West scenario.

Table 4-3: Transit Screenline Analysis Summary

Section	1-Hour Total Passenger Trips				Transit Mode Share			
	2016	2031	2041 (with GTA West)	Future Do Nothing	2016	2031	2041 (with GTA West)	Future Do Nothing
Screenline 1								
Major Mackenzie Dr	1,645	2,206	2,182	2,284	4%	24%	28%	27%
Teston Rd	1,363	1,553	1,836	1,476	0%	1%	4%	4%
Kirby Rd	585	614	1,836	1,831	0%	2%	5%	5%
Screenline Total	3,593	4,373	5,854	5,591	2%	13%	13%	14%
Screenline 2 (WB)								
Major Mackenzie Dr	2,000	2,572	2,441	2,993	4%	19%	25%	21%
Teston Road			1,926				1%	
Kirby Rd	718	749	1,906	2,539	0%	0%	4%	3%
Screenline Total	2,718	3,322	6,273	5,532	3%	15%	11%	13%
Screenline 3 (WB)								
Major Mackenzie Dr	2,156	2,406	2,447	2,691	4%	18%	23%	21%
Teston Rd	891	1,190	1,896	1,649	0%	0%	1%	1%
Kirby Road			1,828	1,796			4%	4%
Screenline Total	3,047	3,596	6,171	6,136	3%	12%	11%	11%
Screenline 4 (SB)								
Jane St	1,144	1,100	2,203	2,311	0%	4%	5%	5%
Keele St	1,825	2,230	2,148	2,148	2%	11%	7%	6%
Dufferin St	694	1,208	2,031	2,272	0%	1%	0%	2%
Bathurst St	2,467	3,144	3,583	3,701	9%	11%	8%	8%
Screenline Total	6,131	7,682	9,965	10,431	4%	8%	6%	5%

Section	1-Hour Total Passenger Trips				Transit Mode Share			
	2016	2031	2041 (with GTA West)	Future Do Nothing	2016	2031	2041 (with GTA West)	Future Do Nothing
Screenline 5 (SB)								
Jane St	1,089	1,766	2,706	2,577	0%	1%	5%	5%
Keele St	1,244	1,813	2,239	2,312	2%	3%	13%	13%
Dufferin St	1,181	2,107	2,491	2,504	0%	0%	1%	1%
Bathurst St	2,393	2,821	3,433	3,381	8%	12%	9%	9%
Screenline Total	5,907	8,506	10,869	10,774	4%	5%	7%	7%

Given that according to the link and screenline analyses, southbound movements south of Teston Road are expected to be operating with a V/C ratio that exceeds 0.90 in the future, a solution for addressing this congestion needs to be identified.

4.4.1 Summary of Problems and Opportunities

Based on the review of the planning context and the detailed demand analysis presented above for the existing and future conditions, the problems and opportunities (or needs and justification) identified for the project include:

- Future land-use change surrounding Teston Road from primarily rural to residential and mixed use will considerably increase future travel demand within the Study Area. The screenline analysis indicates that A.M. peak hour travel demand along arterial roads is projected to increase from 2016 to 2041 on average by 66% (SL 1, 2 and 3) and 72% (SL 4 and 5), respectively, in the westbound and southbound directions under the Future Do Nothing scenario (i.e., 2041 TMP Network excluding a Teston Road Extension between Keele and Dufferin), with even higher increases under the 2041 TMP Network scenario (including GTA West).
- The estimated 2041 A.M. peak hour traffic volumes in the westbound direction between Keele Street and Dufferin Street exceed available capacity under the Future Do Nothing scenario. The estimated 2041 A.M. peak hour traffic volumes in the southbound direction between Kirby Road and Major MacKenzie Drive generally exceed available capacity under the Future Do Nothing scenario.
- The discontinuity on Teston Road between Keele Street and Dufferin Street is a barrier to local and regional east/west trips and adds traffic load to parallel east/west alternatives routes such as the already congested Major Mackenzie Drive and Kirby Road with over-capacity conditions at multiple intersections.
- There is limited east-west accessibility along the Teston Road corridor to access existing and planned Highway 400 interchanges (i.e., Teston Road Interchange, Major Mackenzie Drive Interchange and Kirby Road Interchange). Current levels of congestion and out-of-way travel faced by commuters would be exacerbated by increasing traffic

demands. While it is anticipated that links within the vicinity of Highway 400 would have greater capacity due to proposed future widenings, east of this facility, the same capacity is not provided which produces bottlenecks at major intersections.

- The discontinuity on Teston Road between Keele Street and Dufferin Street is a barrier to residents from better access to amenities (e.g., schools, parks, recreational facilities, emergency, and other public services, etc.).
- The discontinuity on Teston Road between Keele Street and Dufferin Street results in longer trip distances which may increase greenhouse gas emissions and have negative impacts on climate change.
- The area of Teston Road between Keele Street and Dufferin Street is identified in York Region's TMP as having a separated cycling facility by 2041. The current network requires significant out-of-way travel by cyclists and pedestrians, channeling additional cycling and pedestrian traffic to Keele Street or Dufferin Street to use Kirby Road or Major Mackenzie Drive to cross this barrier.
- Teston Road between Keele Street and Dufferin Street is identified in York Region's 2016 TMP to be served by frequent transit service by the year 2041. Currently, transit is only available on Teston Road in four short sections at Jane Street (Route 20), Keele Street (Route 107), Thornhill Woods (Route 23) and Elgin Mills (Route 80). The discontinuity on Teston Road between Keele Street and Dufferin Street is a barrier to increased transit service and ridership along this corridor.
- Westbound A.M. peak hour transit ridership and Transit Mode Share are both projected to increase significantly within the study area between 2016 and 2041 (e.g., at SL2 transit ridership to increase by 741% and Transit Modal Share from 3% to 13% for the Future Do Nothing scenario). While the above is a very significant increase, the opportunity may exist to further increase transit ridership and Transit Mode Share within the study area.
- Transport Demand Management (TDM) and Smart Commute strategies (e.g. parking fees, carpool priority, discounted transit passes, bike racks, etc.) to promote and increase walking, cycling and transit use should be evaluated to estimate potential mode shift for the study area.
- To improve network performance issues identified from the 2041 Future Do Nothing scenario, localized intersection improvements using Transportation System Management (TSM) techniques should be considered (e.g., traffic signal improvements, channelization, etc.).
- Based on the discussion with the Deputy Fire Chief, City of Vaughan Fire and Rescue Service, there is a need for another fire station on the west side of the study area. The location of the station depends on the findings of the IEA.
- Future bus service to the planned Kirby Go Station on Kirby Road.

4.5 Problem and Opportunity Statement

The Teston Road Area Transportation Improvements project is being undertaken to improve the efficiency, safety, and continuity of the transportation network within the Teston Road area. Teston Road is an east-west arterial road that is identified in the York Region TMP as currently having a “missing link” between Keele Street and Dufferin Street. The discontinuity in Teston Road creates a barrier for east/west vehicular trips, creates a barrier for walking, cycling and transit service, and increases out-of-way travel and congestion along adjacent routes and communities. Planned growth in the area will significantly increase travel demand. An estimated 50% growth in population by 2041 is expected to create congested roadway conditions where demand exceeds capacity during the A.M. peak hour going westbound. This confirms the requirements from the TMP which recognizes the need to complete missing links such as Teston Road within the Regional Road network.

The implementation of transportation improvements to the study area would provide opportunities to enhance access to existing and new development in the area to help meet the Province’s new housing targets, and provide better access to amenities, public services and facilities to residents. The project also presents the opportunity to create better active transportation routes, including better access and connections to the North Maple Regional Park and the future Kirby Road GO Station, increase transit ridership, and reduce vehicle emissions and climate change impacts.

5. Existing Conditions

This section documents the baseline conditions for the study area against which the potential environmental effects of the alternatives has been assessed. This section the presents the findings of the studies, investigations and policy review undertaken to document the existing conditions within the study area. Environmental conditions include natural, social, cultural, built, and economic environments.

Overall, the baseline data was collected and analyzed for key environmental parameters to:

- Provide an understanding of existing conditions.
- Allow for predictions of how the proposed project may cause these environmental conditions to change and how those changes can be mitigated.
- Provide a basis for designing monitoring programs.

Some areas within the study area have been previously evaluated during other environmental assessments. These previous studies have been used to inform the documentation of the existing conditions report. Where information gaps exist, new content will be added to the work that has been done to date.

5.1 Study Area

The study area is situated within the City of Vaughan. The City of Vaughan is one of nine local municipalities within York Region, with local government organized in a two-tier structure. The discontinuous section of Teston Road is defined by industrial lands, natural areas, and landfills sites. The landfills are represented by the Vaughan Township landfill and private landfill to the north and the City of Toronto's Keele Valley Landfill to the south. All three landfills have ceased active waste management operations and follow various requirements for management and monitoring.

The western segment of the discontinuous Teston Road is occupied by natural features including the Easter Don River Tributary. This area is heavily forested and contains dramatic elevations changes due to the river valley. Currently, the City of Vaughan is planning to expand the North Maple Regional Park, a portion of which will occupy the landfill areas within the discontinuous Teston Road section.

The remaining portion of the study area is occupied by residential development, planned residential developments, and industrial uses.

5.1.1 Physical Boundaries

The study area for existing conditions varies depending on the environmental features which were investigated. The study area boundaries are not rigidly defined and remain flexible to accommodate the extent of the particular environmental feature being described. This is because some potential environmental effects may be localized, such as noise, whereas others, like the movement of people may have broader implications outside of a restricted geographical boundary. Where broader study area boundaries have been used, they have been identified in context.

In general, the study area falls within the boundaries identified in **Figure 5-1**.

Figure 5-1: Study Area

The EA study area has geographical boundaries that extend from:

- West Limit: Highway 400
- North Limit: Kirby Road
- East Limit: Bathurst Street
- South Limit: Major Mackenzie Drive West

5.1.2 Temporal Boundaries

The temporal boundaries of the study will encompass all phases of the project implementation including planning and design, construction, and operation/maintenance.

5.2 Planning Policy Context

5.2.1 Impact Assessment Act, 2019

The purpose of the *Impact Assessment Act, 2019* is to provide a process for assessing the environmental, health, social, and economic effects of designated projects with a view to preventing certain adverse effects and fostering sustainability. Additionally, the Act serves to:

- Promote cooperation and coordinated action between federal and provincial governments with respect to environmental assessments.
- Ensure that impact assessments of designated projects consider all effects — both positive and adverse — that may be caused by the carrying out of designated projects.
- To promote communication and cooperation with indigenous peoples of Canada with respect to impact assessments.

Under the Act, an assessment is required for “designated projects”, which are determined in one of two ways:

- Projects designated by the “Physical Activities Regulations” or Project List. Projects are designated by type and prescribed thresholds, and range from the construction, operation, decommissioning and abandonment of mines and metal mills to renewable energy and large-scale transportation projects, among others.
- Ministerial discretion. The IAA gives the Minister of Environment and Climate Change discretion to designate projects not included in the Regulations, where the Minister is of the opinion that the physical activity “may cause adverse effects within federal jurisdiction or adverse direct or incidental effects, or public concerns related to those effects warrant the designation.”

Under Section 82 of the *Impact Assessment Act (IAA),* 2019:

- “An authority must not carry out a project on federal lands, exercise any power or perform any duty or function conferred on it under any Act of Parliament other than this Act that could permit a project to be carried out, in whole or in part, on federal lands or provide financial assistance to any person for the purpose of enabling that project to be carried out, in whole or in part, on federal lands, unless (a) the authority determines that the carrying out of the project is not likely to cause significant adverse environmental effects; or (b) the authority determines that the carrying out of the project is likely to cause significant adverse environmental effects and the Governor in Council decides, under subsection 90(3), that those effects are justified in the circumstances.”

Upon review of the Physical Activities Regulations, this Project does not include physical activities identified therein, and as such, is not a “Designated Project”. In addition, this Project does not involve physical activities - that is, construction activities such as grading, excavation, and/or vegetation clearing and removal for example, taking place on federal lands, including a National Park or Protected Area.

For the purposes of this Report, it is assumed that the Minister of Environment and Climate Change will not designate the Project. Accordingly, the Teston Road Area Transportation Improvements Project will not require assessment under the IAA.

5.2.2 Provincial Policy Framework

5.2.2.1 Planning Act, 1990

The *Planning Act,* 1990 is the Province of Ontario's legislated tool for ensuring that all land use planning throughout the Province follows the same set of rules/guidelines. The Act outlines how decisions are to be made and the tools used to determine those decisions. Section 3 of the *Planning Act* grants the authority for the Government of Ontario to issue policy statements. The *Planning Act* requires that decisions affecting planning matters "shall be consistent with" policy statements issued under the Act.

Since 2001, the Province of Ontario has approved a series of initiatives and plans that have profoundly changed the way planning and development is to occur within Ontario. Those of relevance to transportation and land uses within and in proximity to the study area are discussed in the sections below.

Provincial Policy Statement, 2020

Under the *Planning Act*, the most recent Provincial Policy Statement (PPS) came into effect on May 1, 2020. The PPS (2020) provides policy direction on matters of provincial interest related to land use planning and development and intends to protect resources, public health and safety and the quality of the natural and built environment. Though the PPS (2020) informs land use planning decisions under the *Planning Act* (1990) in Ontario and requires that infrastructure be provided in a coordinated, efficient, and cost-effective manner, it is worth noting that PPS policies represent a minimum standard, and decision-makers may go beyond these minimum standards to address matters of local importance so long as doing so does not conflict with any other PPS policies. The PPS is complemented by other provincial plans such as the Oak Ridges Moraine Conservation Plan (ORMCP) and the Greenbelt Plan, discussed below.

The following policies within the PPS (2020) support the development of the Teston Road Area Transportation Improvements:

- Section 1.1.1(g): Ensuring the necessary infrastructure and public service facilities are or will be able to meet current and projected needs, and
- Section 1.6.1 (b): Planning for infrastructure that meets current and projected needs.

Based on the above policies, the completion of any Teston Road Area Transportation Improvements will be consistent with the PPS (2020). Additionally, the Teston Road Area Transportation Improvements, for which this document is a part of, intends to fulfill the requirements of other sections of the PPS (2020), including:

- Section 1.6.3: States that consideration will be given to optimizing existing infrastructure before developing any new infrastructure.

- Section 1.6.7.1: Transportation systems should be provided which are safe, energy efficient, facilitate the movement of people and goods and are appropriate to address projected needs.
- Section 1.6.7.3: As part of a multi-modal transportation system, connectivity within and among transportation systems and modes should be maintained and, where possible, improved including connections which cross jurisdictional boundaries.

This IEA study will also address a variety of sections of the PPS (2020) with respect to the protection of natural heritage, water, agricultural, cultural heritage, and archaeological resources as well as preparing for regional and local impacts of climate change.

5.2.2.2 Places to Grow Act, 2005

The *Places to Grow Act, 2005* provides a legal framework for the Ontario government to designate any geographic area of the Province as a "growth plan area" and to develop an associated growth plan for that area in consultation with local officials and stakeholders. The *Act* enables the government to plan for population growth, economic expansion and the protection of the environment, agricultural lands, and other valuable natural resources in a coordinated and strategic way.

A Place to Grow, 2019

A Place to Grow: Growth Plan for the Greater Golden Horseshoe (2019) was approved under the *Places to Grow Act*, 2005 to take effect on May 16, 2019, and was subsequently amended through Order in Council in August 2020. Known simply as "A Place to Grow", the new Plan builds upon the success of the initial Growth Plan, (2006) and responds to the key challenges that the region continues to face.

A Place to Grow (2019) works in conjunction with the PPS (2020) as well as the other provincial plans discussed herein. A Place to Grow (2019) is intended to provide a framework for growth and development in the Greater Golden Horseshoe (GGH) that supports economic prosperity, protects the environment, and helps communities achieve a high quality of life.

Section 3 of A Place to Grow (2019) outlines the role of infrastructure in supporting growth throughout the GGH. As it applies to this IEA study, A Place to Grow (2019) requires a coordinated approach to infrastructure planning that includes:

- Providing connectivity among transportation modes for movement of people and goods.
- Offering a balance of transportation choices that promotes transit and active transportation.
- Being sustainable and reducing emissions.
- Offering multi-modal access to jobs, housing, schools, cultural and recreational opportunities and goods and services.
- Accommodating agricultural vehicles and equipment, as appropriate.
- Providing for the safety of system users.

Per Section 3.5 of A Place to Grow (2019), when planning for the development of new infrastructure corridors, where applicable it must be demonstrated through an EA process, "that any impacts on key natural heritage features in the Natural Heritage System for the Growth Plan, key hydrologic features and key hydrologic areas have been avoided or, if avoidance is not possible, minimized and to the extent feasible mitigated".

The completion of this IEA study process has reviewed the natural features within the Study Area to ensure that predicted impacts of the undertaking are avoided or minimized. Mitigation measures have been proposed based on the Preliminary Design of the preferred alternative, as documented in **Section 9**, in keeping with the framework of A Place to Grow (2019).

5.2.2.3 Greenbelt Act, 2005

Faced with intense growth pressures on the GGH and its potential impacts to the area's rural and environmental resources, the Province of Ontario formulated the *Greenbelt Act* in 2005. This Act authorizes the Lieutenant Governor in Council, by Regulation, to designate an area of land as the Greenbelt Area, and to establish a Greenbelt Plan for all or part of the designated Greenbelt Area. Thus, the *Greenbelt Act* defines the Greenbelt Area as including the areas covered by the Oak Ridges Moraine Conservation Plan and the Niagara Escarpment Plan, as well as areas of land as may be described in the regulations.

Greenbelt Act, 2017

Governed by the Ministry of Municipal Affairs and Housing, the Plan describes the Greenbelt as a broad band of permanently protected land which:

- Protects against the loss and fragmentation of the agricultural land base and supports agriculture as the predominant land use.
- Gives permanent protection to the natural heritage and water resource systems that sustain ecological and human health and that form the environmental framework around which major urbanization in south-central Ontario will be organized.
- Provides for a diverse range of economic and social activities associated with rural communities, agriculture, tourism, recreation, and resource uses.

Together with the Oak Ridges Moraine Conservation Plan (ORMCP) and the Niagara Escarpment Plan (NEP), the Greenbelt Plan is intended to provide permanent protection to the agricultural land base and the ecological and hydrological features, areas and functions occurring on the landscape throughout the Greenbelt Area. The Greenbelt Plan includes lands within, and builds upon the ecological protections provided by, the ORMCP and the NEP. Together with A Place to Grow (2019), the ORMCP, the NEP, and the Greenbelt Plan, build on the PPS to establish a land use planning framework for the GGH that supports a thriving economy, a clean and healthy environment, and social equity.

The Greenbelt Plan includes lands within, and bolsters the ecological protections provided by, the Niagara Escarpment Plan (NEP) and the ORMCP, which is intended to improve linkages between these areas and the surrounding major lake systems and watersheds. In relationship to the PPS, the Greenbelt Plan is given precedence to the more general PPS policies wherever they address the same, similar, or overlapping content (as defined in the Greenbelt Plan

Introduction, pg. 8). Building on this landscape of increasing specificity and precedence, the Greenbelt Plan further gives precedence to the ORMCP and NEP on lands covered by these plans.

As per above, the Greenbelt Plan, the NEP, and the ORMCP work together to identify where urbanization should and should not occur, and further, the NEP and ORMCP are given precedence to the Greenbelt Plan where more specific policies address the same, similar, or overlapping content. Thus, since the Teston Road Area Transportation Improvements study area falls partially within an area of the Greenbelt that is overlapping with the ORMCP, the ORMCP will take precedence for these portions of the study area.

5.2.2.4 Oak Ridges Moraine Conservation Act, 2001

The Oak Ridges Moraine (ORM) is a 160 km long landform, comprising of 190,000 hectares (ha) that stretches from Caledon and the Niagara Escarpment in the west to the Trent River in the east and is one of Ontario's most valuable ecological features. It is noted that approximately 31 per cent of York Region is within the ORM (York Region, 2019) which includes a portion of the study area as illustrated in **Figure 5-2**. The *Oak Ridges Moraine Conservation Act* (2001) provides the authority for the creation of the Oak Ridges Moraine Conservation Plan for the Oak Ridges Moraine Area. The act requires that decisions made under the *Planning Act* conform with the Oak Ridges Moraine Conservation Plan.

Oak Ridges Moraine Conservation Plan, 2017

The Oak Ridges Moraine Conservation Plan (ORMCP) was established under the *Oak Ridges Moraine Conservation Act, 2001* and provides direction on land uses and resource management for the land and water located within the moraine. Specifically, the Plan includes a series of objectives relating to protecting, restoring, and enhancing the integrity of the ORM's ecological and hydrological features and functions. As outlined in the ORM *Act*, decisions made under the *Planning Act* for areas with the ORM are required to conform to the ORMCP.

The Plan was most recently updated in 2023, to add 15 sites back to the Greenbelt that were removed/redesignated in December 2022 by incorporating the description of the Greenbelt Area and Oak Ridges Moraine Area boundaries directly into the legislation so that any future amendments would require legislative change. The amendment does not change the general structure of the plan, which outlines four distinct land use designations:

- **Natural Core Areas** protect those lands with the greatest concentrations of key natural heritage features which are critical to maintaining the integrity of the Moraine as a whole. Only existing uses, agricultural uses and very restricted new resource management, low intensity recreational, home businesses, and infrastructure uses are allowed in these areas.
- **Natural Linkage Areas** protect critical natural and open space linkages between the Natural Core Areas and along rivers and streams. The only uses that are allowed are those allowed in Natural Core Areas, plus some aggregate resource operations.
- **Countryside Areas** provide an agricultural and rural transition and buffer between the Natural Core Areas and Natural Linkage Areas and the urbanized Settlement Areas.

Prime agricultural areas as identified in the Agricultural System referred to in the Growth Plan for the Greater Golden Horseshoe and the Greenbelt Plan, as well as natural features are protected. Uses typically allowed in agricultural and other rural areas are allowed here to support agriculture and the rural economy. Existing public service facilities in Countryside Areas should be maintained and adapted to meet the needs of the community, where feasible.

- **Settlement Areas** reflect a range of existing communities planned by municipalities to reflect community needs and values. Urban uses and development as set out in municipal Official Plans are allowed.

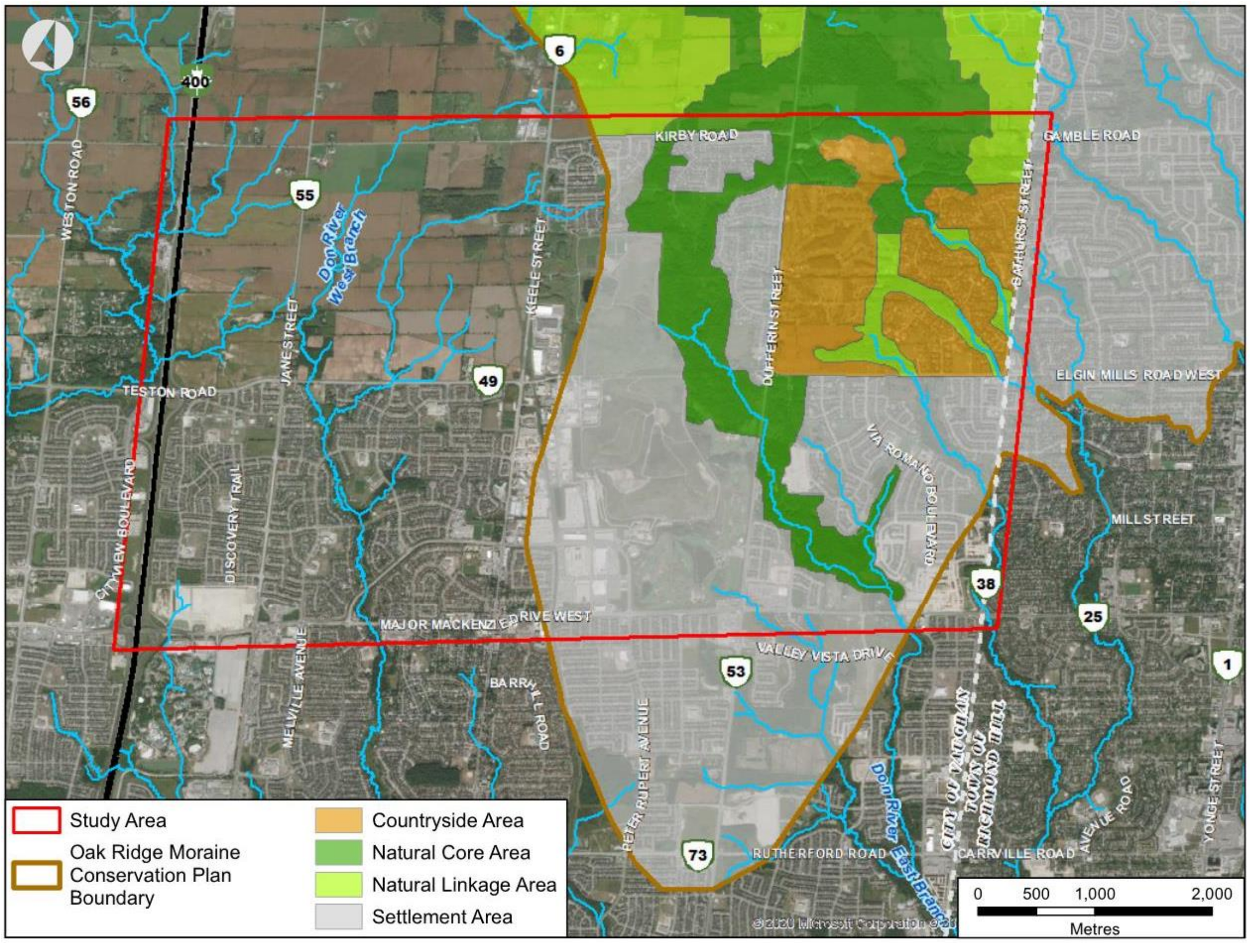

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Figure 5-2: Oak Ridges Moraine Conservation Plan Boundary & Land Use Designations

Figure 5-2 highlights that all four ORMCP land use designations are present within the Study Area. As such, the generation and evaluation of alternatives will take into consideration the type and significance of predicted effects (or impacts) on the key values used to define these designations.

Section 41 of the ORMCP outlines the various requirements to allow the development of infrastructure in each land use designations. In order for transportation infrastructure to be located in Natural Core or Natural Linkage Areas it must be demonstrated that there is no reasonable alternative.

5.2.2.5 Niagara Escarpment Planning & Development Act, 1990

The purpose of this *Act* is to provide for the maintenance of the Niagara Escarpment and land in its vicinity substantially as a continuous natural environment, and to ensure only such development occurs as is compatible with that natural environment. The Act gives authority to maintain the Niagara Escarpment Plan, including amendments and revisions in accordance with applicable regulations.

Niagara Escarpment Plan

The Niagara Escarpment Plan (NEP) was first adopted in 1985 and was most recently amended in 2017. The Plan serves as a framework of objectives and policies to strike a balance between development, protection, and the enjoyment of the Niagara Escarpment as an important natural feature, including the resources it supports. As previously stated, the Niagara Escarpment Plan, the Oak Ridges Moraine Conservation Plan and the Greenbelt Plan work within the framework set out by the Growth Plan for where and how future population and employment growth should be accommodated. While this is important planning context, the NEP is not relevant to this project as the study area is not within the Niagara Escarpment Planning Area.

5.2.3 York Region Planning Policies & Related Studies

In addition to provincial policies, various regional and municipal policy documents exist and will be taken into consideration in relation to the Project. At the municipal level, Official Plans provide the context and boundaries within which a municipality operates with regards to land use, development, and growth. The *Planning Act* requires that an Official Plan conforms to, or does not conflict with provincial plans, has regard for matters of provincial interest, and “shall be consistent with” policy statements issued under the Act. Implementation of provincial policy initiatives are matters that municipalities must incorporate into their Official Plans, and other planning policy documents. Relevant municipal planning policies and how they affect land uses within the study area are presented below for York Region and the City of Vaughan.

5.2.3.1 2022 York Region Official Plan

As per the PPS (2020), Official Plans are considered the most important vehicle for implementation of PPS policies. The 2022 York Region Official Plan outlines the Region’s strategy for managing growth in a sustainable manner through the land use planning process. The Plan describes how the Region plans to accommodate future growth and development while meeting the needs of existing residents and businesses in the Region. The Plan focuses on sustainability, protection of the natural environment, economic growth, and success, while working to meet the needs of and deliver important human services to residents.

The Plan also sets the direction for growth and development across the nine local municipalities within York Region, impacting how the community grows and changes. This includes policies to help co-ordinate and provide the framework for these municipalities to undertake more detailed planning. The Region is responsible for regulating land use and establishing policies for physical, economic, and social development within its respective jurisdiction. However, this responsibility is conducted within a provincial framework. Accordingly, during the planning horizon of its Plan, the Province and the Region will work together to ensure successful implementation of the governing Provincial Plans and legislation. Thus, all planning decisions under the York Region Official Plan shall conform with provincial plans such as the ORMCP, Growth Plan (A Place to Grow, 2019), and Greenbelt Plan and be consistent with the PPS, as discussed in previous sections.

According to the Official Plan, York Region is expected to experience significant growth, up to a population of 2.02 million people and 990,000 jobs by 2051. Thus, the Plan places a high priority on complete communities that support a full range of amenities and housing types for all ages and stages of life, different household formations and incomes. Along with this growth comes the need to increase infrastructure to meet the demands of the growing communities, including the City of Vaughan. The decisions documented within the Official Plan will act as a base scenario for the IEA study and it is assumed that all improvements identified within the Official Plan for the study area will be approved and built.

Chapter 6 – Servicing Our Communities documents York Region's policies for making efficient use of infrastructure, growth, and infrastructure alignment, and moving people and goods. Overall, the goal of this chapter is to outline policies intended to *"provide the services required to support York Region's residents and businesses in a financially and environmentally sustainable manner*". Services covered under this section relevant to this study include transit and streets, amongst others. Further, the chapter specifically identifies efficient and climate resilient transportation infrastructure as a priority: "*York Region's approach to transportation planning is focused on making efficient use of existing and future transportation infrastructure, while addressing impacts of a changing climate. To reduce automobile dependence, more sustainable transportation options need to be innovative, convenient, and reliable. This goal requires a combination of infrastructure investment, supportive policies, and partnerships*".

The objectives that dictate the policies as well as the most relevant policies for this study are included in **Table 5-1.**

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Table 5-1: Official Plan Objectives for the Movement of People & Goods

Objective	Relevant Policies
Transportation: To provide a full range of transportation facilities throughout York Region, while reducing automobile dependence by enhancing opportunities for residents and workers to walk, cycle, take transit and carpool.	▪ To prioritize active transportation, transit, and goods movement and require that Transportation Demand Management measures to reduce single occupancy automobile trips are identified in transportation studies and in development applications. ▪ To continue to work with local municipalities and external agencies to develop programs and initiatives that encourage transportation options other than single occupancy vehicles, including transportation network options that are multi-modal and include inter-connections between modes.
Active Transportation: To create an active transportation system that promotes active transportation modes.	▪ To apply the principles and objectives and policies of the Transportation Master Plan to support the implementation of the Regional pedestrian and cycling network in partnership with local municipalities and other stakeholders. ▪ To implement the Regional Cycling Network shown on Maps 9A and 9B to enhance Regional transportation multimodal efficiency by placing priority on improving connections to facilitate active transportation and community connectivity. ▪ To provide connected, comfortable, safe, and accessible pedestrian and cycling facilities that meet the needs of York Region's residents and workers, including children, youth, seniors and people of all abilities, with continuous linkages between strategic growth areas, adjacent neighbourhoods, major trip generators, and transit stations. ▪ To integrate pedestrian, cycling and transit activities through improvements such as bicycle racks and storage at transit stops, bicycle racks on buses, and improved access for pedestrians and bicycles at transit stops, commuter lots, park and ride facilities, stations, and terminals, where warranted.
Transit: To provide transit service that is convenient and accessible to all residents and workers of York Region.	▪ To develop effective transit services which support integration by providing connection points for inter and intra-regional transit and connections between the Urban Area and Towns and Villages. ▪ To protect for and develop transit corridors and related infrastructure necessary to establish the York Region Transit Network as illustrated on Map 10. ▪ To achieve higher transit usage by supporting improvements in service, convenient access, connectivity, and urban design. ▪ To coordinate the planning, integration, improvement, and operation of existing and potential new transit services, including fares with local municipalities, the Toronto Transit Commission, the Province, Metrolinx and neighbouring transit agencies

Objective	Relevant Policies
Complete Streets: To plan, protect and design a Regional street network that accommodates all modes of transportation and supports the efficient movement of goods.	▪ To recognize that all existing and planned regional arterial roads are designed, refurbished, or reconstructed to accommodate all vehicles and modes of travel including passenger vehicles, goods movement, transit, active transportation and users of all ages and abilities. ▪ That an Individual Environmental Assessment will be undertaken for the unopened road allowance of Teston Road between Dufferin Street and Keele Street which will include a comprehensive network analysis and environmental impact assessment to determine a preferred transportation strategy in the corridor.
Goods Movement: To promote a linked and efficient network for goods movement that supports economic vitality and minimizes conflicts with sensitive land uses.	▪ To work with the Province, local municipalities, and surrounding jurisdictions to plan for, protect and promote an interconnected and efficient multimodal goods movement network that links local municipalities, Employment Areas and surrounding areas, utilizing freight-supportive infrastructure (Provincial highways, airports, Regional streets, and rail corridors) to meet current and future needs.

The Official Plan also provides a number of policies regarding a sustainable natural environment (Chapter 3). This chapter recognizes that York Region contains some of the most significant and environmentally sensitive geological landforms in Ontario including the Oak Ridges Moraine. Specifically, the natural features objective of the plan is "*to ensure that key natural heritage features and key hydrologic features and their functions are protected, restored and enhanced*". The Plan identifies features which are considered key natural heritage features, or key hydrologic features in the Greenbelt Plan, Oak Ridges Moraine Conservation Plan, Lake Simcoe Protection Plan, and the Growth Plan and prohibits development and site alteration for these features unless the following criteria are met:

- The use is permitted by the Plan, the applicable Provincial Plan and it is demonstrated through an environmental impact study that the development or site alteration will not result in a negative impact on the natural feature or its ecological functions,
- As authorized through an Environmental Assessment, or
- For agricultural, agriculture-related and on-farm diversified uses, subject to the applicable Provincial plan.

As such, the policies regarding these areas generally support the protection of these features and reaffirm the protection by other legislation (such as the ORMCP), including that appropriate studies must be undertaken to determine the impact to these features. York Region's Regional Greenlands System as well as the Environmentally Significant Areas and Areas of Natural and Scientific Interest maps are discussed in **Section 5.3.2** and provided in **Appendix E**.

In summary, the York Region Official Plan requires this project to balance infrastructure needs with the Region's social, economic, environmental, and climate change priorities. York Region Vision 2051 Strategic Plan

Vision 2051 is intended to provide a path forward for decision-making to ensure that the decisions made today support the desired future state for the next 40 years of initiatives in York Region. The vision advances efforts in sustainability, fosters the health and well-being of residents, and enhances the livability of York Region's communities. This vision is about the people and places of York Region as well as the systems and services that support and sustain them, including the economy and the environment.

Of particular relevance to this project, one Vision 2051 goal is Interconnected Systems for Mobility. This goal envisions a seamless network for mobility; one that provides access to all destinations using diverse transportation options for people in all communities, promotes active healthy living, and safely and efficiently moves people and goods.

5.2.3.2 Metrolinx 2041 Regional Transportation Plan

The 2041 Regional Transportation Plan (RTP) is intended to guide the continuing transformation of the transportation system in the Greater Toronto and Hamilton Area (GTHA) with a focus on an integrated multimodal regional transportation system. The Plan's overarching goal is to provide people with access to fast, frequent, and reliable transit, and making it easier for travelers to use transit and active transportation. Implementation of the RTP will improve the traveler experience, offer enhanced transportation choices, improve access to reliable and frequent rapid transit, and make travel more affordable by reducing the need to own a car. To achieve this, there are five strategies in the RTP which should be considered for this project:

- Complete the delivery of current regional transit projects
- Connect more of the region with frequent rapid transit
- Optimize the transportation system
- Integrate transportation and land use
- Prepare for an uncertain future

5.2.3.3 York Region Transportation Master Plan

The Regional Municipality of York Transportation Master Plan (adopted 2009, updated 2016) identified required improvements on Teston Road from Keele Street to Dufferin Street: the Teston Road "Missing Link". This Transportation Master Plan (TMP) has since been augmented by the adoption of the 2022 Transportation Master Plan. The 2022 TMP is the long-term vision for York Region's transportation network and highlights four areas of focus: Economic Vitality, Good Government, Healthy Communities and Sustainable Environment. This new TMP builds upon the elements of the 2016 TMP and has been coordinated to align with the Regional Official Plan and the Water and Wastewater Master Plan updates. The TMP builds upon the direction given in the Official Plan but focuses on the transportation network and the various modes of transportation provided or planned throughout York Region. The TMP sets six objectives for planning and implementing the transportation network focused on three main elements: active transportation, rapid transit, and an optimized road network. These objectives are:

- Make the best use of infrastructure and services
- Encourage all types of travel
- Provide a resilient and adaptable transportation network
- Enhance partnerships
- Actively engage and share information
- Align project costs

Aligned with these 5 objectives, a number of recommendations were made for transportation improvements for active transportation, rapid transit and roads designed to support regional growth to 2051. These improvements are shown in a series of maps that cover regional road cycling, trails, rapid transit corridors, and regional road network. These conditions will play a crucial role in identifying the problems and opportunities, generating reasonable alternatives, and comparatively evaluating those alternatives during the IEA study. Accordingly, every effort will be made to conform to the TMP during the IEA study.

Because the 2022 TMP builds on the 2016 TMP, objectives and initiatives from the 2016 TMP are also included for discussion below.

Table 5-2 identifies the various objectives and the initiatives within those objectives that apply to the Teston Road Area Transportation Improvements Project.

Table 5-2: TMP Objectives & Applicable Major Initiatives

Objective	Major Initiatives
Objective 1: Create a world class transit system	▪ Improve transit frequency and coverage.
Objective 2: Develop a road network fit for the future	▪ Build missing links and new roads ▪ Utilize technology to improve efficiency of the road network ▪ Expand high occupancy vehicle/transit network ▪ Develop the finer grid road network ▪ Build context sensitive multi-modal corridors ▪ Incorporate flexibility in corridors ▪ Maximize the person carrying capacity through corridor evolution
Objective 3: Integrate active transportation in urban areas	▪ Accelerate active transportation infrastructure that connects communities to transit spines, major destinations, and Regional Centres ▪ Support the last mile ▪ Complete gaps in sidewalks
Objective 4: Maximize the potential of employment areas	▪ Improve connectivity to 400-series highways
Objective 5: Make the last mile work	▪ Provide safe and convenient walking/cycling opportunities to mobility hubs

Section 9.3.5 of the 2016 TMP addresses the need to complete several missing links within the Regional road network, including Teston Road between Keele Street and Dufferin Street, and this is explicitly called out as an important piece of the recommended 2051 road network in the 2022 TMP. The 2022 TMP also recognizes Kirby Road, located north of Teston Road, as a missing link within the 2051 road network. However, Kirby Road is currently under the jurisdiction of the City of Vaughan. The TMP ensures that crossing of natural heritage systems (such as those mentioned above) in the Teston Road area, are subject to environmental assessments that support the need for the project through an analysis of alternative solutions. The completion of missing links is also supported by active transportation policies throughout both versions of the TMP as it provides additional connections for active transportation users.

5.2.3.4 York Region Sustainability Strategy

The Sustainability Strategy was released in 2007 with the intent of providing a framework for ensuring that environmental, economic, and community considerations are better integrated into the Region’s decision-making process. One component of the strategy’s vision relative to the project is for all community members to be able to access different, efficient, and affordable modes of transportation. The overarching goal of the strategy is to balance a sustainable natural environment and a healthy community with economic vitality. Action areas within the plan are:

- Corporate Culture of Sustainability
- Healthy Communities
- Economic Vitality

- Sustainable Natural Environment
- Education, Engagement and Partnerships
- Sustainability Implementation and Monitoring

The Healthy Communities action area is particularly important to this project, with action items related to promoting the Region's Transit-Oriented Development Guidelines to provide opportunities to shape urban form that is transit-supportive, mixed use and efficient, and provides a sense of place to residents and employees.

5.2.3.5 Built Environment & Health Action Plan

In response to the strong linkages between planning, design and human health, York Region Public Health has developed a Built Environment and Health Action Plan (2017). The Action Plan aims to support the development of community, transportation, and land-use planning policies and practices to create a healthier York Region. The pathways to action for this plan include clear process, effective promotion, supportive policies, and strong partnership. To support Plan implementation, this project should consider the relationship between transportation infrastructure and community health.

5.2.3.6 Pedestrian & Cycling Planning & Design Guidelines

Building upon York Region's original Pedestrian & Cycling Master Plan, the latest Pedestrian and Cycling Planning & Design Guidelines (PCPDG, 2018) provide designers with a design reference to support the development of active transportation facilities from the Region's perspective. The guideline, in addition to the Region's Designing Great Streets guideline, reflects the Region's vision to develop high quality active transportation facilities to balance the needs of all road users (comfort, safety and efficiency). The guideline highlights the importance of implementing consistent facility types and design treatments which are in accordance with the region's planning and design initiatives to further increase active mode shares. The PCPDG expands on the objectives of the 2016 TMP that pertain to pedestrians and cyclists, such as Objective 3 as shown in **Table 5-2**. The PCPDG will be examined for opportunities to provide active transportation facilities within the study area.

5.2.3.7 Designing Great Streets Guidelines

The Designing Great Streets (DGS, 2019) design guideline is an update to York Region's roadway design process using a context sensitive approach, which emphasizes greater mobility for all road users while supporting the development of adjacent land uses. The latest guideline contains six roadway types (City Centre Street, Avenue, Main Street, Connector, Rural Road, and Rural Hamlet Road) that the Region has developed to reflect their road network aspirations. Additionally, the guideline includes design best practices for cross-sectional elements and intersection design, with a nine-step decision-making process to guide the development of roadway corridors (retrofit, reconstruction or new construction). The various features of the latest design guideline support the Region's vision of "create[ing] vibrant streets for York Region that provide a range of safe and reliable transportation options, while being sensitive to adjacent land uses and needs of the community." The DGS will be reviewed for opportunities to incorporate the Region's recommended road typologies and design best practices.

5.2.4 City of Vaughan Planning Policies & Related Studies

5.2.4.1 City of Vaughan Official Plan

The study area lies within the City of Vaughan, which is a municipality in York Region. Centrally located within the GGH, the City enjoys strong rail and road transportation links to its neighbouring municipalities and others across the GGH and beyond. The City is also home to the headwaters of both the Humber and Don Rivers, with their significant valley systems being a prominent feature on the landscape.

Vaughan is forecasted to experience significant population and employment growth by 2031. With a population of more than 330,000 residents, Provincial and Regional forecasts predict the City of Vaughan will reach a population of 416,600 people and 266,100 jobs by 2031. As such, the City of Vaughan will be the recipient of significant investment in the infrastructure necessary to manage this growth and transform the City moving forward.

The City of Vaughan Official Plan 2010 (June 2019 Office Consolidation) is part of an overall Growth Management Strategy, initiated by City Council that is intended to “shape the future of the City and guide its continued transformation into a vibrant, beautiful and sustainable City” (City of Vaughan, 2019). The Official Plan – A Plan for Transformation, was prepared as part of a comprehensive three-year exercise, involving a number of concurrent studies and Master Plans to address the City’s long-term planning requirements to the year 2031. The June 2019 Office Consolidation of the Vaughan Official Plan 2010 was updated to include Local Planning Appeal Tribunal decisions and City Council approved Official Plan Amendments as of May 29, 2019. In addition to consolidating all former land use policy into one document, the June 2019 Office Consolidation brings the City into conformity with recent Provincial and Regional land use policy direction.

Where the York Region Official Plan sets priorities at the regional level, the City of Vaughan’s Official Plan provides the structure for planning decisions made within the City and at the local level. This includes land use planning and the local road network. The study area features a number of different land uses which are described in **Table 5-3**.

The City’s Official Plan also discusses the importance of a safe and efficient street network that accommodates transit, active transportation, and other vehicles. The City’s local network is dependent on the planning and implementation of the provincial and regional road networks.

Table 5-3: City of Vaughan Land Use Descriptions & Areas

Land Use	Description from the Official Plan	Locations Within the Study Area
Natural Areas and Countryside	Natural Areas and Countryside generally follow the valleys of the Humber and Don River systems and their associated tablelands but also feature areas of agricultural lands in the north parts of Vaughan.	▪ Similar to areas identified as Natural Core or Countryside Areas in the ORMCP (see **Figure 5-2**). ▪ The areas east of Dufferin Street and North of Teston Road. ▪ Throughout the study area generally following watercourses such as the east and west branches of the Don River.
Employment Area	Employment Areas are intended for the use of economic activities that require separation from other uses to achieve their maximum potential. Employment areas offer areas for economic activity related to industrial, manufacturing, warehousing and some offices.	▪ On the east side of the GO Barrie Line, north and south of Teston Road abutting the landfills. ▪ Between Jane Street and Highway 400, north of Teston Road.
Primary Intensification Corridor	Intensification corridors link various centres and are linear places of activity in their own right. They may accommodate mixed-use intensification or employment intensification.	▪ Along Major Mackenzie Drive West.
Local Centres	Local centres act as the focus for communities, are lower in scale and offer a more limited range of uses.	▪ Surrounding the intersection of Major Mackenzie Drive West and Keele Street and encompasses much of Historic Maple Village.
Primary Centres	Primary Centres accommodate a wide range of uses and will have tall buildings, as well as lower ones, to facilitate an appropriate transition to neighbouring areas.	▪ North of Major Mackenzie Drive West, west of Jane Street and east of Highway 400, includes the Mackenzie Vaughan Hospital (currently under construction).
Community Areas	Characterized by predominately Low-Rise Residential housing stock, with local amenities including local retail, community facilities, schools, and parks, and they provide access to the City's natural heritage and open spaces.	▪ The remainder of the study area not identified above. ▪ A new community area is planned for the block bound by Kirby Road, Keele Street, Teston Road, and Jane Street.

5.2.4.2 City of Vaughan Transportation Master Plan

The City's TMP (2012) builds upon the direction given in the Official Plan but focusses on the transportation network and the various modes of transportation provided or planned throughout the City of Vaughan. The City's TMP focuses on solutions to several transportation issues, including affordability of supplying sufficient capacity for rapid growth; the dependency on the automobile; heavy orientation for travel to the City of Toronto; providing more efficient movement of goods; the threat of air quality posed by the rise in auto and truck travel; and if development density is high enough to support efficient public transit. The TMP attempts to address these issues through the planning of the City's road network, active transportation, and transit initiatives.

The future conditions provided within the TMP will be incorporated into the IEA study as part of the generation and evaluation of alternatives. In this regard, every effort will be made to conform to the City's TMP during the IEA study.

5.2.4.3 City of Vaughan Pedestrian & Bicycle Master Plan Update

In 2017, the City of Vaughan began a study to update the 2007 Pedestrian and Bicycle Master Plan. The 2007 plan was progressive for its time, setting the City on a path to become a more walkable and bikeable community. It was the first active transportation-focused master plan in York Region and one of only a few in the Province. The updated Pedestrian and Bicycle Master Plan (2020) outlines a dynamic strategic plan that centers around four key themes: safety, infrastructure, connectivity, and awareness and culture. It is designed to be flexible, medium term and focused on community needs. More than 50 recommendations emerged during the update, organized under the four themes to highlight how the City plans to address community priorities. This project should consider these recommendations and seek to integrate the recommendations where possible, such as providing active transportation infrastructure (pedestrian, cycling and multi-use recreational trails) that is suitable for all ages and abilities.

5.2.4.4 Green Direction Vaughan

On June 4, 2019, Mayor and Members of Council unanimously passed a Members' Resolution to declare a climate emergency in the City of Vaughan. In addition to naming and reaffirming the City's commitment to climate action, the declaration also directs staff to report back to Mayor and Council on a variety of related projects and initiatives to ensure ongoing tracking of progress and impact of the City's declaration. While Green Directions Vaughan (GDV) predates this declaration, it is an important cornerstone of Vaughan's climate response. GDV was first approved by Council in 2009 as the City of Vaughan's community sustainability plan, and as a living document was most recently updated in 2019.

This long-term plan guides the community to a more sustainable future by addressing environmental, cultural, social, and economic values, including action on climate change adaptation and mitigation. Guided by a definition of sustainability, environmental ethic, and a set of principles, GDV outlines the City's approach to maintaining a healthy natural environment, vibrant communities, and a strong economy by defining six goal areas and listing objectives and sustainability actions to meet these goals. These sustainability actions enable Vaughan to remain a complete community where the needs for daily living are accessible to people of all ages and abilities. Of particular relevance to this project, the 'How We Get Around' principle aims to ensure that the City is easy to get around with a low environmental impact, and thus includes objectives and actions related to transportation and mobility. For example, Objective 3.3 is to "reduce single occupant vehicle (SOV) trips by supporting active transportation, carpooling and public transit"; supporting transit and active transportation is a key theme throughout this project.

5.2.4.5 North Vaughan & New Communities Transportation Master Plan

The North Vaughan and New Communities Transportation Master Plan (NVNCTMP) is a long-range plan that recommends policies, programs and the infrastructure required to meeting the existing and future mobility needs for the North Vaughan area (City of Vaughan, 2019a). The area covered by the NVNCTMP is shown in **Figure 5-3**. The Teston Road IEA study area has been added to the map.

The TMP recommended both the Transportation network layout and Active Transportation networks for the area.

The study was conducted in parallel with Secondary Plan studies for both Block 27 and Block 41 (see **Figure 5-3**) that are reviewing the transportation network and land uses within each block.

A portion of the NVNCTMP study area and all of Block 27 falls within the Teston Road Area Improvements study area. The decisions made within these studies will be further examined and integrated into the Teston Road Area study as required.

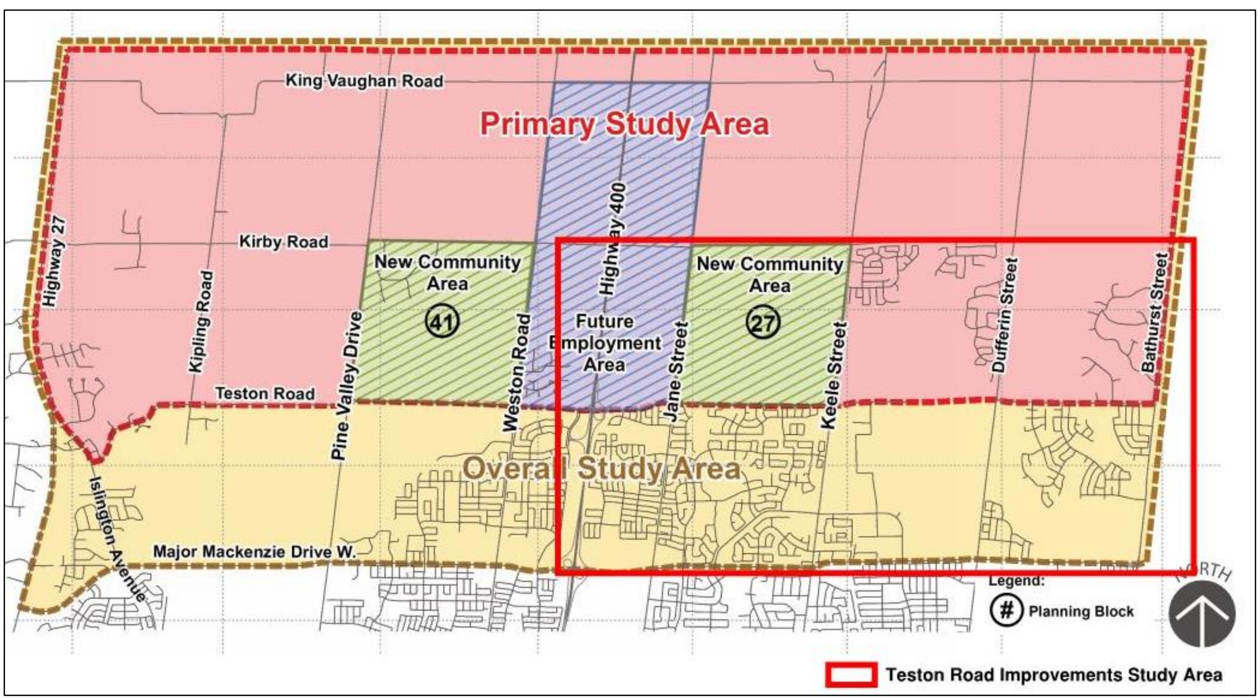

Figure 5-3: North Vaughan & New Communities TMP Study Area (City of Vaughan, 2019a)

5.2.5 Other Related Planning Context Components

5.2.5.1 Previous Environmental Assessments

Widening & Reconstruction of Teston Road (Y.R. 49) from Pine Valley Drive (Y.R. 57) to Bathurst Street (Y.R. 38) Environmental Assessment (2003)

A Class Environmental Assessment (Schedule C) for the Widening and Reconstruction of Teston Road (Y.R. 49) from Pine Valley Drive (Y.R. 57) to Bathurst Street (Y.R. 38) was completed and approved in 2003 (**Figure 5-4**). The rationale for this project was to address the future transportation issues that would arise as a result of continued growth and proposed urban development in the Teston Road area as well as within the Regional Municipality of York. While the study area encompassed Teston Road from Pine Valley Drive to Bathurst Street, it was determined at the time that the most appropriate approach for the section of proposed Teston Road corridor between Keele Street and Dufferin Street was to "Do Nothing". Although desirable from a transportation planning perspective, potentially significant financial and environmental issues were raised as concerns by approving agencies which was recognized would require more detailed study to resolve.

Key background studies were carried out which determined the need for the widening and reconstruction of the corridor to meet projected travel demand and transportation system capacity issues identified within the Teston Road corridor, and more broadly in the York Region.

As part of the 2003 EA, the recommended design included increased capacity within the Teston Road corridor between Bathurst Street and Dufferin Street in the east, and between Keele Street and Pine Valley Drive in the west (**Figure 5-4**). The study determined that widening of Teston Road was the only option available to address deficiencies and satisfactorily accommodate the projected demand within the planning period. Provision of a 2-lane rural cross-section with a 4.0 metre flush median was recommended for the Dufferin Street to Bathurst Street segment of the Teston Road corridor. A full access interchange at Highway 400 with the provision of a 4-5 lane urban cross-section to accommodate urban expansion was identified for the segment of Teston Road between Keele Street and Weston Road. The western extent of the Teston Road study area from Weston Road to Pine Valley Drive was recommended to be upgraded to a 2-lane rural cross-section.

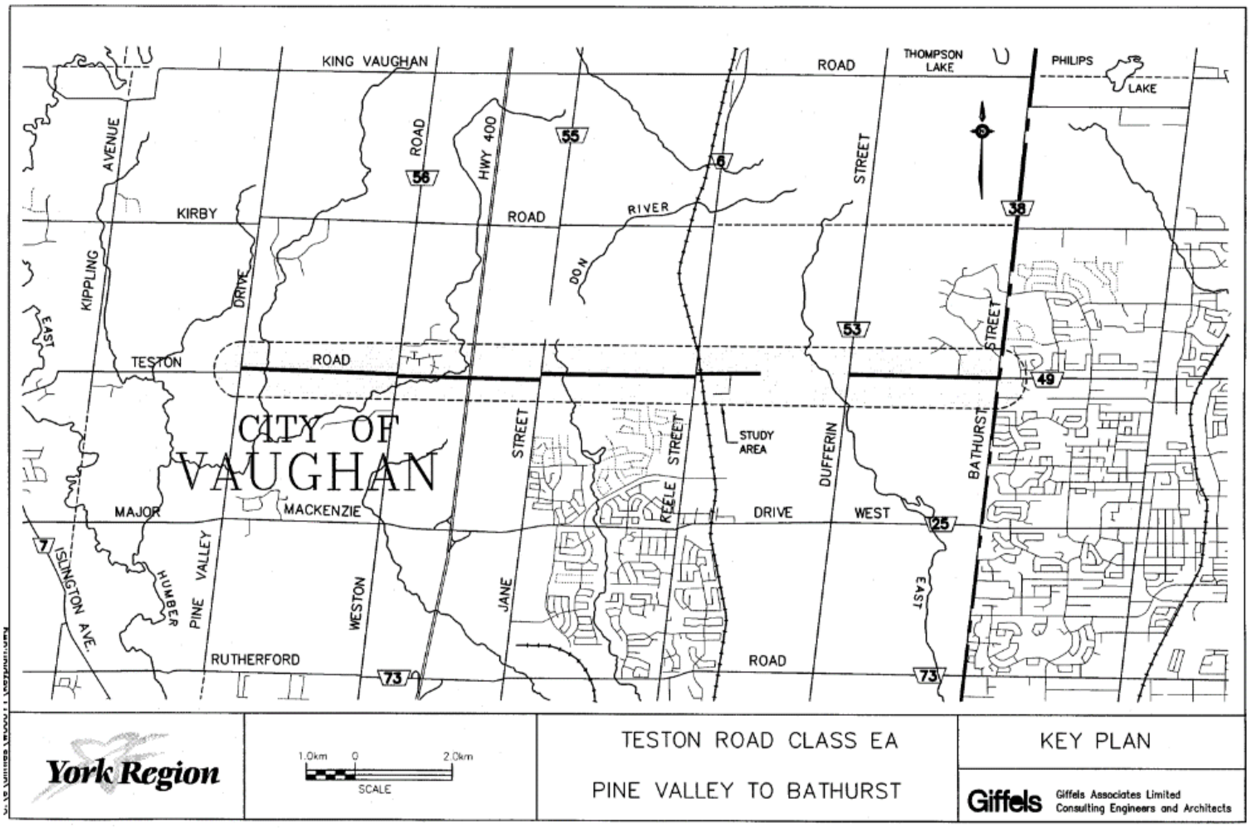

Figure 5-4: Teston Road (Pine Valley to Bathurst Street) Class Environmental Assessment Study Area (2003)

Dufferin Street Class Environmental Study (2019)

In 2019, York Region completed a Class Environmental Assessment to identify and confirm recommended improvements to Dufferin Street from Langstaff Road to Teston Road in the City of Vaughan. York Region's 2016 TMP identified the need to improve the corridor to accommodate population and employment growth. The 2016 TMP identified the need to improve Dufferin Street from Langstaff Road to Marc Santi Boulevard and from Sir Benson Drive to Teston Road by 2031. The study put forward a preferred design to address the identified capacity deficiencies along this 6 km section of Dufferin Street which included a four-lane undivided roadway with bicycle lanes and sidewalks on both sides at Teston Road (**Figure 5-5**).

Figure 5-5: Preferred Design, Typical Cross-Section (Sir Benson Drive to Teston Road)

5.2.5.2 Other Environmental Assessments

There are several other (and some ongoing) EAs within and in proximity to the study area. Though these EAs involve assessments of planned improvements identified within the Official Plans of either York Region or the City of Vaughan for the most part, it is recognized that they may affect the future conditions within the study area.

The IEA study will ensure the recommendations for these EAs are incorporated should they be available. Otherwise, reasonable assumptions will be made based on available information. A preliminary list of other EAs within and in proximity to the study area includes:

- York Region's EA for Teston Road, Pine Valley Drive to Weston Road (Approved November 2016 – Construction Completion Anticipated in 2024)
- York Region's EA for Major Mackenzie Drive, McNaughton Road/Avro Road to Keele Street (Approved December 2018 – Construction Completion Anticipated in 2024)
- City of Vaughan's EA for the Kirby Road Widening between Jane Street and Dufferin Street and the Grade Separation of the Barrie GO Line at Kirby Road (Approved July 2022).
- City of Vaughan's EA for Kirby Road Extension between Bathurst Street and Dufferin Street (Approved October 2019 – Construction Completion Anticipated in 2026).
- City of Vaughan's EA for North Maple Community Bridge (Approved December 2013 – Construction Anticipated To Begin in 2023)
- Metrolinx Barrie Rail Corridor Expansion, Transit Project Assessment Process (Approved August 2017).

City of Vaughan EA for the North Maple Community Bridge

The City of Vaughan is conducting a Class EA study in accordance with the Schedule 'C' requirements to evaluate alternative design concepts for the North Maple Community Bridge to address multi-modal transportation needs within the broader North Maple Community. The ESR was open for public review in February 2014 and construction is anticipated to begin in 2023.

York Region EA for Teston Road From Pine Valley Drive to Weston Road

Improvements to Teston Road from 250 metres west of Pine Valley Drive to Weston Road in the City of Vaughan began in November 2022 to accommodate growth. Improvements to Teston Road include widening the road to four lanes, addition of new traffic signals, installation of active transit facilities, street lighting, streetscaping, and tree planting, and construction of a new 45-metre span bridge at Purpleville creek. Construction is anticipated to be completed in Summer 2025.

Metrolinx EA for the Barrie Rail Corridor Expansion

Metrolinx conducted an Environmental Project Report in 2017 in accordance with the Transit Project Assessment Process (TPAP), which is regulated under the Environmental Assessment Act (EAA). The expansion of the Barrie Rail corridor will add a second track between Lansdowne Avenue in Toronto and Allandale Waterfront GO Station in Barrie. It also includes upgrades to nine existing GO Stations, as well as to existing structures within the corridor. The expansion will enable increased GO service on the Barrie Line.

York Region EA for the Major Mackenzie Drive Improvements from McNaughton Road to Keele Street

York Region is investing in building a safe, efficient, and reliable regional transportation network for users. Improvements to Major Mackenzie from McNaughton Road to Keele Street began in Spring 2023 and was completed in Winter 2024, and included widening and reconstructing Major Mackenzie Drive, installing a new centre turning lane and eastbound right turn lane at Keele Street, upgrading all intersections including installing new traffic signals, installing active transit facilities and streetscaping.

City of Vaughan EA for the Kirby Road Extension between Bathurst Street and Dufferin Street

The City of Vaughan completed a Schedule ‘C’ Municipal Class EA to extend Kirby Road between Dufferin Street and Bathurst Street as a four-lane roadway. An ESR was created in 2019 to determine the alignment and characteristics of a planned easterly extension of Kirby Road from Dufferin Street to Bathurst Street in the City of Vaughan. The Kirby Road extension project was awarded to a design-build contractor in April 2023 and construction is anticipated to be complete by Summer 2026.

City of Vaughan EA for the Kirby Road Widening between Jane Street and Dufferin Street

The City of Vaughan completed a Schedule ‘C’ Municipal Class EA to address capacity and operational needs and accommodate planned growth in the area for pedestrians, cyclists, transit users and motorists. An environmental study report (ESR) was created in June 2022 and open to public review in July 2022. The recommended Kirby Road improvements include widening from two to four lanes and urbanization, in-boulevard cycle tracks and sidewalks on both sides of the road, eliminating the jog at Kirby Road and Jane Street, and the grade Separation (underpass) of the Barrie GO Rail line.

5.2.5.3 Conservation Authority Act

The *Conservation Authorities Act* provides for the creation of Conservation Authorities throughout the Province of Ontario. Under the *Conservation Authorities Act*, Conservation Authorities are empowered to regulate development; interference with wetlands and alterations to shorelines and watercourses, and to provide technical expertise on flood and erosion control, stormwater management, and the protection of natural features and functions within their respective watersheds (Toronto and Region Conservation Authority (TRCA), 2008).

It is noted that the study area is wholly within the jurisdiction of the Toronto and Region Conservation Authority (TRCA). One of its primary objectives is to prevent the loss of life and property due to flooding and erosion. Accordingly, the TRCA administers a natural hazard-based Regulation (i.e., *Ontario Regulation 166/06: Development, Interference with Wetlands and Alterations to Shorelines and Watercourses*) that captures watercourses, river and stream valleys, the Lake Ontario Shoreline, wetlands, and potential areas of interference around wetlands (TRCA, 2008).

Under the IEA process, the TRCA will be consulted and engaged, and requested to provide review and technical expertise to the study team. In addition, the TRCA will participate in the review of the EA Report during the review process. Depending on the final alternative solution selected, the TRCA may also need to issue a permit for the Project prior to construction. This will be reviewed later in the IEA process once a solution has been selected.

Humber River Watershed Plan

The last Humber River Watershed Plan, Pathways to a Healthy Humber, was completed in 2008. TRCA is in the process of developing a new watershed plan for the Humber River. The Humber River watershed is approximately 90,257 hectares in size and is the largest watershed in TRCA's jurisdiction. It is the only Canadian Heritage River in the Greater Toronto Area. This plan will use the most recent data and science to understand the current conditions of the watershed (including habitat quality and quantity, water quality, flooding, and erosion issues) and provide insight on the future conditions of the watershed (i.e., improve, stay the same, deteriorate, or significantly deteriorate) based on potential land use and climate scenarios. The watershed plan will be used to inform various TRCA and municipal initiatives including land use and infrastructure planning, ecosystem restoration and management, and green infrastructure initiatives.

Don River Watershed Plan

The Don River Watershed Plan, Beyond Forty Steps was completed in 2009 by TRCA. The Don River flows through the heart of Canada's largest urban area, with its two tributaries flowing south through the Cities of Vaughan, Markham, and Richmond Hill. Almost half of the watershed is devoted to housing, and a fifth to industrial, institutional or commercial development. Three guiding principles were developed for the Don River Watershed Plan; building communities to restore water balance and improve sustainability of the urban model, regenerating the aquatic and terrestrial landscapes; and engaging the attention, enthusiasm and support of the people of the Don River watershed.

5.2.5.4 GTA West Study (Highway 413)

MTO is in the process of confirming the Preferred Route for a new 400-series highway and transit corridor across York, Peel and Halton regions. The new highway will connect with Highway 400, somewhere north of the Teston Road interchange.

The GTA West corridor will include an up to six lane 400-series highway, separate infrastructure dedicated for transit and passenger stations, as well as intelligent transportation features and truck parking. **Figure 5-6** illustrates the GTA West route planning study area.

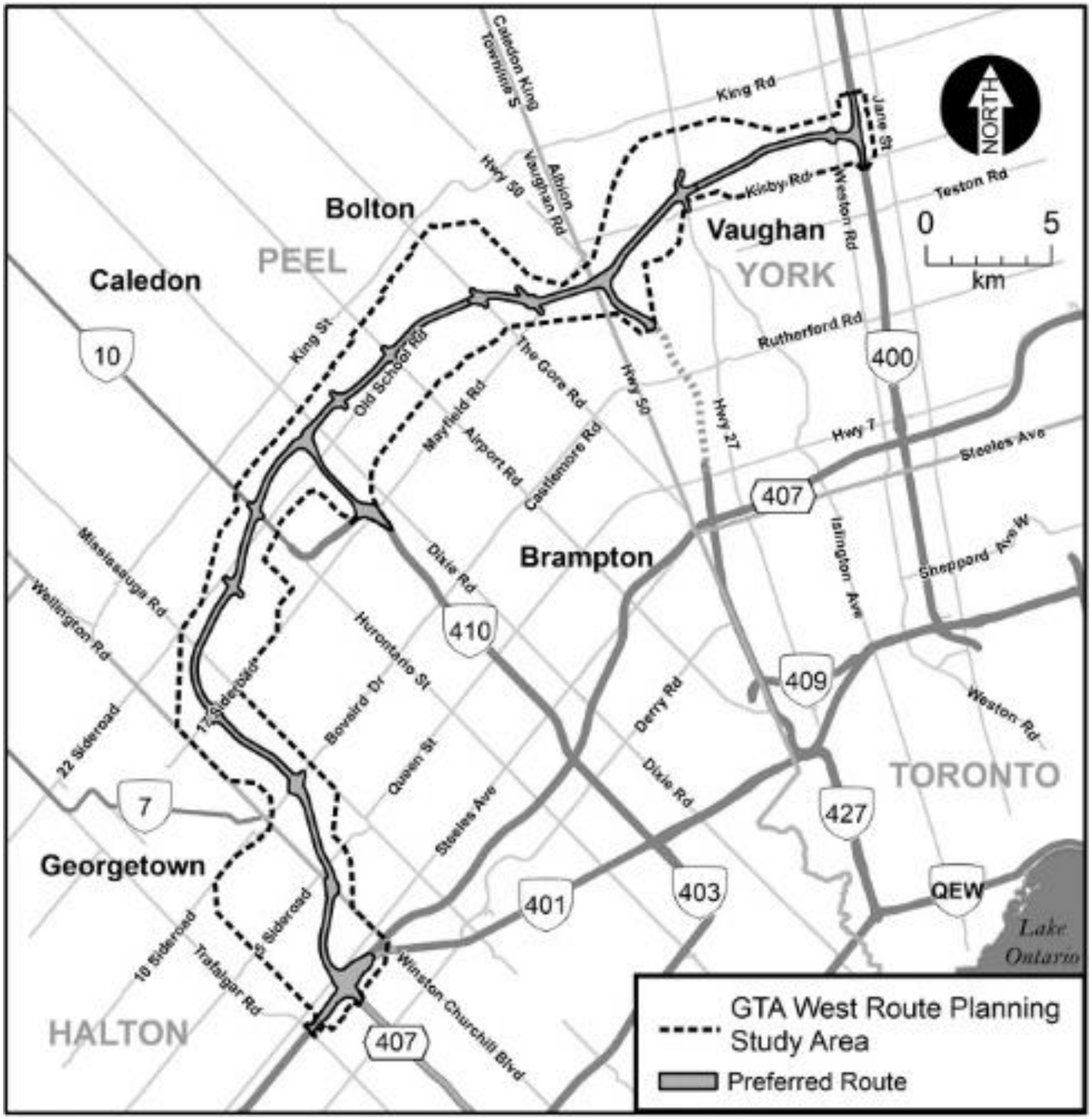

Figure 5-6: GTA West Route Planning Study Area

5.2.6 Summary of the Planning & Policy Framework

The Teston Road Area Transportation improvements are being undertaken to improve the efficiency, safety, and continuity of the transportation network within the study area. According to the York Region Official Plan, the region is expected to experience population growth, along with this growth comes the need to increase infrastructure, such as the Teston Road Area Transportation improvements, to meet the demands of the growing communities.

The project aims to solve concerns regarding accommodating growth through infrastructure, aligned with A Place to Grow (2019), the Teston Road Area Transportation improvements will provide connectivity among transportation modes, offer a balance of transportation choices, and help reduce emissions. Based on the projected needs for the study area, without the Teston Road Area Transportation Improvements, parallel roads such as Kirby Road and Major Mackenzie Drive will become over congested. The Teston Road improvements will address congestion and out-of-way travel currently faced by commuters attempting to access Highway 400. Improvements are supported by the PPS (2020) which aims to ensure the necessary infrastructure and public service facilities will be able to meet current and project needs.

The project falls within the Oak Ridges Moraine boundary which aims to protect, restore, and enhance the integrity of the Oak Ridges Moraine's ecological and hydrological features and functions. The Teston Road Area improvements will avoid environmental effects where possible, and mitigation measures will be taken to minimize impacts.

The Teston Road Area Improvements is an Urban Regional Designated Area as classified by York Region's TMP. Section 9.3.5 of the TMP addresses the need to complete several missing links within the Regional road network, including the continuation of Teston Road between Keele Street and Dufferin Street. The discontinuous roadway is also part of the regional cycling network. The current network requires out of way travel by cyclists and pedestrians, the continuation of Teston Road will improve the cycling network's connectivity and allow cyclists and other active transportation users to connect to the North Maple Regional Park. The Teston Road area improvements will improve connectivity and help to accommodate predicted growth. The York Region 2041 Transportation Master Plan aims to increase transit within the region, designating the Teston Road corridor between Keele Street and Bathurst Street, as a frequent transit network. The Teston Road improvements will allow for increased public transit travel, diversifying options for travelers and working to reduce vehicle emissions.

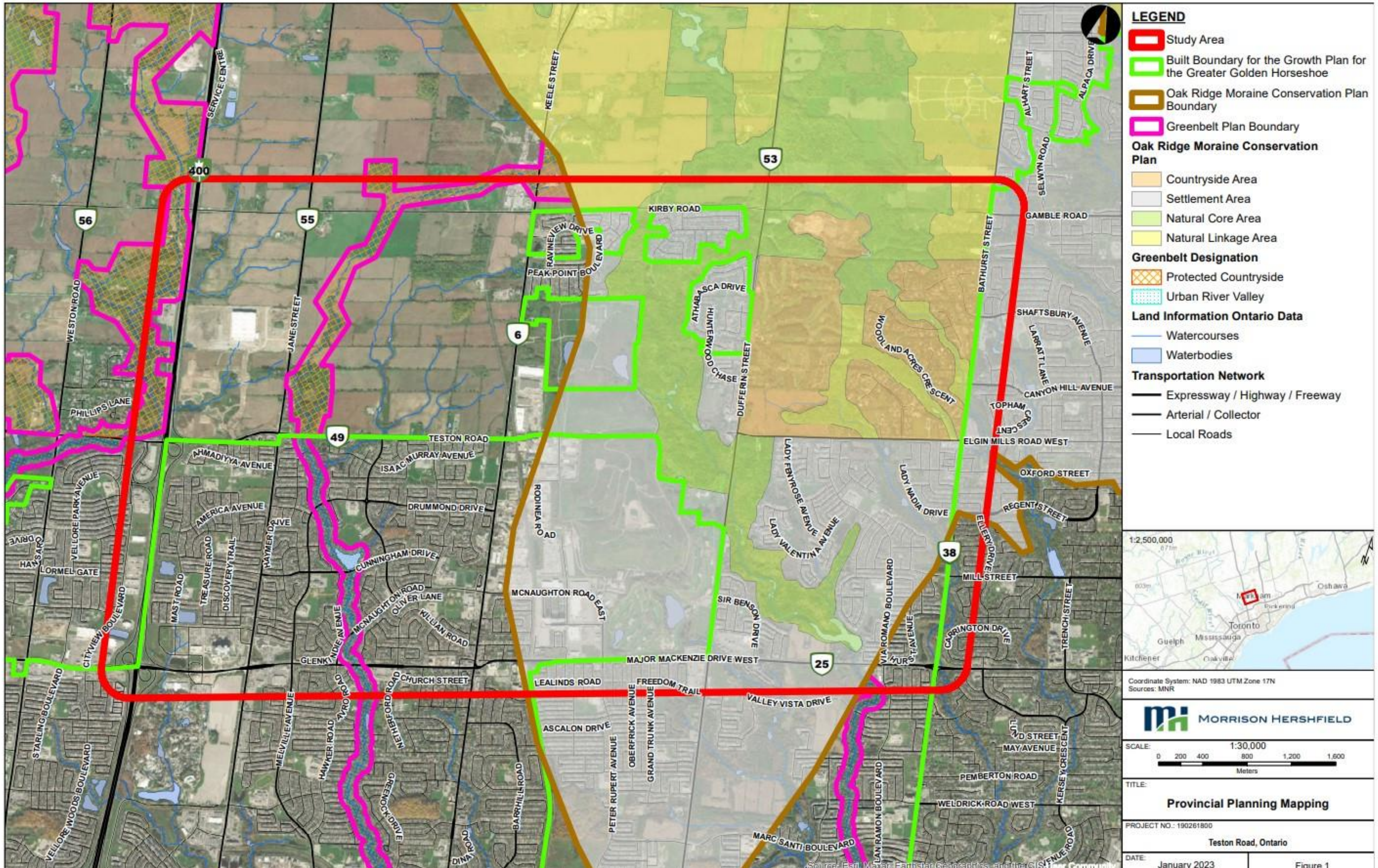

Figure 5-7: Summary of Mapping & Policy Framework

5.3 Natural Environment

5.3.1 Aquatic Environment

5.3.1.1 Fish & Fish Habitat

A review of available background data as well as preliminary field investigations have confirmed that there are multiple areas of important aquatic habitat within the overall IEA study area.

- The overall IEA study area contains the headwaters of the East Don River, specifically the area within the McGill Area Environmental Significant Area (ESA #73) within the Teston Road gap between Keele Street and Dufferin Street. The tributary within this location contains permanent water flow that originates from Maple Down Pond and Maple Ridge Pond, as well as natural wetland habitat west of Hunterwood Chase Road.
- The headwaters within the study area also contain various stream features such as historical ponds, ground water seeps and springs, and the presence of watercress.
- Fish were present in the headwater streams within the Teston Road gap between Keele Street and Dufferin Street, confirming that this area provides permanent fish habitat.

Redside Dace (*Clinostomus elogatus*) have been recorded by Fisheries and Oceans Canada, the Ministry of Natural Resources and Forestry (MNRF) Natural Heritage Information Centre, and Land Information Ontario as occurring within multiple tributaries within the Don River East Branch. Preliminary field investigations have determined that suitable habitat for Redside Dace is present within the Don River East Branch.

No fisheries surveys were completed in year 2021. Fisheries surveys in 2022 were focused on the Don River East Branch located west of Dufferin Street (Site 1) as well as the two watercourse crossings along Teston Road between Dufferin Street and Bathurst Street (Site 2 and 3). Locations of the Sites are shown in **Figure 5-8** and **Figure 5-9**.

Figure 5-8: Aquatic Existing Conditions Site 1

Figure 5-9: Aquatic Existing Conditions Sites 2 & 3

Site 1 – Don River East Branch Located West of Dufferin Street

This stretch of aquatic habitat is located within the natural area west of the Teston Road and Dufferin Street intersection. The detailed aquatic and fisheries habitat survey was completed for this area on August 18, 2022. The area of investigation included a 200m channel reach within the expected path of the construction of the new bridge, downstream of the private pond and dam.

This study area contains the headwaters for the East Don River. The surveyed reach was a defined channel as it flowed through a mixed forest directly downstream of the private pond, before opening into open marsh habitat and continuing southeast towards Dufferin Street where it crosses just north of the Eagles Nest Golf Course. The pond dam acts as a barrier to fish movement, however a small branching channel flows to the west around the pond connecting the tributary to the upstream habitat. The main channel contained permanent flow and consisted of 100% run habitat, with a mean wetted depth of 3cm and a mean wetted width of 40cm. The bankfull depth was approximate 12cm and the bankfull width was approximately 3.8m. The substrates consisted primarily of silt, followed by sand, detritus, and boulders. The banks in this area are moderately unstable and show signs of erosion. In-stream cover was dominated by instream and overhanging woody debris, while instream and overhanging vegetation and organic debris were also present. Emergent vegetation was present within the marsh habitat and consisted primarily of Reed Canary Grass (Phalaris arundinacea) and Common Jewelweed (Impatiens capensis). Iron staining was present approximately 100m downstream of the dam within the marsh area, indicating groundwater upwelling is present.

The sediment substrate, which was found within the channel primarily 50-80m downstream from the dam where the channel gradient declines, appeared unnatural compared to the native substrate further downstream. This indicated the dam and pond may be holding and subsequently releasing sediment during large rainfall or snowmelt events.

Fisheries sampling was completed within the channel, which resulted in the capture of Blacknose Dace, confirming that this channel provides direct fish habitat.

Site 2 – Tributary of Don River East Branch, Culvert Crossing Teston Road West of Saul Court.

This tributary flows from north to south through a 7.5m wide and 1.5m high box culvert under Teston road, 70m west of Saul Court. The channel upstream (north) of Teston Road is small, incised channel within dense cattails (Typha spp.) and Common Reed (Phragmites australis ssp. australis). The channel contained permanent flow and was 100% run habitat, with a wetted depth of 10cm and a wetted width of 15cm. The substrate consisted of muck and detritus. The dense vegetation provided 100% shore cover. Permission to Enter upstream of Teston Road was not available and this area may need further studies at later design stages.

Downstream (south) of Teston Road the channel leads south through private property where it is crossed by a privately owned bridge approximately 7m wide consisting of three corrugated steel pipe Culverts. This reach is 100% flats habitat and had limited to no flow with a mean wetted depth of 7cm and a wetted width of 80cm. The bankfull depth was 17cm and the bankfull width was 4m. The dominant substrate was silt, with detritus also present. In stream cover was abundant and included in stream and overhanging vegetation and woody debris, as well as organic debris. The emergent vegetation consisted of cattails and upland species, and duckweed (Lemna sp.) was also present floating vegetation as the channel was not flowing.

Fisheries sampling was not completed at this site as the water depth was insufficient to sample upstream of Teston Road, and downstream of the bridge is classified as Occupied Redside Dace Habitat and therefore sampling this reach is prohibited by MNRF. No fish were seen during the survey and low water levels as well as dense vegetation suggest fish passage is unlikely within the sampled reach.

Site 3 – Tributary of East Don River, Culvert Crossing Teston Road at Bathurst Street

This tributary flows from north to south into a 1.4m concrete pipe inlet located 60m west of Bathurst Street. The tributary is then piped underground southwest approximately 325m where it emerges to join a second East Don River tributary. The channel was flowing during the spring survey and dry during the summer survey, indicating this channel is intermittent or ephemeral in nature. Landowner access beyond the right of way was not granted and the site survey were completed from within the right of way. From the culvert inlet to the edge of the right of way, the substrate consists of cobble, silt, and boulder, beyond the right of way the channel is low gradient and silt is dominant. Fisheries sampling was not completed at this site as conditions were dry, and no fish were observed during visual surveys.

5.3.2 Terrestrial Environment

5.3.2.1 Designated Natural Areas

A review of background documents received from the MNRF pertaining to designated natural areas located along the limits of the existing and future extension of Teston Road was completed, which included an *Inventory of the Life Science Maple Uplands & Kettle Wetlands and Earth Science Oak Ridges Moraine Maple Spur Areas of Natural and Scientific Interest, City Of Vaughan, Ontario* (MNRF, 2000) and *Provincially Significant East Don River Headwater Wetland Complex Summary* (GEM Services Inc., 2019).

Life Science Maple Uplands & Kettle Wetlands & Earth Science Oak Ridges Moraine Maple Spur Areas of Natural & Scientific Interest

According to the *Inventory of the Life Science Maple Uplands & Kettle Wetlands and Earth Science Oak Ridges Moraine Maple Spur Areas of Natural and Scientific Interest,* the Maple Uplands & Kettle Wetlands are significant due to the earth science features present, as it contains kettle and meltwater channel features characteristic of moraine physiography. During de-glaciation, most of the area was occupied by a large block of glacial ice, which melted to leave behind a large, flat-bottomed depression or “kettle”, which occupies the central portion of the site and is the basis for selection of the area as being regionally significant. Around the large kettle formation, the landscape is dotted with small kettle depressions underlain by peat and muck deposits, which sustain a variety of wetlands.

The kettle is characterized by a number of narrow spillway or meltwater channels, of which the largest and best developed is a well-defined valley system, which forms the headwaters of the East Don River. The sand deposits in this area constitute a highly sensitive recharge area, which discharges in the southern part of the ANSI and further south providing a major headwater source for the East Branch of the Don River; waters percolating into the highly permeable sands of the ANSI are discharged in the ANSI and to the south, as headwater sources for the Don River watershed. River valleys such as the East Don River provide important ecological corridors and play an important role in maintaining ecological functions, by allowing for the physical passage and genetic flow of animals and plants.

This ANSI is also noteworthy for its high diversity. Its forests are largely intermediate aged to semi-mature, with some trees in excess of 100 years old, and with no recent logging activity. The large forest area provides critical forest interior habitat (i.e., forest habitat at least 120m from a forest edge) for area sensitive species that depend on this rare habitat type.

Provincially Significant East Don River Headwater Wetland Complex

According to the *Provincially Significant East Don River Headwater Wetland Complex Summary*, wetlands are considered rare in this region (i.e., Ecoregion 6E), with an estimate of only 6% wetland land cover. The East Don River Headwater Wetland Complex received a high score for its hydrological component, as the wetlands in the complex contribute to flood attenuation, short term water quality improvement, long term nutrient trapping, and groundwater recharge and discharge in the area. The wetlands constitute 81% of all of the water detention or storage areas in the East Don River upstream catchment, which covers an area 654 ha in size. Most of the wetlands are hydrologically linked to one another by watercourses within the complex.

Wildlife has been noted moving between wetlands within the PSW complex, as well as between the wetlands and surrounding upland habitats. The wetlands have been shown to support and sustain numerous provincially significant species and/or SAR, such as Redside Dace, Barn Swallow, Midland Painted Turtle, Wood Thrush, and Eastern Wood-Pewee. Furthermore, the wetlands provide stopover habitat for migrating waterfowl, and support breeding Wood Ducks (*Aix sponsa*), Mallards (*Anas platyrhynchos*), and Canada Geese (*Branta canadensis*). The East Don wetlands also support breeding populations of amphibians. These amphibians require wetlands for breeding and forested habitats for feeding and hibernating, and they need to be able to travel between these habitats seasonally. In addition to the travel corridors between breeding wetlands and upland habitats, there are also wildlife corridors along the forested East Don River valley corridor and its tributaries.

McGill Area Environmental Significant Area

The McGill Area Environmental Significant Area #73 is 344ha in size and contained within the Don River watershed. Environmental Significant Areas, such as the McGill Area Environmental Significant Area #73, are conservation lands owned by TRCA, protecting features such as valley and stream corridors, flood plains, and Lake Ontario shore lands.

Oak Ridges Moraine

According to the *Oak Ridges Moraine Conservation Plan* (Ontario, 2017), the purpose of Natural Core Areas identified within the Oak Ridges Moraine (ORM) plan area is to maintain, and where possible improve or restore, the ecological integrity of the plan area, by maintaining (and where possible improving or restoring) the health, diversity, size, and connectivity of key natural heritage features, key hydrologic features and the related ecological functions (Ontario, 2017).

The purpose of Natural Linkage Areas identified within the ORM plan area is to maintain, and where possible improve or restore, the ecological integrity of the plan area, and to maintain (and where possible improve or restore) regional-scale open space linkages between Natural Core Areas and along river valleys and stream corridors, by, maintaining (and where possible improving or restoring) the health, diversity, size, and connectivity of key heritage features, key hydrologic features and the related ecological functions (Ontario, 2017).

The purpose of Countryside Areas identified within the ORM plan area is to encourage agricultural and other rural uses that support the Plan's objectives by protecting prime agricultural areas, promoting and protecting agricultural and other rural land uses and normal farm practices, maintaining the rural character of rural settlements, protecting and restoring natural areas and features that sequester carbon and provide ecological functions (including water storage) to help reduce the impacts of climate change, and maintaining existing public service facilities and adapting them, where feasible, to meet the needs of the community (Ontario, 2017).

The purpose of Settlement Areas identified within the ORM plan area is to focus and contain urban growth by encouraging the development of communities that provide their residents with convenient access to an appropriate mix of employment, transportation options and local services and a full range of housing and public service facilities (Ontario, 2017).

York Region Significant Woodlands

According to *York Region Significant Woodlands Study* (NSEI, 2005), woodlands (sometimes called forests) satisfying any of the following are recommended as being significant in York Region: any woodland that supports any rare or vulnerable (G1, G2, G3, S1, S2, or S3) "plant or animal species or community, as designated by NHIC, or any SAR designated by Committee on the Status of Endangered Wildlife in Canada (COSEWIC) or Committee on the Status of Species at Risk in Ontario (COSSARO) as Threatened, Endangered, or of Special Concern, any woodland that is within 30 metres of a watercourse, surface water feature or evaluated wetland, and any woodland over 2 ha in size that is within 100 metres of another significant feature or that occurs within the Regional Greenlands System…". The Significant Forests within the Technically Preferred Alternative limits would meet all of these criteria, based on the results of the terrestrial field investigations described herein.

The features and functions of the Significant Forests, ORM plan areas, ANSIs, and PSW in the Teston Road area also contribute to these same general areas being included as part of York Region's Regional Greenlands System.

5.3.2.2 Ecological Land Classification

Based on MH's field investigations, a total of 44 different ELC communities were confirmed within the focal study area, which also contains the west portion of the Technically Preferred Alternative study area from Keele Street to Dufferin Street. Almost half (20/44) of these communities were considered communities of Conservation Concern by the TRCA. Refer to the Natural Environmental Report in **Appendix E** for ELC mapping of the focal study area.

5.3.3 Vegetation & Flora

5.3.3.1 Tree Inventory

The tree inventory has been divided into two sections; the individual tree inventory along York Region's right-of-way, and the prism sweeps within the woodland feature between Keele Street and Dufferin Street. To determine tree ownership within the Tree Inventory Study Area, parcel fabric was available to download from the Region's open data platform, illustrating the general right-of-way and private property linework.

Individual Street Tree Inventory

A total of seven hundred and forty-six (746) individual trees were inventoried and assessed within and outside the Tree Inventory Study Area. **Table 5-4** below provides a summary of tree locations within and outside the Tree Inventory Study area. The survey consisted of trees with Diameter at Breast Height (DBH) measurements ranging from 2cm to 184cm; the average DBH was 16cm. Most defects observed were caused either by human interference such as mechanical damage or natural occurrences including insects, weather events, and natural environmental conditions.

Table 5-4: Summary of Tree Locations Within the Tree Inventory Limits

Ownership	Trees within Preliminary Design (Impact Area)	Trees within the Buffer Area (10m)	Trees Located Outside the Tree Inventory Study Area	Total
York Region (ROW Trees)	272	131	20	**423**
Private Property	75	195	34	**304**
Shared (York Region & Private Property)	13	6	0	**19**
Total	**360**	**332**	**54**	**746**

Prism Sweep Inventory

A total of thirty-eight (38) prism sweep survey locations were plotted within ten (10) ELC communities within the woodlot between Keele Street and Dufferin Street. A total of five hundred and twenty-four (524) individual trees were identified within the 38 survey locations.

As individual trees were not surveyed within the woodlot at the time of the Preliminary Design, the values from the total basal area were extrapolated to calculate the stand basal area for each ELC community. Stand basal area is the total cross-sectional area of all stems in an ecosystem typically expressed in m^2 per hectare and provides a general overview of how dense the forested community is with respect to trees.

The most densely forested ELC community within the woodland feature was the Fresh-Moist Hemlock - White Pine Coniferous Forest (FOC3-A), with an average stand basal area of $50m^2$. The most abundant tree species identified were Eastern White Pine (*Pinus strobus*), Black Cherry (*Prunus serotina*) and Trembling Aspen (*Populus tremuloides*). The least densely forested ELC community within the woodland feature was the White Pine – Successional Savannah (CUS1-A2) with Eastern White Pine, White Spruce (*Picea glauca*) and Black Walnut (*Juglans nigra*) dominating the canopy.

5.3.3.2 Rare Vegetation & Flora

A total of 136 plant species were recorded by MH within the focal study area, of which just over 20% (28 species) were considered species of Conservation Concern by the TRCA. In addition, three (3) Butternuts, a species listed as Endangered and protected under the Endangered Species Act (ESA) 2007, were recorded in the focal study area. One (1) of the three (3) Butternuts, which was located west of the east end of the existing section of Teston Road and west of Dufferin Street (a sapling), was later determined to have been removed as a result of tree clearing within a Rural Property (CVR-4) that had been completed as part of an unrelated project. The other two (2) Butternuts (both larger trees) were not located within the Technically Preferred Alternative study area limits during the 2022 studies after they were documented the year before, therefore, the status of these two (2) trees has not been ascertained since 2021.

As of January 26, 2022, Black Ash (*Fraxinus nigra*) was listed as Endangered under the ESA. Black Ash was recorded in the focal study area near the Breeding Bird Survey #13 within the White Cedar – Conifer Mineral Coniferous Swamp (SWC1-2) community extending into the Technically Preferred Alternative limits during the field surveys, though was not listed under the ESA at the time it was observed in 2021.

5.3.4 Wildlife

5.3.4.1 Significant Wildlife Habitat

A number of potential and confirmed SWH types have been identified in proximity to the proposed project, particularly within the Technically Preferred Alternative study area, where the project impacts are proposed.

The study area is located within Ecoregion 6E. There are four (4) categories of provincially SWH within Ecoregion 6E according to the Significant Wildlife Habitat Technical Guide (MNRF, 2000) and the Significant Wildlife Habitat Eco-Regional Criterion Schedule for Ecoregion 6E (MNRF, 2015), including:

- Seasonal Concentration Areas of Animals
- Rare Vegetation Communities or Specialized for Habitat for Wildlife

- Habitat for Species of Conservation Concern (Not including Endangered or Threatened Species)
- Animal Movement Corridors

Season Concentration Areas

Some species of animals gather together from geographically wide areas at certain times of the year. This could be to hibernate or to bask (e.g., some reptiles and bats), over-winter (e.g. deer yards), or to breed (e.g. Bullfrog breeding and nursery areas, bird breeding colonies). Maintenance of the habitat features that result in these concentrations can be critical in sustaining local or even regional populations of wildlife.

Based on the results of the field surveys completed, the habitat and ELC communities present, and site conditions observed, candidate (i.e., potential) Seasonal Concentration Areas of Animals identified included Shorebird Migratory Stopover Areas, a Raptor Wintering Area, Bat Maternity Colonies, Turtle Wintering Areas, Reptile Hibernacula, and Colonially - Nesting Bird Breeding Habitat (Tree/Shrubs).

The shorelines of watercourses and wetlands present act as a Shorebird Migratory Stopover Area. The large tracts of forest and grassland present may act as a Raptor Wintering Area, and both Red-tailed Hawk and American Kestrel have been observed during the summer field surveys and also have the potential to be present during the winter. Numerous potential maternity roost trees for bats have been documented and, given the abundance and quality of available habitat present, it is likely that Bat Maternity Colonies are present. Wetlands and watercourses present may provide Turtle Wintering Areas, and both Snapping Turtles and Midland Painted Turtles have been observed in the area. There may be numerous opportunities for Reptile Hibernacula in the area (e.g., rock piles or fissures, in wetlands) and two (2) Eastern Gartersnakes were observed basking in early spring in the forest west of the East Don River, indicating that this SWH is present. Wetlands and forests in the area may potentially provide Colonially - Nesting Bird Breeding Habitat, particularly for Green Herons (*Butorides virescens*) and Great Blue Herons (*Ardea herodias*), the latter of which has been confirmed in the area.

Rare Vegetation Communities & Specialized Habitat for Wildlife

Rare Vegetation Communities often contain rare species, particularly plants, which depend on those habitats for survival and cannot readily move or find alternative habitats. There were no Rare Vegetation Communities identified within the study area. As a result of the field surveys, Rare Vegetation Communities were confirmed to be absent within the Technically Preferred Alternative study area.

Based on the field survey results and the site conditions, several candidate Specialized Habitats for Wildlife were identified, including Waterfowl Nesting Areas, Bald Eagle, and Osprey Nesting, Foraging, and Perching Habitat, Woodland Raptor Nesting Habitat, Turtle Nesting Areas, Seeps and Springs, Amphibian Breeding Habitat (Woodlands), Amphibian Breeding Habitat (Wetlands), and Woodland Area Sensitive Breeding Bird Habitat.

Wetlands and surrounding upland areas proximal to the project may contain Waterfowl Nesting Areas, particularly for species such as Wood Duck and Mallards, as noted within *Provincially Significant East Don River Headwater Wetland Complex Summary*. Osprey Nesting, Foraging, and Perching Habitat may be available, as nesting and foraging habitat is present in proximity to each other, and Ospreys were observed foraging over open water and wetlands along the East Don River during several site visits. The continuous forest along the East Don River is large (>30ha) and includes interior habitat, therefore it may provide Woodland Raptor Nesting Habitat for several species. Lands adjacent to wetlands and watercourses have the potential to provide Turtle Nesting Areas, both Snapping Turtle and Midland Painted Turtles have been observed during field surveys, and in a Midland Painted Turtle hatchling was previously observed adjacent to a Duckweed Floating-leaved Shallow Aquatic (SAF1- 3) community (north and west of Dufferin Street near BBS 15) indicating that turtle nesting does occur in the area, though the scale and extent of nesting activity is unknown and the threshold for this SWH could not be confirmed. Seeps have been recorded in headwater areas within the project limits, though the scale and extent of these features are unknown and the threshold for this SWH could not be confirmed. Wetland habitats with permanent water adjacent to woodlands are present and may provide Amphibian Breeding Habitat (Woodlands), and wetlands themselves may provide Amphibian Breeding Habitat (Wetlands). Several amphibian species have been recorded during field surveys that require these habitat types. Interior forest habitat is present along the East Don River and several species indicating Woodland Area Sensitive Breeding Bird Habitat is present have been observed during the breeding season, including Red-breasted Nuthatch, Winter Wren, and Black-throated Green Warblers though the threshold for this SWH could not be confirmed.

Habitat for Species of Conservation Concern

Rare wildlife status is based on species listed as Special Concern under the ESA, Global Rank (G-Rank) or Provincial Rank (S-rank) status, identified through the NHIC. The Significant Wildlife Habitat Technical Guide (MNRF, 2000) suggests that the highest priority for protection should be provided to habitats of the rarest species (on a scale of global through to local municipality); it also states that habitats that support large populations of a species of concern should be considered significant.

Both confirmed and candidate Habitat for Species of Conservation Concern were identified based on the field survey results and the site conditions recorded, including Marsh Breeding Bird Habitat, Open Country Bird Breeding Habitat, and habitat for Special Concern and Rare Wildlife Species.

Marsh habitat is present in proximity to the project and may provide Marsh Breeding Bird Habitat for several species, particularly Green Heron. Large Native Forb Meadow (CUM1-A) communities are present with Savannah Sparrow and Vesper Sparrow determined to be probable breeders in this community during breeding bird surveys, therefore this SWH has been confirmed. Special Concern species observed to date with confirmed habitat in the study area include Barn Swallow, Wood Thrush, Eastern Wood-pewee, Monarch, and Snapping Turtle, therefore habitat for Special Concern and Rare Wildlife Species has been confirmed.

Animal Movement Corridors

Animal Movement Corridors are elongated areas used by wildlife to move from one habitat to another. They are important to ensure genetic diversity in populations, to allow seasonal migration of animals (e.g., deer moving from summer to winter range) and to allow animals to move throughout their home range from feeding areas to cover areas. Animal Movement Corridors in Ecoregion 6E include Amphibian Movement Corridors and Deer Movement Corridors.

No confirmation of Animal Movement Corridors was obtained during the Year 1 surveys. However, potential Amphibian Movement Corridors were noted along the watercourses within the Year 1 study area, as there was interspersed open water and wetland habitats surrounded by naturalized vegetative communities, east of Keele Street from Kirby Road south to Major Mackenzie Drive. No confirmation of Animal Movement Corridors was obtained during the Year 2 surveys either. Potential White-tailed Deer (*Odocoileus virginianus*) movement corridors were identified between the Native Forb Meadow (CUM1-A) communities and the forest communities within the focal study area through evidence of deer observed (i.e., a deer trail, deer beds, deer tracks, and a deer foraging), which are likely locally significant to deer. However, the MNRF is responsible for identifying Deer Movement Corridors as provincially SWH areas and has not identified them in this area. In Year 2, potential Amphibian Movement Corridors and locally significant movement corridors for deer were also noted along the watercourses within the focal study area, where there are interspersed open water and wetland habitats surrounded by naturalized vegetative communities. In Year 3, the same potential movement corridors as in Year 2 were confirmed as being likely, due to continuing evidence of deer as well as persistence of similar site conditions.

Inventory of the Life Science Maple Uplands & Kettle Wetlands and Earth Science Oak Ridges Moraine Maple Spur Areas of Natural and Scientific Interest, City of Vaughan, Ontario, and Provincially Significant East Don River Headwater Wetland Complex Summary each note that river valleys such as the East Don River play essential roles in maintaining ecological functions by providing corridors that allow for the physical passage and genetic flow of animals and plants. The documents further indicate that there are known travel corridors along the East Don River between amphibian breeding wetlands and adjacent upland habitats, as well as movement corridors for wildlife along the forested East Don River valley corridor and its tributaries.

5.3.4.2 Terrestrial Rare & Species at Risk

Ontario's ESA provides protection for species listed as Endangered or Threatened on the Species at Risk in Ontario list, as determined by COSSARO, as well as protection of the habitat of Endangered and Threatened species. The SAR in Ontario list also identifies species of Special Concern, defined as wildlife species that may become Threatened or Endangered because of a combination of biological characteristics and identified threats. Species of Special Concern and their habitats are not protected under the ESA, though are also included in discussion of SAR.

Species are also assigned an L Rank by the TRCA to identify species of regional conservation concern, which are targeted for conservation in the Toronto area, though they do not receive protection, aside from protection of nests, eggs, and individuals that most birds receive under either the Migratory Birds Convention Act (MBCA) or the Fish and Wildlife Conservation Act (FWCA). An L Rank of L1-L3 indicates a species of Regional Conservation Concern (L3 being less so than L2 or L1), L4 indicates a species of Conservation Concern in Urban Areas, and L5 indicates a species is secure throughout the region.

During the background screening 25 terrestrial SAR wildlife were identified as being previously being recorded in the area surrounding the Technically Preferred Alternative, a number of which have potential or confirmed habitats in the Technically Preferred Alternative limits. **Table 5-5** lists the SAR wildlife that were identified during the background screening as being previously recorded in the vicinity, identifies those with confirmed and potential habitat in the Technically Preferred Alternative study area, and provides a description of suitable habitat that exists in the Technically Preferred Alternative study area for each species. The Natural Environment Report provided in **Appendix E** provides a detailed description of each SARs habitat requirements, and an assessment of suitable habitat for each species.

Over the course of the field investigations in all years, 73 species of birds, eight (8) species of mammals, eight (8) species of herpetofauna, and 10 species or family groups of invertebrates have been observed. Of these, the majority are ranked by the TRCA as species of conservation concern and have potential to occur within or adjacent to the Technically Preferred Alternative limits. Within the focal and Technically Preferred Alternative study areas, 39 of the 65 birds observed, three (3) of six (6) mammals, and five (5) of five (5) herptiles were ranked as species of Regional Conservation Concern (L1-L3) or L4 by the TRCA.

Over the course of the terrestrial field surveys, five (5) of the wildlife species observed within or proximal to the Technically Preferred Alternative limits are listed as Special Concern under the ESA, including Barn Swallow, Eastern Wood-Pewee, Wood Thrush, Snapping Turtle, and Monarch. In addition, two (2) wildlife species observed are listed as Threatened under the ESA, including Bobolink, and Eastern Meadowlark. It should be noted that Barn Swallow was previously listed as Threatened under the ESA, at the time of the 2021 surveys, however, it has since been re-listed as Special Concern under the ESA in Ontario.

Barn Swallows were observed foraging at five (5) breeding bird survey locations. Monarch, Eastern Meadowlark, and Bobolink were all observed within the Native Forb Meadow (CUM1-A) community present within the Vaughan landfill. It is also presumed that suitable habitat for these species is present in the City of Toronto's Keele Valley Landfill site to the south, based on conditions observed across the property line. Bobolinks were recorded at four (4) breeding bird survey locations, and Eastern Meadowlarks were recorded at six (6) breeding bird survey locations. Eastern Wood-Pewee and Wood Thrush were observed within several of the forested communities in the tract of forest north and west of Dufferin Street alongside the East Don River. Snapping Turtle was observed basking in open water within a Duckweed Floating-leaved Shallow Aquatic (SAF1-3) community at BBS 10, and Barn Swallows were observed foraging over open water at two (2) locations: north of Teston Road and west of Dufferin Street, and east of Dufferin Street and south of Teston Road.

No additional rare or SAR wildlife were observed during the field surveys. No bird nests were observed within culverts inspected within the Technically Preferred Alternative study area, and no suitable structures for Barn Swallow or Chimney Swift nesting aside from the inspected culverts were identified within the Technically Preferred Alternative study area. During the numerous surveys completed by MH, no vernal or ephemeral pools were observed within the forested communities contained within the within the Technically Preferred Alternative limits. Therefore, these specialized habitat features for salamanders, including Jefferson Salamanders (a species listed as endangered under the ESA), were confirmed to be absent.

Aside from SAR, an additional noteworthy wildlife observation was two (2) Eastern Gartersnakes (*Thamnophis sirtalis sirtalis*) basking together in early spring along a pathway running east to west within the Dry-Fresh Hardwood – Hemlock Mixed Forest (FOM3-1) community located directly east of the Vaughan and City of Toronto landfills, within the Technically Preferred Alternative limits. Given the time of year that these snakes were observed and the suitability of the surrounding habitat features (rocky slope with sun exposure) it is likely that a potential hibernaculum for snakes was located in the vicinity of this observation. However, confirmation of more than five (5) individuals of the same species of snake are required to meet the threshold of SWH (Reptile Hibernaculum) per the criteria within this region (i.e., Ecoregion 6E).

Based on the 2021 field surveys, which were completed based on the anticipated footprint for the recommended alternative, and included an initial assessment of habitat for SAR bats, almost all of the forest and woodland communities located within the focal study area met the criteria to be considered suitable maternity roost habitat for SAR bats under Phase I: Bat Habitat Suitability Assessment of The Protocol. The only communities that didn't meet these criteria were several small and immature Willow Deciduous Plantation (CUP1-B) and Restoration Deciduous Plantation (CUP1-A) communities located within the Vaughan landfill. Therefore, the majority of forest and woodland communities were deemed to warrant more detailed, Phase II: Identification of Suitable Maternity Roost Trees surveys for SAR bat habitat during the Year 3 surveys. A total of 86 potential maternity trees were identified during the surveys. Many of the trees identified exhibit one (1) or more characteristics that would make them of higher quality for bats, such as cavities, cracks, or crevices higher than 10 m, being located in close proximity to other potential roost trees, having 25cm or greater DBH, and being in earlier stages of decay. Based on the results of the surveys, the treed communities adjacent to the existing sections of Teston Road contained very few potential maternity roost trees, and were therefore less suitable for bat roosting, whereas all of the treed communities located in between the existing sections of Teston Road were of higher suitability for bats, containing a much higher density of potential maternity roost trees.

Table 5-5: Wildlife SAR & SAR Habitat Summary

Common Name	Scientific Name	ESA 2007 Status	Observed during Year 1-3 Field Investigations (Y/N)?	Potential to Occur in Technically Preferred Alternative Study Area (Y/N)?	Description of Habitat within Technically Preferred Alternative Study Area
Jefferson Salamander	*Ambystoma jeffersonianum*	Endangered	No	No	None
Acadian Flycatcher	*Empidonax virescens*	Endangered	No	No	None
Bank Swallow	*Riparia riparia*	Threatened	No	Yes, during construction only	None However, construction activities can create habitat.
Barn Swallow	*Hirundo rustica*	Special Concern	Yes	Yes, confirmed	Confirmed foraging in wetlands [Jewelweed Mineral Meadow Marsh (MAM2-9), Narrow-leaved Cattail Mineral Shallow Marsh (MAS2-1B), Duckweed Floating-leaved Shallow Aquatic (SAF1-3)] and open meadows [Native Forb Meadow (CUM1-A)]. Potential nesting structures present, though no nesting observed.
Bobolink	*Dolichonyx oryzivorus*	Threatened	Yes	Yes, confirmed	Confirmed breeding within open meadow [Native Forb Meadow (CUM1-A)] communities.
Canada Warbler	*Cardellina canadensis*	Special Concern	No	No	None
Cerulean Warbler	*Setophaga cerulea*	Threatened	No	No	None
Chimney Swift	*Chaetura pelagica*	Threatened	No	No	None
Common Nighthawk	*Chordeiles minor*	Special Concern	No	No	None
Eastern Meadowlark	*Sturnella magna*	Threatened	Yes	Yes, confirmed	Confirmed breeding within open meadow [Native Forb Meadow (CUM1-A)] communities.
Eastern Wood-Pewee	*Contopus virens*	Special Concern	Yes	Yes, confirmed	Confirmed breeding and potential habitat within numerous treed and forest communities [Hybrid Poplar - Conifer Mixed Plantation (CUP2-f), White Pine Coniferous Plantation (CUP3-2), Mixed Conifer Coniferous Plantation (CUP3-H), Native Cultural Woodland (CUW1-A), Native Deciduous Cultural Woodland (CUW1-A3), Fresh-Moist Hemlock Coniferous Forest (FOC3-1), Fresh-Moist Hemlock – White Pine Coniferous Forest (FOC3-A), Fresh-Moist Poplar Deciduous Forest (FOD8-1), Dry-Fresh Poplar Deciduous Forest (FOD3-1), Dry-Fresh Hardwood – Hemlock Mixed Forest (FOM3-1), Fresh-Moist White Pine – Sugar Maple Mixed Forest (FOMA-A)].
Evening Grosbeak	*Coccothraustes vespertinus*	Special Concern	No	No	None
Golden Winged Warbler	*Vermivora chrysoptera*	Special Concern	No	No	None
Grasshopper Sparrow	*Ammodramus savannarum*	Special Concern	No	Yes	This species is not currently present, though there is suitable habitat for this species within the same open meadow [Native Forb Meadow (CUM1-A)] communities as Eastern Meadowlark and/or Bobolink.
Least Bittern	*Ixobrychus exilis*	Threatened	No	No	None
Red Headed Woodpecker	*Melanerpes erythrocephalus*	Endangered	No	No	None
Wood Thrush	*Hylocichla mustelina*	Special Concern	Yes	Yes, confirmed	Confirmed breeding and potential habitat within numerous treed and forest communities [Native Cultural Woodland (CUW1-A), Native Deciduous Cultural Woodland (CUW1-A3), Fresh-Moist Poplar Deciduous Forest (FOD8-1), Dry-Fresh Poplar Deciduous Forest (FOD3-1), Dry-Fresh Hardwood – Hemlock Mixed Forest (FOM3-1), Fresh-Moist White Pine – Sugar Maple Mixed Forest (FOMA-A)].
Monarch	*Danaus plexippus*	Special Concern	Yes	Yes, confirmed	Confirmed present and to have potential for breeding within open meadow [Native Forb Meadow (CUM1-A)] communities. Nectaring habitat is also present wherever there are flowering plants.
Eastern Small-footed Myotis	*Myotis leibii*	Endangered	No	Yes	There are confirmed suitable maternity roosting trees within treed and forest communities, where potential maternity roost trees were documented.

Common Name	Scientific Name	ESA 2007 Status	Observed during Year 1-3 Field Investigations (Y/N)?	Potential to Occur in Technically Preferred Alternative Study Area (Y/N)?	Description of Habitat within Technically Preferred Alternative Study Area
Little Brown Myotis	*Myotis lucifugus*	Endangered	No	Yes	There are confirmed suitable maternity roosting trees within treed and forest communities where potential maternity roost trees were documented.
Northern Myotis	*Myotis septentrionalis*	Endangered	No	Yes	There are confirmed suitable maternity roosting trees within treed and forest communities where potential maternity roost trees were documented.
Tri-colored Bat	*Perimyotis subflavus*	Endangered	No	Yes	There are confirmed suitable maternity roosting trees within treed and forest communities where potential maternity roost trees were documented.
Blanding's Turtle	*Emydoidea blandingii*	Endangered	No	Yes	This species is not highly detectable without targeted surveys. This species has not been observed on site. However, there is suitable habitat for this species in wetland [Jewelweed Mineral Meadow Marsh (MAM2-9), Narrow-leaved Cattail Mineral Shallow Marsh (MAS2-1B), Duckweed Floating-leaved Shallow Aquatic (SAF1-3)] and swamp [White Cedar - Conifer Mineral Coniferous Swamp (SWC1-2)] communities and in adjacent upland habitats.
Eastern Ribbonsnake	*Thamnophis sauritus*	Special Concern	No	Yes	This species is not highly detectable without targeted surveys. This species has not been observed on site. However, there is suitable habitat for this species in throughout the site, in all wetland, treed, and forest communities.
Snapping Turtle	*Chelydra serpentina*	Special Concern	Yes	Yes, confirmed	This species has been confirmed and there is suitable year-round habitat for this species in wetland [Jewelweed Mineral Meadow Marsh (MAM2-9), Narrow-leaved Cattail Mineral Shallow Marsh (MAS2-1B), Duckweed Floating-leaved Shallow Aquatic (SAF1-3)] and swamp [White Cedar - Conifer Mineral Coniferous Swamp (SWC1-2)] communities and in adjacent upland habitats.

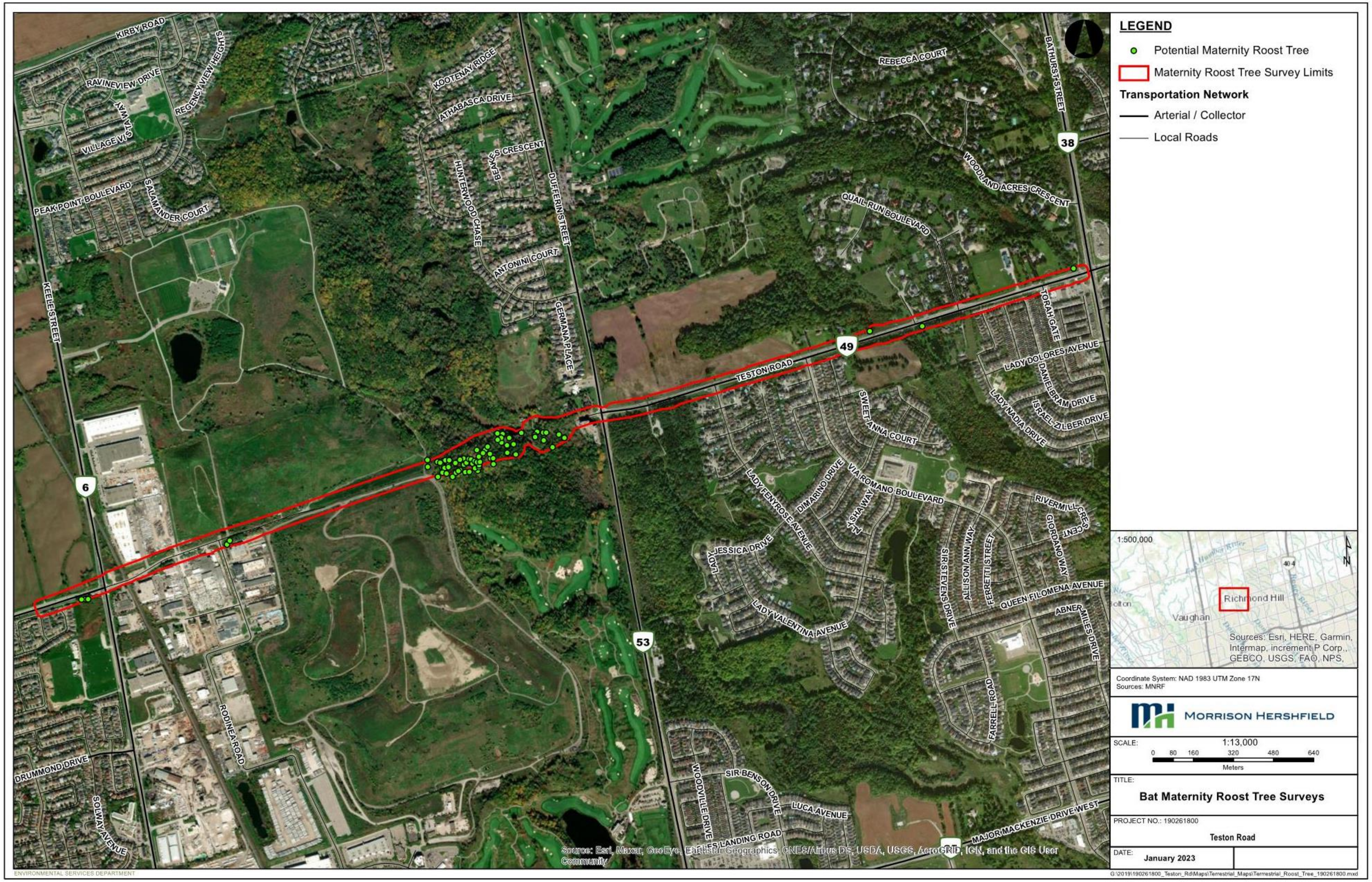

Figure 5-10: Potential Maternity Roost Trees for Bats Identified in Year 3

5.3.5 Geological Environment

5.3.5.1 Physiography & Topography

The Oak Ridges Moraine is a massive ridge of glacial drift extending between Caledon and Rice Lake, near Peterborough, containing significant amounts of sand and gravel. The moraine has a geographic area of 1,900 square kilometres with overburden that is up to 200m thick. According to Chapman and Putnam (1984), a lobe of the moraine proper occupies the central part of the Study Area which is flanked on either side by the till plains of the area known as the South Slope of the Oak Ridges Moraine.

According to the Atlas of Canada (Natural Resources Canada, 2014), the topography of the Study Area drops from (approximately 310m elevation in the) northwest to (approximately 230m elevation in the) southeast, towards Lake Ontario, as is consistent with the South slope physiography. The northwestern part of the Study Area is a height of land, on the other side of which the topography drops off towards King City in the northwest.

Multiple tributaries of the Don River East Branch originate in the Study Area, flowing toward Lake Ontario, incised 10m to 20m into the landscape.

Along the alignment of the proposed Teston Road, the topography is highest (approximately 285m elevation) just east of Rodinea Road and drops into the valley of Don River East Branch which crosses the alignment at just less than 250m elevation. Moving east, the topography climbs back up as the alignment crosses Dufferin Street, to approximately 280m elevation, before dropping back below 250m elevation at another branch of the Don River East Branch (mid-block). The topography climbs again and drops again to another branch of the Don River East Branch, approximately coincident with Bathurst Street.

5.3.5.2 Bedrock Geology

According to “Bedrock Geology of Ontario, Southern Sheet” (Ontario Geological Survey, Map 2544), the underlying bedrock within the Study Area is Upper Ordovician aged shale of the Georgian Bay, Blue Mountain, and Lindsay Formation. Bedrock is encountered at depths ranging from approximately 80 meters below ground surface at the southern limit to approximately 250 meters below ground surface at the northern limit of the Study Area.

5.3.5.3 Surficial Geology

According to “Quaternary Geology of Ontario, Southern Sheet” (Ontario Geological Survey, Map 2556, Scale 1:1,000,000), and “Surficial Geology of Southern Ontario” (2010, Northern Development and Mines), the quaternary deposit at the edges of the Study Area consists of Halton Till. Where the Oak Ridges Moraine occupies the central part of the Study Area, the geology is mapped as glaciofluvial ice-contact deposits consisting of gravel and sand, minor till, including esker, kame, end moraine, ice-marginal delta, and subaqueous fan deposits.

A review of wells in the WWIS indicates that in areas mapped as gravel and sand, the sand is often described as very fine, and interbedded with silt and clay. In areas mapped as till, the soils are typically described as clay or clayey, interbedded with silt, and sometimes sandy. Between the Vaughan Landfill and the Keele Valley Landfill, the upper 30m to 50m is typically sand and gravel before the first significant silty or clayey layer appears. South of Teston Road, mid-block between Dufferin Street and Bathurst Street, the overburden is 136m thick, as one well in this area extended into bedrock. This particular well was entirely clayey and produced no water.

5.3.5.4 Slopes & Ravines

The Study Area is located in the physiographic region known as the South Slope. The South Slope is the southern portion of the Oak Ridges Moraine, but it includes the strip south of the Peel Plain. The South Slope contains a variety of soils, some of which have proved to be excellent through more than a century of agricultural use. In the vicinity of Study Area, the topography consists mostly of till with some clay and silt deposits and ground surface elevations ranging from 230 to 300 meters above sea level (masl) (Chapman and Putnam, 1984). The majority of the surficial soils in the area are mapped as till consisting of clay to silt-textured till derived from glaciolacustrine deposits or shale. The surficial soils in the northeastern section of Study Area are mapped as ice-contact stratified deposits/ice-contact stratified deposits consisting of sand and gravel, minor silt, clay, and till (OGS, 2010). The Study Area slopes gently towards the south-east.

5.3.5.5 Groundwater

Referring to Gerber et al., 2018 and Sharpe et al., 2007, the Lower sediment, which is characterized by sandy formations with good hydraulic conductivity, is considered an aquifer, or containing significant regional aquifers. The Lower sediment is confined by the Newmarket Till and, where present, the Halton Till. The Oak Ridges Moraine is an unconfined aquifer (except where it underlies and is confined by the Halton Till) with good hydraulic conductivity and an aquifer potential that is one of the highest of the country. The Oak Ridges Moraine forms a major recharge area, being the source of baseflow in dozens of headwater stream springs and also the source of water in underlying aquifers within the Lower sediment. Within the Oak Ridges Moraine, the water table can be 30m to 40m below ground surface while in the tills beyond the Oak Ridges Moraine, the water table is generally within a few (5-10) metres of surface.

The Ministry of the Environment, Conservation and Parks (MECP) Water Well Information System (WWIS) database was queried for records of water supply wells within 500m of the Study Area (MECP, 2023). A total of approximately nine-hundred and forty (940) water well records were identified including: one-hundred and ninety-three (193) domestic supply wells, one hundred and eighty-five (185) monitoring wells, twenty-two (22) commercial use wells, eighteen (18) agricultural wells, sixteen (16) industrial use wells, and ten (10) irrigation wells. The well installation dates ranged from 1947 to 2020.

Despite the relatively large number of wells in the MECP database, it is considered that the actual use of groundwater for domestic, agricultural, or industrial purposes is minimal. The main reason for this is that municipal/piped water supply is available throughout the study area. Areas with existing subdivisions east of the valley may still have a small number of domestic wells in use.

MH reviewed the groundwater contours provided in 'Golder Associates, Input to Teston Road IEA presentation, June 17th, 2020'. Groundwater elevation varies approximately between 247 meters above sea level (masl) at Dufferin Street and 257 masl at Keele Street. Between the Vaughan Landfill and Keele Valley Landfill, the purge well system draws the water table down to an elevation of 252 m.

5.3.5.6 Source Water Protection

Certain Wellhead Protection Areas, and Highly Vulnerable Aquifers and Significant Groundwater Recharge Areas are delineated for the protection of Ontario's drinking water, under the Clean Water Act, 2006 (CWA). The CWA has a focus on sources of water that have been designated by a municipality as being a current or future source of residential municipal drinking water for the community. These sources are protected in each Source Protection Region (SPR) through the development and implementation of a Source Protection Plan (SPP). These areas are all shown on the Source Water Protection Information Atlas which is compiled by the Ontario Ministry of the Environment, Conservation and Parks.

The Project is entirely contained within the CTC (Credit Valley-Toronto and Region-Central Lake Ontario) SPR. As such, the policies of the Approved Source Protection Plan: CTC Source Protection Region (the SPP) apply.

Wellhead Protection Areas

A Wellhead Protection Areas (WHPA) is the area or capture zone surrounding the wellhead where land use activities have the greatest potential to affect the quality of groundwater within the aquifer from which the well derives its source. In Ontario WHPAs have been delineated for all municipal wells. According to Source Protection Information Atlas, no WHPAs are within the Study Area. The closest WHPA was identified more than a kilometer away from the study area.

Highly Vulnerable Aquifer

A highly vulnerable aquifer (HVA) is an aquifer that is rapid to recharge from precipitation or other water at the ground surface. Such aquifers are, by virtue of the short travel time between ground surface and water table more vulnerable to contamination. These aquifers typically occur in areas of coarse or sandy soils with a high groundwater table. According to Source Protection Information Atlas, an HVA was found over the majority of the Teston Road right-of-way, from approximately 900m east of Keele Street eastwards to Bathurst Street.

Significant Groundwater Recharge Area

Most groundwater recharge occurs from the downwards percolation of precipitation/surface water from the ground surface to the water table. The rate of recharge is proportional to the permeability of the shallow soils but is also affected by a number of other factors, such as depth to water table. Significant Groundwater Recharge Areas (SGRAs) are characterized by the Province of Ontario as having highly permeable soils at surface, such as sand and/or gravel, which allows water to readily pass from the ground surface to an aquifer. These areas are considered significant when they aid in maintaining the water level in an aquifer that provides water for potable means or supplies groundwater to a cold-water ecosystem. According to Source Protection Information Atlas, the Teston Road right-of-way is within an SGRA from approximately the center line northerly, from 300m west of Keele Street to the center line of Keele Street, and from 35m east of Dufferin Street to 630m east of Dufferin Street.

Intake Protection Zones

The closest intake protection zone is identified in Lake Ontario, located more than 25 kilometers away from the Study Area.

5.3.5.7 Fluvial

The study area is near the headwaters of the East Don River. At the study reach, the channel has a drainage area of approximately 3.3 km^2 as estimated using the Ontario Watershed Information Tool (OWIT). The drainage area is almost entirely within the Oak Ridges Moraine Planning Area. Contributing cover within this area predominantly consists of agriculture and rural land use (44%), forests and swamps (34%), and community and infrastructure (21%). The channel is within a natural core area land use designation of the Oak Ridges Moraine. The Oak Ridges Moraine is also the main physiographic feature within the drainage area with the resultant geology of the area consisting of ice-contact deposits of sand, gravel, and silt (Sharpe, 1980).

GeoProcess Research Associates Inc. (GeoProcess) was retained by Morrison Hershfield to complete a study of the fluvial erosion hazard for a tributary to the East Don River, located approximately 350m west of the intersection of Dufferin Street and Teston Road. GeoProcess completed a geomorphological reconnaissance of the study area on April 21st, 2022. The unconfined valley setting was verified and an online pond, having an outlet structure in disrepair, was documented. The study area was subsequently divided into two reaches, with the pond being the divide. The upstream extent of the study reach is the confluence of the main tributary channel with a smaller ephemeral channel. The downstream extent is a historical (remnant) flow structure that may have been a culvert or low-head dam. Two offline ponds contribute flow to the channel near the upstream extents of the study reach.

At the upstream extent of Reach 1, as shown on **Figure 5-11**, there is a steep valley wall present on the northeast side of the channel and a berm separating an offline pond is located along the southwest side of the channel. The valley subsequently transitions to a more expansive, unconfined setting. The Reach 1 channel is a low gradient, parabolic-shaped swale having poorly defined banks and stability controlled by vegetation. The channel bottom is primarily muck and detritus. The floodplain is readily connected to the channel due to the low-profile banks. The backwater and low gradient impact of the existing pond (at the downstream limit of Reach 1) is likely contributing to the channel form here. This reach includes a section where the channel transitions into the pond/wetland, having substantial cattail growth. There are no indicators of systemic instability in Reach 1.

Reach 2 flows out of the existing pond, and is within the footprint of a remnant pond, terminating at the historically failed outlet structure. The nature of this outlet is not clear (dam or culvert crossing). The channel in Reach 2 is a very low gradient and its slope is maintained by the rock outlet, which provides grade control. The form of the channel is almost indistinguishable from the floodplain at some locations, except for localized instances of scour where the channel intersects the valley wall (near the discharge from the existing pond). There are also no indicators of systemic instability in Reach 2.

Downstream of Reach 2, outside of the proposed road corridor, the channel definition increases and there are indicators of geomorphic instability by way of undercut vegetation and downcutting. This condition may be related to the past failure of the historical pond's flow conveyance structure, but the detailed history of this feature could not be ascertained. The channel incision downstream of Reach 2 is not predicted to propagate upstream, owing to the generally low flows (minimal energy) and presence of the historical rock outlet structure at the downstream extent of Reach 2, which provides grade control.

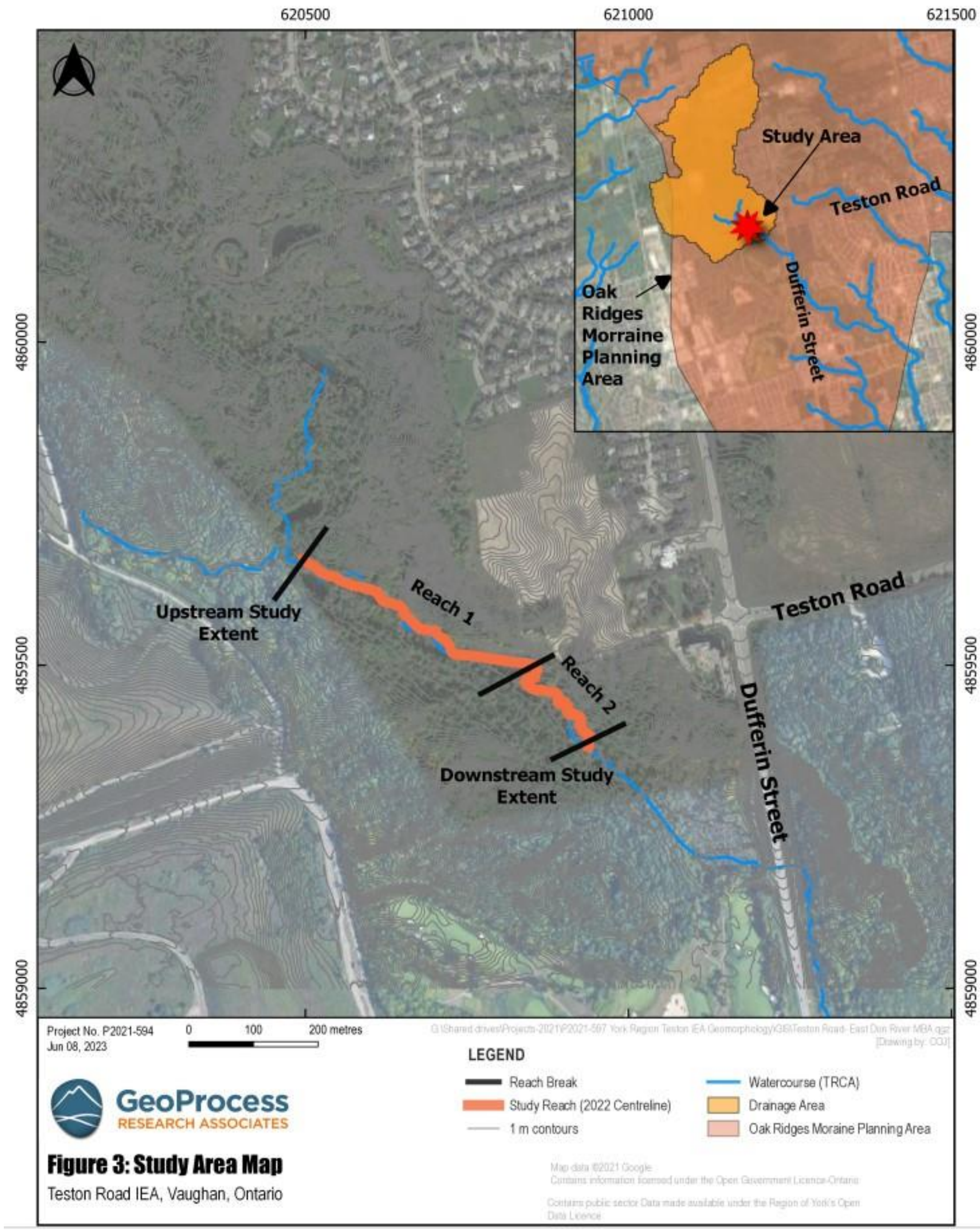

Figure 5-11: Fluvial Study Area Map

5.4 Socio-Economic Environment

5.4.1 Existing Land Use

Existing land uses within the study area include residential, recreational, agricultural, institutional, retail commercial, open space, and industrial. The study area includes Teston Road and the surrounding area between Highway 400 to the west, Bathurst Street to the east, Major Mackenzie Drive West to the south, and Kirby Road to the north.

The study area is generally zoned as agricultural to the northwest, residential to the southwest, residential, and open space to the east and industrial in the central region west of the Keele Valley Landfill. Refer to **Figure 5-12** for a map of the City of Vaughan's Official Plan designations within the study area.

Residential land use is concentrated on the southwest and southeast portion of the study area. There are public parks located within each neighbourhood that serve as recreational facilities for residents, these include Mackenzie Glen District Park, Maple Community District Park, Princeton Gate Park, Clearview Park, Woodrose Park, Forest View Park, and Twelve Oaks Park.

Institutional uses within the study area include schools, churches and religious temples, libraries, daycares, and community centres.

Retail commercial uses are predominantly concentrated along major urban roadways such as Keele St, Bathurst St, and Major Mackenzie Drive. Three commercial plazas are located along Major Mackenzie Dr at the south of the study area with grocery stores, department stores, restaurants, bakeries, fitness studios, banks, and spas and beauty centres.

Industrial land use is concentrated in the central region of the study area, west of the Keele Valley Landfill.

The eastern portion of the study area falls within the Oak Ridges Moraine area of the Greenbelt. As part of the Greenbelt the Oak Ridges Moraine covers approximately 470,000 acres. Countryside area, natural core area, and natural linkage area of the Oak Ridges Moraine are concentrated in the northeast portion of the study area. It consists of residential neighbourhoods, the Maple Nature Reserve trail, and two golf courses: the Eagles Nest Golf Club and the Maple Downs Golf and Country Club.

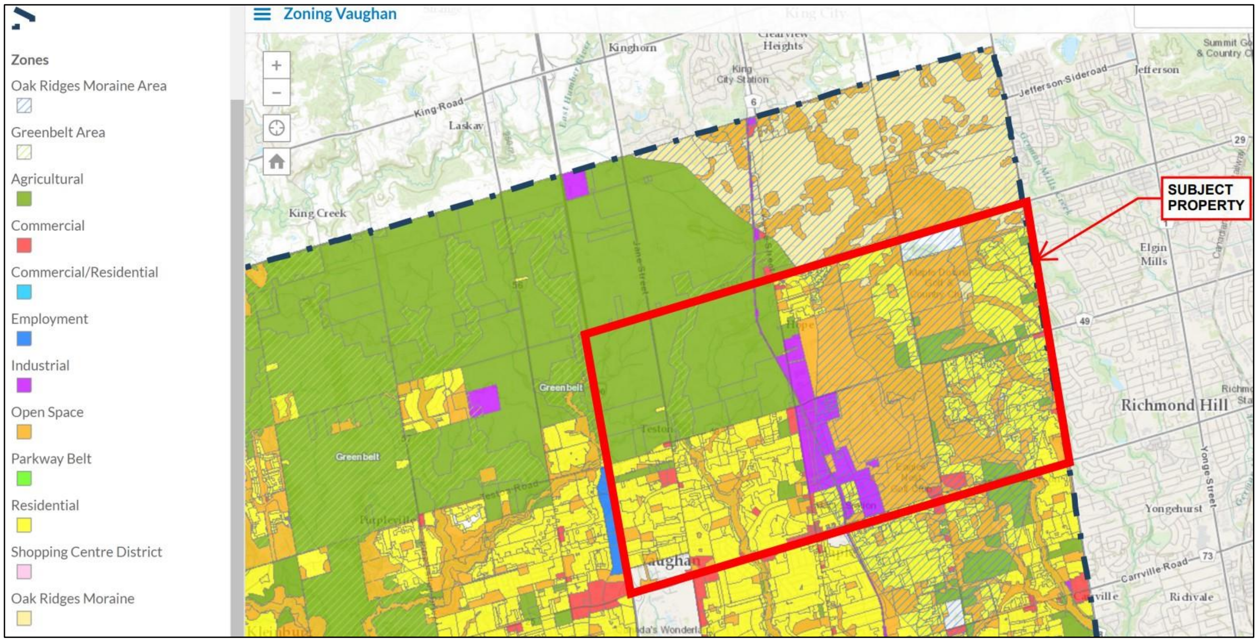

Figure 5-12: Existing Official Plan Land Use Designations

5.4.2 Public Land Ownership

There is a mix of provincial, municipal, and private property ownerships within the project limits. The majority of the project limits are located within the Greenbelt.

Metrolinx, a Crown agency of the Government of Ontario, owns the land for the Barrie GO railway.

York Region, owns and maintains the right-of-way of Teston Road and all municipal stormwater management facilities.

The Keele Valley Landfill, located south of Teston Road between Keele Street and the Valley lands, is owned, and maintained by the City of Toronto. The Vaughan township landfill, located north of Teston Road is owned and maintained by the City of Vaughan.

The Valley lands, located east of Dufferin Street are owned by the city of Vaughan.

All additional properties parcels are privately owned.

5.4.3 Municipal Development

5.4.3.1 North Maple Regional Park

The North Maple Regional Park (NMRP) sits south of Kirby Road between Keele Street and Dufferin Street on the former Avondale Compost lands. It is currently roughly 81 hectares of parklands with walking trails, soccer fields as well as washrooms and other amenities. Phase 1 of the park (81 hectares) was opened in 2019.

The City of Vaughan has plans to increase the size of the park through a phased planning approach. The expected final size of the park will be roughly 365 hectares and will cover the land of the Vaughan Landfill and Keele Valley Landfill. The plan also includes integration with a Teston Road missing link between Keele Street and Dufferin Street.

The NMRP will include a portion of the proposed Vaughan Super Trail which will create a 100km city-wide trail system.

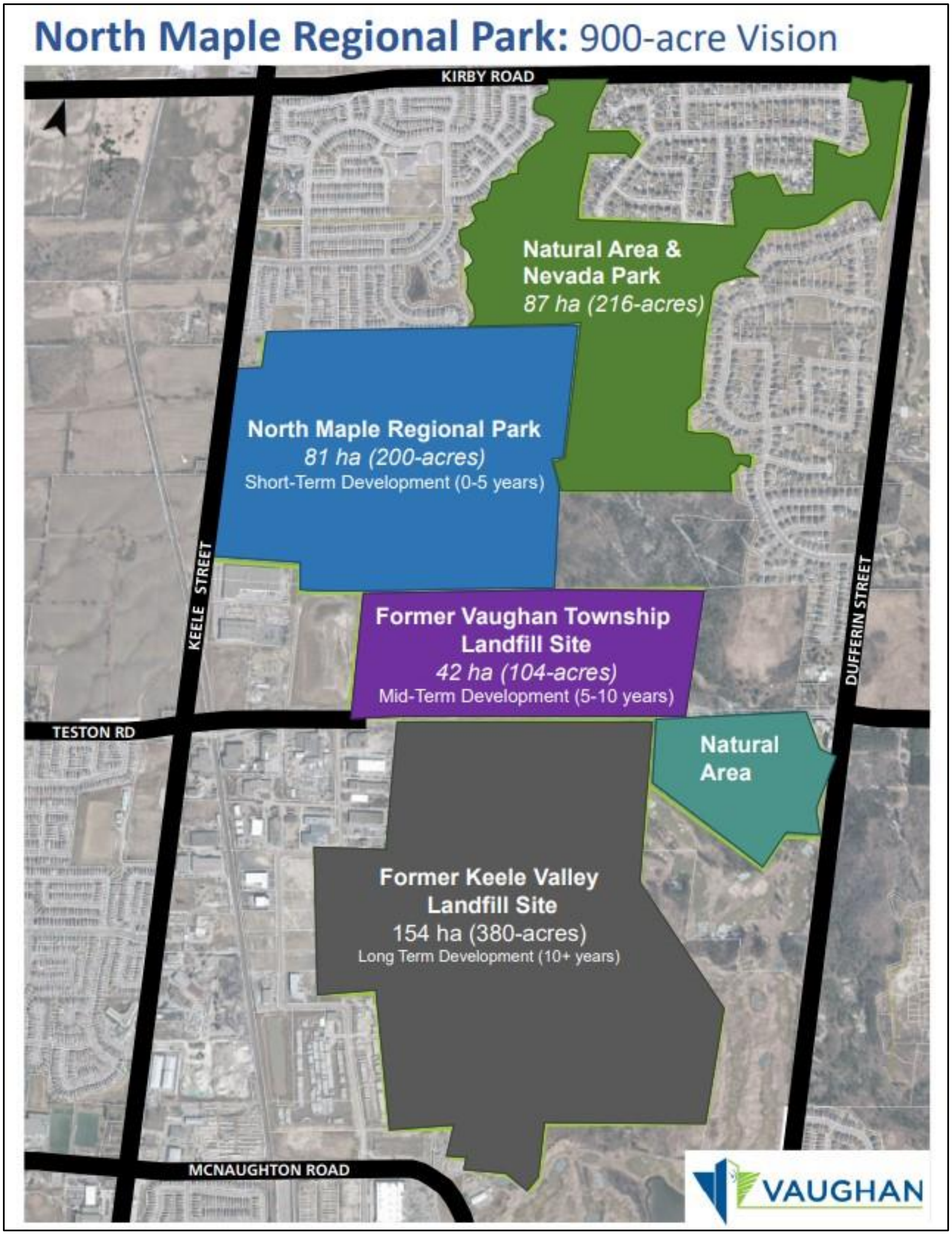

Figure *5-13*: Planned North Maple Regional Park

5.4.3.2 Active (Proposed) Land Use Developments

The City of Vaughan maintains a database of current development projects and studies taking place within the City (PLANit). Upon review of the City of Vaughan's development application website, there are several active development applications within the study area, which are discussed below.

Part of Lots 26 and 27, Concession 5. 10980 Jane Street

Located between Jane Street and Highway 400, the proposed draft plan of subdivision will create five (5) blocks for General prestige employment, two (2) stormwater management blocks, one (1) mixed use area, one (1) pump station block to accommodate a future York Region pumping station which will service the proposed development and three public streets.

Part Lot 23, Concession 4 (10316 Keele Street)

This draft plan of subdivision is located on Keele Street between Teston Road and Major Mackenzie Drive West. The development will consist of twenty freehold condominium townhouse units and a three-storey building on a common element road.

11191 Keele Street, Part of Lot 28, Concession 3

Located on Jane Street between Teston Road and Kirby Road, the proposed draft plan of subdivision will create a multi-use residential development consisting of 42 townhouse units. The townhouse blocks have been designed with a height of 3-storeys (10.38 metres) and accommodate 4-6 units per development block.

1600 Teston Road

A proposed subdivision development is located on the northside of Teston Road, west of Dufferin Street in Part Lot 26, Concession 3. The plan of subdivision consists of 87 detached residential lots with frontages ranging from 12m to 15m, an open space block, roads, and reserves.

2863, 2889, 2901 Teston Road

The proposed draft plan of subdivision is located on Teston Road between Jane Street and Keele Street. The proposed development will provide 380 townhouse units spread across four (4) blocks, a future private condominium road, an extension of Ashton Drive, an extension of Queensbury Crescent, 2641m2 of outdoor amenity space, and 554 parking spaces in one (1) level of underground parking.

19T-89124 (R)

A draft plan of subdivision has been proposed south of Teston Road, west of Bathurst Street.

Block 27 Development

A new residential community in North Maple (Block 27) is planned to be located between Kirby Road to the north, Keele Street to the east, Teston Road to the south, and Jane Street to the west. The New Community Area includes a mix of uses, including commercial, low- and mid-rise housing, and includes community facilities such as schools and parks.

5.4.4 Economic Activity

Teston Road has an important strategic location within York Region and the City of Vaughan, connecting the communities in Maple to the City of Richmond Hill in the east.

Teston Road services many industrial and employment uses in the area, with several warehouses and auto and car centers just west of Keele Street. This parcel of land stretching from Teston Road in the north to McNaughton Avenue in the south is designated as an Employment Area within the York Region Official Plan (2022). Employment lands within York Region “recognize the importance of enhancing the long-term viability of employment lands by ensuring their protection”. Some of the industrial uses that border Teston Road include:

- Sutong Shipping/Receiving
- Hytek Plastic Sales
- RPS Composites
- Fabco Plastics
- Global Precast
- Cooper Pump and Power

A commercial plaza is located on the corner of Teston Road and Bathurst Street, which includes a day care center called WeCare Childcare, Castlepoint Investments financial planner, Tim Hortons, and a Shell gas station.

The Fah Wah Buddhist Temple is located directly north of Teston Road, just west of Bathurst Street.

5.4.5 Noise Impacts

5.4.5.1 Applicable Guidelines

There are several transportation noise guidelines that are applicable to this project. Ontario provincial policies and guidelines from the Ministry of Transportation, Ontario (MTO) and the Ministry of the Environment, Conservation and Parks, Ontario (MECP) are directly applicable under the Individual EA process for transportation projects and are discussed in detail in this report. In addition to provincial policies and guidelines, York Region has its own policy and operating procedure that applies to roadways under its jurisdiction.

5.4.5.1.1 Ontario Provincial Guidelines

Ontario has several guidelines and documents related to assessing road traffic noise impacts. The document most applicable to municipal roadway projects is:

- Ontario MECP/MTO, "Joint Protocol", A Protocol for Dealing with Noise concerns during the Preparation, Review and Evaluation of Provincial Highway's Environmental Assessments (MTO & MECP, 1986).

5.4.5.1.2 York Region Policy

The York Region policy and operating procedure has been applied to this project because the project falls under its the jurisdiction, and it is more stringent than the Joint Protocol. Following are the policy and operating procedure that are applied to this project:

- Regional Municipality of York, York Region Traffic Noise Mitigation Policy for Regional Roads, (March 23, 2006) (York Policy).
- Regional Municipality of York, Standard Operating Procedures (SOP's) for Traffic Noise Mitigation on Regional Roads, (July 2010) (York SOP's)

5.4.5.2 Noise Sensitive Areas

Under the MECP/MTO Joint Protocol, Noise Sensitive Areas (NSAs) include the following land-uses, provided they have an Outdoor Living Area (OLA) associated with them:

- Private homes (single family units and townhouses).
- Multiple unit buildings such as apartments, provided they have a communal OLA associated with them.
- Hospitals and nursing homes for the aged, provided they have an OLA for use by patients.
- Schools, educational facilities, and daycare centres where there are OLAs for students.
- Campgrounds that provide overnight accommodation.
- Hotels and motels with outdoor communal OLAs for visitors.
- Churches and places of worship.

Current major sources of noise emissions in the area include existing road networks including Teston Rd, Keele St, Dufferin St, and Bathurst St.

5.4.5.3 Construction Noise Impacts

The MECP stipulates limits on noise emissions from individual items of equipment, rather than for overall construction noise. In the presence of persistent noise complaints, sound emission standards for the various types of construction equipment used on the project should be checked to ensure that they meet the specified limits contained within MECP Publication NPC-115 – "Construction Equipment". These limits are provided in Table 5-6.

Table 5-6: Maximum Noise Emission Levels for Typical Construction Equipment

Type of Unit	Maximum Sound Level (dBA)	Distance (m)	Power Rating (kW)
Excavation Equipment	83	15	<75
	85	15	>75
Pneumatic Equipment	85	7	-
Portable Compressors	76	7	-

5.4.6 Air Quality

5.4.6.1 Location of Sensitive Receptors within the Study Area

Land uses which are defined as sensitive receptors for evaluating potential air quality effects are:

- Health care facilities.
- Senior citizens' residences or long-term care facilities.
- Childcare facilities.
- Educational facilities.
- Places of worship.
- Residential dwellings.

Twenty-one sensitive receptor locations were selected to be representative of potential impacts within the study area. They include proposed/existing residential houses, schools, and community centers within the closest proximity to Teston Road, and thus the most likely impacted by the roadway widening and expansion. The representative receptors include locations both north and south of Teston Road.

Current major sources of air quality in the area include existing road networks including Teston Rd, Keele St, Dufferin St, and Bathurst St.

5.4.7 Climate Change

5.4.7.1 Climate Vulnerability Risk Assessment (CVRA)

The effects of climate change on the project were determined by conducting a climate vulnerability risk assessment (CVRA). Historical and projected future climate information on relevant climate factors for locations at or near the infrastructure have been compiled. Future climate projections have been compiled for a period of 60 years into the future (+/- 2080) based on climate models for the Intergovernmental Panel on Climate Change's (IPCC's) Fifth Assessment Report (AR5) Representative Concentration Pathway 8.5 (RCP8.5) for a high greenhouse gas emission scenario.

Increased Average Temperature

Historically, the average annual temperatures for the City of Vaughan are recorded as 6.8°C, from 1951-1980, and more recently 7.7 °C from 1981-2010 (ClimateData.ca). Downscaled regional climate models show future projections of an average annual temperature between 9.6 and 10.2 °C (York Region, 2016). Which is consistent with the York region Climate Action plan (York Region, 2022).

Extreme Warm and Cold Temperature Changes

Projections from ClimateData.ca indicate an increase in both the maximum annual temperature and the minimum annual temperatures under the RCP 8.5 climate scenario. Under the RCP8.5 High Carbon Climate Future, very hot days (+30°C) are predicted to increase, and very cold days are predicted to decrease (Climate Atlas, 2019). Compared to historical means, 2021-2050 will see a projected increase of 192% for very hot days (+30°C), and a decrease of 75% for very cold days under a high carbon emissions scenario (RCP8.5) (Climate Atlas, 2019).

Increases in extreme heat events are considered very likely for the York region (York region, 2016) The number of heat waves per year, is defined as three or more consecutive days with a temperature of +30°C or more. Compared to historical means, 2021-2050 will see a projected increase of 240% in the number of annual heatwaves, and a decrease of 37% for winter days under a high carbon emissions scenario (RCP8.5), where winter days are defined as days with a temperature equal to or less than -15°C (Climate Atlas, 2019).

Freeze-Thaw Cycles

Freeze-thaw data refers to the number of days when the air temperature fluctuates between freezing and non-freezing temperatures (Climate Atlas, 2019). The number of annual freeze-thaw days is anticipated to decrease under high GHG emissions scenarios (RCP8.5). Under RCP8.5 emissions scenarios, the number of cycles is projected to decrease to 68.8 days (decrease of 5.2 days) in the 2021-2050 timeframe and decrease to 62.2 (decrease of 11.7 days) in the 2051-2080 timeframe (Climate Atlas, 2019).

Precipitation

According to current projections under the RCP8.5 climate scenario:

- Total annual precipitation will increase.
- Extreme/heavy precipitation will increase at a faster rate than total annual precipitation.

Though the total number of wet days will remain relatively stable, heavy precipitation days are anticipated to increase (Climate Atlas, 2019). York Region has predicted a 33% increase in heavy precipitation events by the 2050s (York Region, 2020).

Increased Average Winter Precipitation – Freezing Rain/Ice Storms

Southern Ontario is projected to see a 10-50% increase in freezing rain events for all future projected time periods (2016-2035, 2046-2065, 2081-2100) (Cheng et al. 2007). The largest projected increases in freezing rain events are in January, with moderate increases in December and February (Cheng et al. 2007). The study projected that the frequency of freezing rain events would remain unchanged for November, March, and April (Cheng et al. 2007).

Average and Extreme Snowfall

A downward trend can be identified in the average snowfall totals in representative historical data. While overall snowfall amounts may be declining, heavy snowstorms are still expected.

Rainfall Intensity Duration Frequency (IDF)

Intensity Duration Frequency (IDF) curves relate to short-duration rainfall intensity with the frequency of occurrence. Natural Resources Canada (NRCan) notes that projected increases in the frequency, and possibly the intensity, of extreme rainfall events, have implications for urban drainage systems (NRCan, 2016).

The IDF curves generated for the study area, using the MTO IDF Curve Lookup tool indicate that overall the intensity of rainfall (total 24-hour precipitation) is projected to increase in the future, with potentially greater increases seen for shorter return periods (2-year events) than for larger return periods (100-year events).

Water Balance

The projected change in mean dry days under medium (RCP4.5) and high (RCP8.5) carbon future remains relatively stable compared to historic trends. For example, the mean number of annual dry days is projected to be less than 0.8 days in the 2021-2050 time horizon and increased by 0.6 days in the 2051-2080 time horizon (Climate Atlas, 2019). It is noted, however, that dry days (days without precipitation) are not the only factor that affects water balance. The regional analysis predicts a likely overall drier growing season (York Region, 2016).

Wind

The results of the 2012 Environment and Climate change Canada study (Toronto Region) suggest modest increases in wind gusts are likely in the coming decades. Wind gusts over 70 km/h will see the highest increase in frequency, occurring 17% to 19% more often than current conditions in the Toronto Region.

Wildfire

Fire weather in eastern Canada is expected to increase by 200-300% in future projections (Climate Atlas, 2019). Direct wildfire interface may not impact the roadway infrastructure due to its location and proximity to wooded areas. Indirect Impacts on air quality may be impacted from neighboring wildfires producing smog and ash.

5.5 Cultural Environment

5.5.1 Land Claims

5.5.1.1 Settlement History

The Pre-Contact history of the region is both lengthy and rich, and a variety of Indigenous groups inhabited the landscape. Archaeologists generally divide this complex history into three main periods: Palaeo-Indian, Archaic and Woodland. Each of these periods comprise a range of discrete sub-periods characterized by specific material culture, settlement patterns and lifeways. The arrival of European explorers and traders at the beginning of the 17th century triggered widespread shifts in Indigenous lifeways and set the stage for the ensuing Euro-Canadian settlement process. The Post-Contact period can be effectively discussed in terms of major historical events, and the principal characteristics associated with these events are summarized in **Appendix I.**

Southern Ontario has a rich and diverse Indigenous history, with York Region being occupied by different ancestral communities at different times. Ancestors of Curve Lake First Nation, Hiawatha First Nation, the Huron-Wendat First Nation, and the Mississaugas of the Credit Frist Nation lay claim to lands in southern Ontario. Detailed histories provided by the above-mentioned Indigenous groups can be found in **Appendix I.**

5.5.2 Archaeological Potential

Archaeological Services Inc. was contracted by Morrison Hershfield, on behalf of York Region, to conduct a Stage 2 Archaeological Assessment. A Stage 1 assessment for the Teston Road IEA was previously completed by New Directions Archaeology Ltd. (2018). Background research and a property inspection determined that portions of the Study Area retained archaeological potential and Stage 2 test pit survey was recommended. In addition, New Directions Archaeology Ltd. concluded that the study corridor had potential for containing an ossuary and ossuary construction monitoring was recommended following York Region’s Official Plan.

The Stage 2 property survey was conducted from December 13-14, 2022, April 13, 2023, and May 23, 24-26, 2023. Approximately 83.5 percent of the Study Area (14.81) did not exhibit archaeological potential on account of previous assessment, previous disturbance within the Teston Road right-of-way, and permanently low and wet and sloping conditions associated with a tributary of the Don River. Approximately 0.8 percent of the Study Area (0.14 hectares) was inaccessible at the time of survey due to a lack of permission to access. This area demonstrates archaeological potential and requires Stage 2 test pit survey at five metre intervals prior to any soil disturbing activities.

The remaining 15.7 percent of the Study Area (2.77 hectares), comprising woodlots and manicured lawns, was subject to test pit survey at five metre intervals and judgmental test pit survey at 10 and 20 metre intervals to confirm previous disturbance or permanently low and wet gleyed soils.

There are presently two Late Woodland Indigenous sites within one kilometre of the current Study Area where associated ossuaries have not been identified: the McNair site (AlGu-8) and the McGaw site (AlGu-88).

5.5.3 Cultural Heritage Resources

ASI was contracted to conduct a Cultural Heritage Report as part of the Teston Road – Highway 400 to Bathurst Street IEA.

Based on the results of the background research and field review, 18 known and 37 potential Built Heritage Resources (BHRs) and Cultural Heritage Landscapes (CHLs) were identified within the study area. These include: ten properties listed in the City of Vaughan's Heritage Inventory, one property listed in the Town of Richmond Hill's Inventory of Cultural Heritage Resources, three properties designated under Part IV of the *Ontario Heritage Act*, one heritage conservation district designated under Part V of the *Ontario Heritage Act*, and two Provincial Heritage Properties (of local significance). An additional 37 features were identified during the desktop review and fieldwork.

Of these 18 known and 37 potential BHRs and CHLs identified within the overall study area, one BHR and five CHLs are within or adjacent to the proposed Teston Road extension alignment (provided to ASI 8 May 2023). This includes one BHR barn, four CHL farmscapes, and one CHL railscape. Refer to the table below for the locations of the BHR and CHLs adjacent to the proposed Teston Road alignment.

Table 5-7: Inventory of Potential BHRs and CHLs Adjacent to the Proposed Alignment

Features ID	Type of Property	Address or Location	Heritage Status and Recognition	Known or potential Cultural Heritage Value or Interest
BHR 28	Barn	1138 Teston Road	Potential BHR – Identified during desktop review BHR 28 is located within CHL 26	This property has potential to retain historical, contextual, and design value as an early twentieth-century barn in the City of Vaughan. The following is a list of potential heritage attributes of the property: - The wooden barn with fieldstone foundations
CHL 16	Farmscape	814 Teston Road	Potential CHL – Identified during desktop review	This property has potential to retain historical and design value as an early twentieth-century residence in the City of Vaughan. The following is a list of potential heritage attributes of the property: - The residence - The mature trees - The long tree-lined driveway

Features ID	Type of Property	Address or Location	Heritage Status and Recognition	Known or potential Cultural Heritage Value or Interest
CHL 17	Farmscape	981 Teston Road	Potential CHL – Identified during desktop review	This property has potential to retain historical, contextual, and design value as a nineteenthcentury farmscape in the City of Vaughan. The following is a list of potential heritage attributes of the property: - The residence - The barn - The circulation routes - The mature trees - The fields
CHL 18	Farmscape	1600 Teston Road	Potential CHL – Identified during desktop review	This property has potential to retain historical and contextual value as an early twentiethcentury farmscape in the City of Vaughan. The following is a list of potential heritage attributes of the property: - The residence - The circulation routes - The mature trees It should be noted that this property has been heavily altered as part of the Teston Sands Subdivision. A review of satellite imagery demonstrates that significant tree clearing and soil disturbance has occurred, and that the outbuildings east of the residence have been removed since the draft August 2020 submission of this report
CHL 26	Farmscape	Northeast corner of Teston Road and Duffering Street	Potential CHL – Identified during desktop review	This property has potential to retain historical and contextual value as a nineteenth-century farmscape in the City of Vaughan. The following is a list of potential heritage attributes of the property: - The agricultural fields

Features ID	Type of Property	Address or Location	Heritage Status and Recognition	Known or potential Cultural Heritage Value or Interest
				- The barn (identified as BHR 28)
CHL 27	Farmscape	Barrie GO Rail Corridor	Potential CHL – Identified during desktop review	This property has potential to retain historical and contextual value as a nineteenth-century railscape in the City of Vaughan. The following is a list of potential heritage attributes of the property: - The alignment of the rail corridor - The track infrastructure

5.6 Built Environment

5.6.1 Road Network and Signalized Intersections

The traffic characteristics of the existing road network within the study area are discussed in **Section 4.3**.

Figure 5-14 shows the 18 key signalized intersections within the study areas. These intersections include:

- Kirby Road and Jane Street Intersection.
- Kirby Road and Keele Street Intersection.
- Kirby Road and Dufferin Street Intersection.
- Kirby Road and Bathurst Street Intersection.
- Teston Road and Cityview Boulevard Intersection.
- Teston Road and Highway 400 S-E/W Ramp Terminal.
- Teston Road and Jane Street Intersection.
- Teston Road and Cranston Park Avenue Intersection.
- Teston Road and Keele Street Intersection.
- Teston Road and Dufferin Street Intersection.
- Teston Road and Via Romano Boulevard.
- Teston Road and Bathurst Street Intersection.
- Major Mackenzie Drive and Highway 400 N-E/W Ramp Terminal.
- Major Mackenzie Drive and Highway 400 S-E/W Ramp Terminal.
- Major Mackenzie Drive and Jane Street Intersection.
- Major Mackenzie Drive and Keele Street Intersection.
- Major Mackenzie Drive and Dufferin Street Intersection.
- Major Mackenzie Drive and Bathurst Street Intersection.

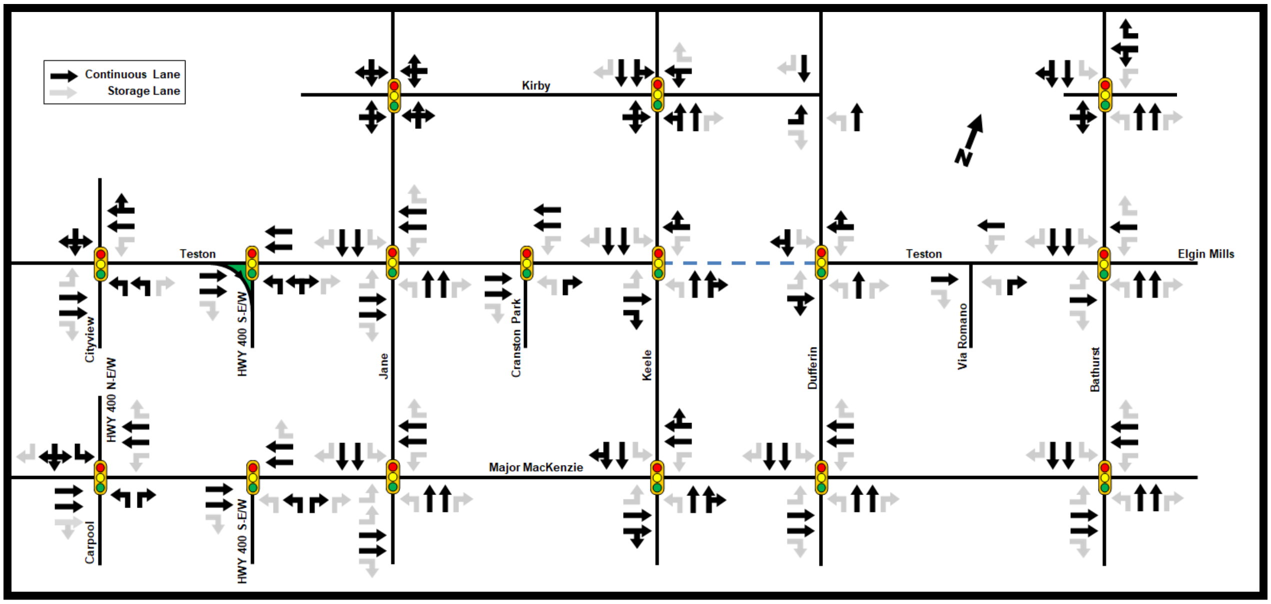

Figure 5-14: Existing Intersections within Traffic Analysis Study Area

5.6.2 Transit Network

Figure 5-15 illustrates existing York Region transit network. The existing GO, Viva, and YRT network within the study area is described below.

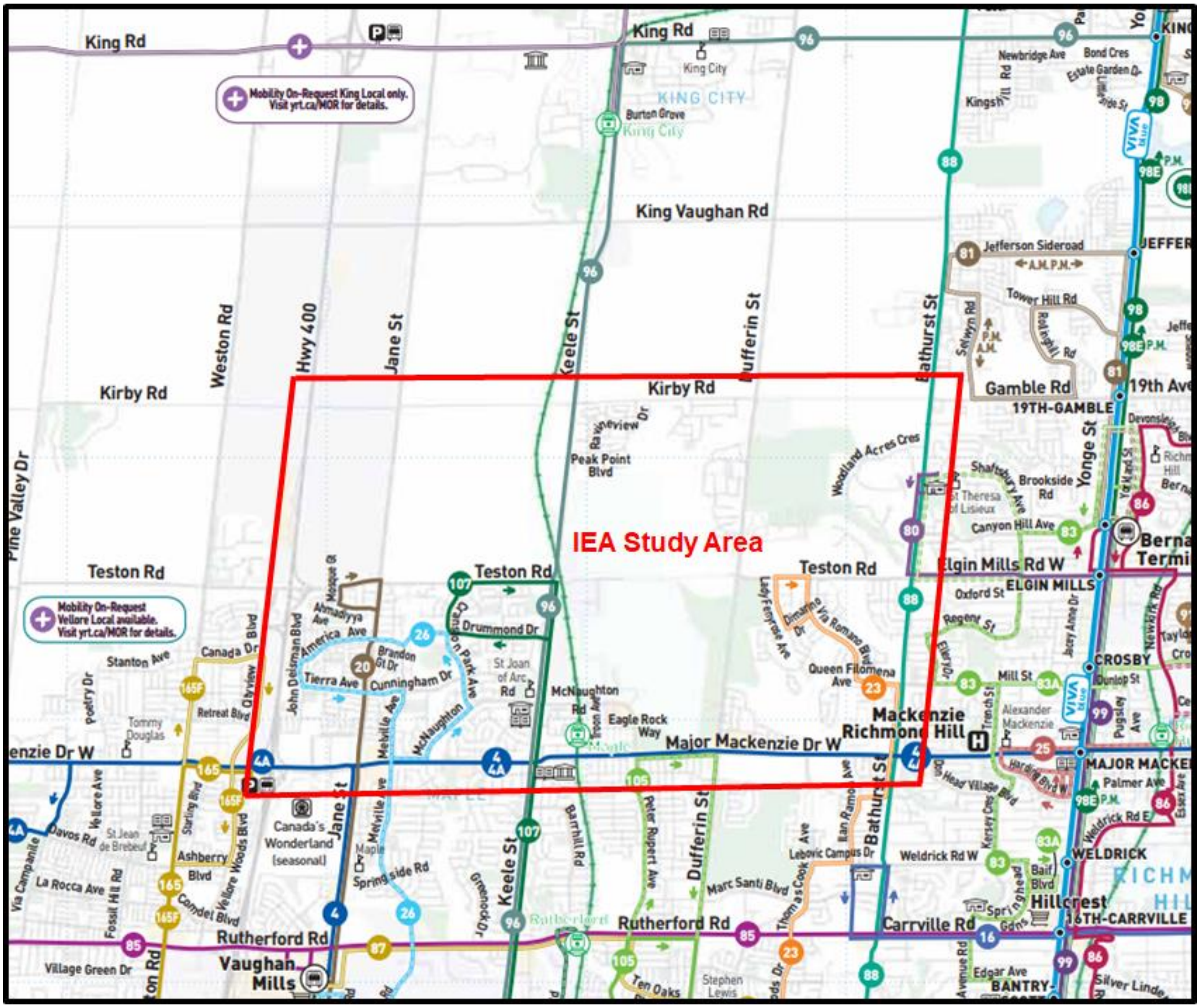

Figure 5-15: Existing York Region Transit Network (June 2020)

5.6.2.1 GO Transit

The Barrie GO rail corridor is one of the seven train lines of the GO Transit system in the Greater Toronto Area. It extends from Union Station in Toronto in a generally northward direction to Barrie, and includes ten stations along its 101.4 km route. Within the study area the GO Barrie rail corridor services the City of Vaughan with stops at King City, Maple (at the southern portion of the study area, just north of Major Mackenzie Drive) and Rutherford (Refer to Figure 5-15).

King City GO Station is situated south of the intersection of Keele Street and King Vaughan Road. The existing 12-car accessible platform, station building and parking lot are located along the west side of the rail corridor. The existing parking lot includes accessible parking and can accommodate 468 vehicles. There is currently no Passenger Pick-up and Drop-off (PPUDO) facility at this location and the bus access is adjacent to the station's main parking lot on Keele Street. The existing King City GO Station has one mainline track that is accessed from the east side platform.

Maple GO Station is situated east of the intersection of Keele Street and Major Mackenzie Drive. The existing 12-car accessible platform, station building and parking lot are located along the east side of the rail corridor. The existing parking lot can accommodate 1,239 vehicles and includes a PPUDO area as well as a bus loop and accessible parking. The existing Maple GO Station has one mainline track that is accessible from the east side platform.

Rutherford GO Station is situated east of the Rutherford Road and Keele Street intersection. The existing 12-car accessible platform, station building and parking lot are located along the west side of the rail corridor. The existing parking lot can accommodate 978 vehicles and includes a PPUDO area as well as a bus loop and accessible parking. The existing Rutherford GO Station has one mainline track that is accessible from the west side platform.

The Barrie GO corridor, which sees more than 9,000 passenger trips each day, is preparing for future expansion. For expanded service, all existing platforms will be maintained and improvements will include an additional side platform and second track at all three above mentioned stations.

Based on the Barrie Rail Corridor Expansion Project, Transit Project Assessment Process, Environmental Project Report (approved in August 2017), Metrolinx announced five new GO Stations for the Barrie rail corridor in June 2016. These stations were endorsed by each municipality and received Municipal Council resolution approvals in November 2016. The Kirby GO Station is one of the new GO stations proposed within the study area.

Kirby GO Station will be located south of Kirby Road approximately 300 metres west of Keele Street, with access from both sides of the Barrie GO rail corridor in the City of Vaughan. The Kirby GO Station will provide a stop between the Maple GO Station and the King City GO Station. Based on the Kirby GO Station Transpiration and Traffic Impact Analysis (completed in 2018), proposed components of the Kirby GO Station are:

Three station access structures including a main station building to the east of the rail corridor and secondary station entrances east and west of the rail corridor;

- Two side platforms;
- Three rail tracks through the station, including a centre express track and two gauntlet tracks;
- Two pedestrian tunnels providing access across the corridor;
- Three bicycle parking areas;

- A bus loop;
- A passenger PPUDO area;
- A 1,000-space surface parking lot;
- Three non-signalized vehicular access points (two off of Keele Street and one off of Kirby Road). The north Keele Street access point will include dedicated bus lanes, vehicular lanes and pedestrian and cyclist access; and
- Multi-Use Path (MUP) connection to the planned TransCanada MUP trail south of the station.

5.6.2.2 York Region Transit (YRT) and Viva Service

Table 5-8 presents the existing and future transit routes within the study areas. The transit data provided below reflects October 2019 conditions, pre-COVID-19 pandemic.

Overall, there are 17 transit routes within the study area. Viva Blue, which operates within dedicated transit lanes along the Yonge Street BRT corridor, between Finch GO Bus Terminal and Newmarket Terminal, provides the shortest headway and most frequent service. There is a total average of 50,314 passenger boardings during a typical weekday for all routes shown below. Approximately 9% of all passengers are using Route 20 along Jane Street and 8% are using Route 4/4A along Major Mackenzie Drive. The predominant route is the Viva Blue along Yonge Street with 33% of all passenger-boardings on it.

Table 5-8: Existing and Future Transit Routes (October 2019)

Route	2019 Average Weekday Daily Passenger Boarding	Existing (October 2019) Weekday Headway		Future Planned (2041) Weekday Headway	
		Peak (Min)	Off-Peak (Min)	Peak (Min)	Off-Peak (Min)
4/4A - Major Mackenzie	4,120	14	19	14	15
16 - 16th Avenue	1,645	30	30	15	15
20 - Jane	4,632	12	19	12	15
23 - Thornhill Woods	610	33	60	20	-
26 - Maple	1,311	16-20	46	16-20	46
80 - Elgin Mills	515	29	50	15	15
81 - Inspiration	193	29	-	29	-
83/83A - Trench	1,045	35	37	20	20
85/85C - Rutherford	3,486	15	30	15	15

Route	2019 Average Weekday Daily Passenger Boarding	Existing (October 2019) Weekday Headway		Future Planned (2041) Weekday Headway	
		Peak (Min)	Off-Peak (Min)	Peak (Min)	Off-Peak (Min)
88 - Bathurst	4,064	15	15	12	12
96 - Keele-Yonge	2,413	25-32	33	15	15
98 - Yonge	768	38	52	15	15
99 - Yonge	1,798^	32	51	15	15
105 - Dufferin	2,467	16	28	15	15
107 - Keele	2,720^	19	41	15	15
165/165F - Weston	2,111	15-19	44	15	15
Viva blue	16,416	8	9	4	4

** Note: Ridership data based on the entire length of the route.*
^ Note: Ridership data includes associated branch routes (i.e. Route 98/99 - Yonge (Late Night) & Route 107B - Keele).

The existing and proposed transit routes along all major arterial roads within the study area is described below:

5.6.2.2.1 Teston Road (York Region Road 49)

Based on York Region Transit (YRT) Map (Refer to Figure 5-15), YRT local Route is only available on Teston Road in four short sections at Jane Street (Route 20), Keele Street (Route 107), Thornhill Woods (Route 23) and Elgin Mills (Route 80).

Figure 5-16 illustrates the proposed transit network in the 2016 TMP for the year 2041. Teston Road will be served by frequent transit service.

5.6.2.2.2 Kirby Road (City of Vaughan)

Currently transit is available on Kirby Road in a short section at Keele Street (Route 96) and along Bathurst Street (Route 88). Based on **Figure 5-16,** Kirby Road will be served by frequent transit service.

The GO Transit rail corridor crosses through Kirby Road west of Keele Street, with King City Station being the closest terminal. The City of Vaughan is supporting Metrolinx’s GO Expansion program along the Barrie GO Rail Corridor to increase train frequency to provide all-day, two-way services and the future Kirby GO Station at Kirby Road/Keele Street.

5.6.2.2.3 Major Mackenzie Drive (York Regional Road 25)

Major Mackenzie Drive within the study area is primarily serviced along the whole corridor by YRT local Route 4/4A beginning at the Vaughan Mills Terminal. Short segments of other YRT routes travel along Major Mackenzie Drive including, Route 26 (Melville Avenue to McNaughton Road) and Route 105 (Peter Rupert Avenue to Dufferin Street).

The GO Transit rail corridor crosses through Major Mackenzie Drive east of Keele Street, with Maple Station being the closest terminal. The forthcoming plan for Major Mackenzie Drive is to provide Viva curbside service until around 2026 before being transformed to a dedicated rapidway beyond 2027.

5.6.2.2.4 Bathurst Street (York Regional Road 38)

Bathurst Street is primarily serviced by YRT local Route 88 which travels between GO Transit's Finch terminal and Seneca College's King Campus. Other transit routes that intersect along short segments of Bathurst Street include Route 23 (Queen Filomena Avenue to Valley Vista Drive), and Route 80 and 83 (Elgin Mills Road to Shaftsbury Avenue).

Based on **Figure 5-16**, Bathurst Street will be served by frequent transit service.

5.6.2.2.5 Dufferin Street (York Regional Road 53)

There are no transit routes which travel along Dufferin Street within the study area between Major Mackenzie Drive and Kirby Road. Based on **Figure 5-16**, Dufferin Street will be served by frequent transit service.

5.6.2.2.6 Keele Street (York Regional Road 6)

Keele Street is primarily serviced by YRT local Route 96 which travels between TTC's Pioneer Village Station, Go Transit's King City Station, and YRT's Newmarket terminal. Other transit routes that travel along Keele Street include YRT's local Route 107 which primarily travels along Keele Street, originating from TTC's Pioneer Village Station and loops through the residential community in the southwest corner of the Teston Road intersection. Based on **Figure 5-16**, Keele Street will be served by frequent transit service.

5.6.2.2.7 Jane Street (York Regional Road 55)

Transit on Jane Street is limited to YRT Route 20 which travels between TTC's Pioneer Village Station to the south, connects to TTC's Vaughan Metropolitan Station and Highway 407 station, and loops through the residential community in the southwest corner of the Teston Road intersection. Based on **Figure 5-16**, Jane Street will be served by frequent transit service.

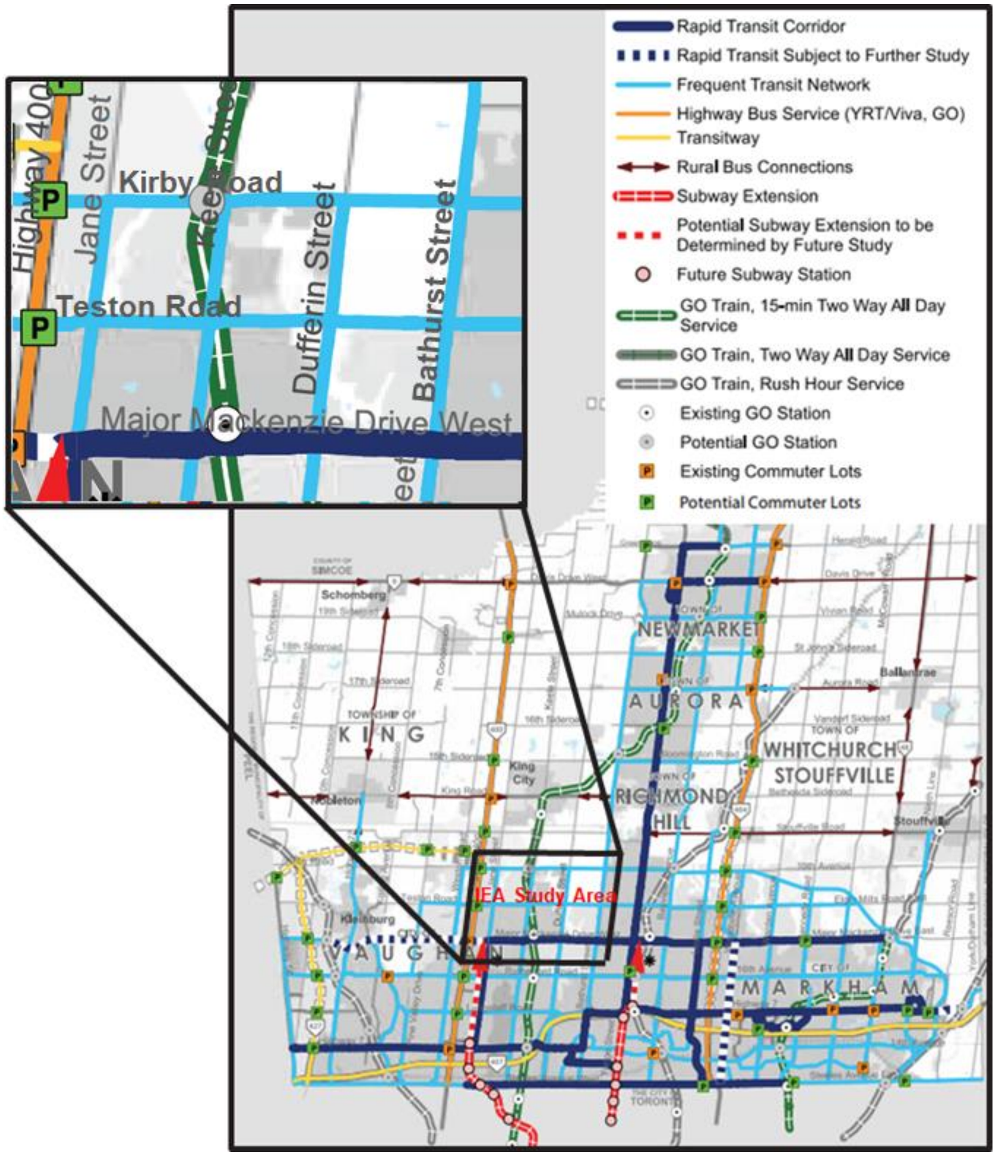

Figure 5-16: York Region Recommended Transit Network for 2041 (2016 TMP)

5.6.3 Modal Share by Ward / Zone

5.6.3.1 2016 Transportation Tomorrow Survey

As shown in Figure 5-17, the Traffic Analysis study area is within Wards 1, 3 and 4 of City of Vaughan.

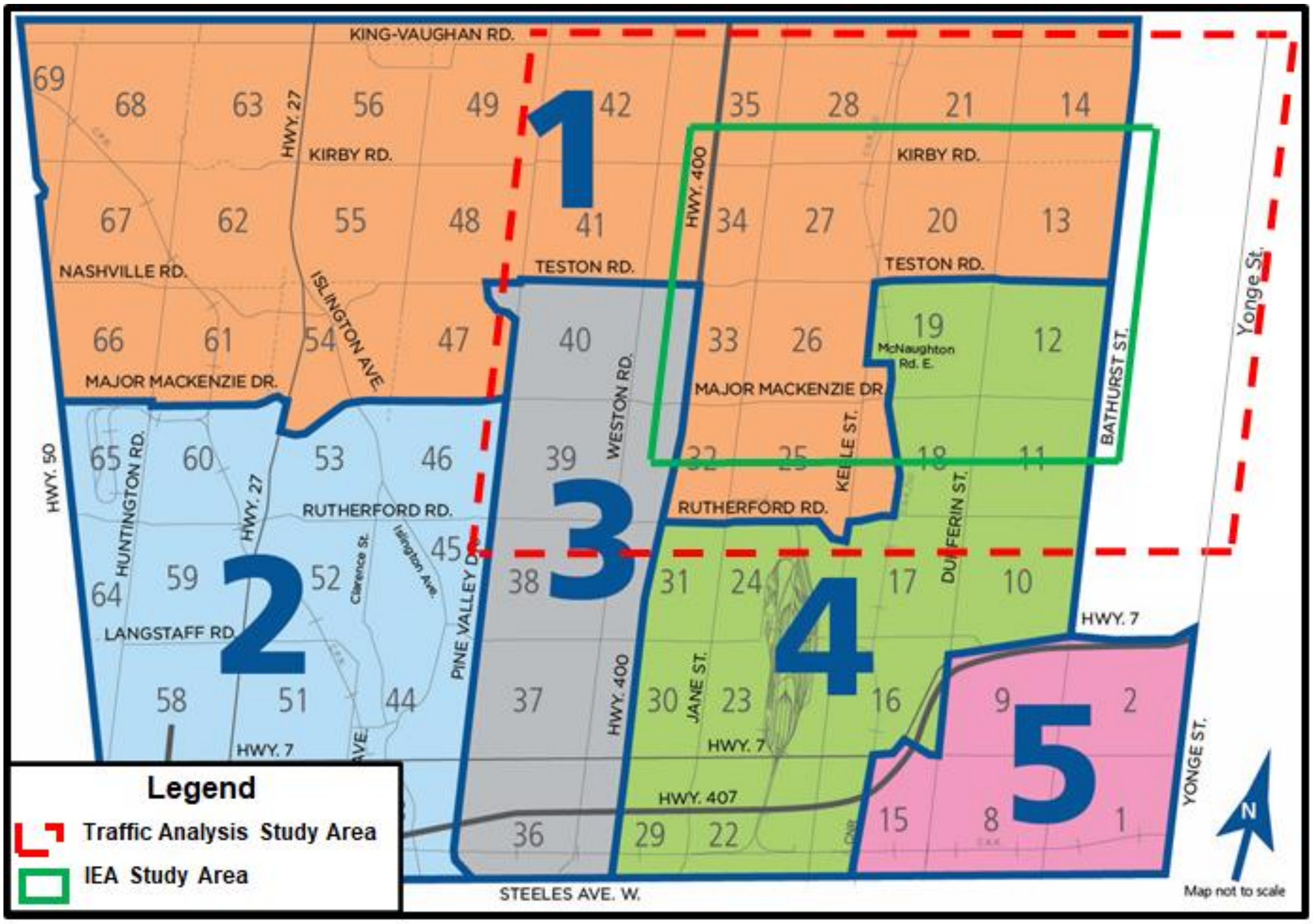

Figure 5-17: City of Vaughan Ward Area Map

To better identify the opportunities for modal shift, mode share data from the 2016 Transportation Tomorrow Survey (TTS) was extracted for trips made by residents of City of Vaughan within Wards 1, 3 and 4.

As shown in **Table 5-9** the current combined Transit and GO Train ridership during the AM peak period is in the order of 10% of all trips (97,400) made by residents of City of Vaughan within Wards 1, 3 and 4.

Six percent (6%) of trips are walking and/or cycle trips. Also, 13% of trips are made by passengers in vehicles driven by someone else.

Table 5-9: Trips Made by Residents of City of Vaughan (6:00 – 9:00 AM)

Trips	% 24 hr	Mode of Travel					
		Driver	Pass	Transit	GO Train	Walk & Cycle	Other
Ward 1							
34,900	27.0%	66%	13%	4%	4%	5%	8%
Ward 3							
32,700	28.2%	69%	13%	6%	2%	7%	2%
Ward 4							
29,800	29.2%	65%	12%	8%	5%	7%	3%
Total							
97,400	-	67%	13%	6%	4%	6%	5%

As shown in **Table 5-10**, mode share data from the 2016 TTS was extracted for trips made by residents of the TTS area to City of Vaughan (Wards 1, 3 and 4). It is evident that approximately 4% of all trips (112,300) by residents of the TTS area are using Transit and GO Train during the AM peak period to get into City of Vaughan (Wards 1, 3 and 4).

Five percent (5%) of trips are walking and/or cycle trips. Also, 11% of trips are made by passengers in vehicles driven by someone else.

Table 5-10: Trips Made to City of Vaughan by Residents of the TTS Area (6:00 – 9:00 AM)

Trips	% 24 hr	Mode of Travel					
		Driver	Pass	Transit	GO Train	Walk & Cycle	Other
Ward 1							
17,200	18.60%	67%	17%	2%	1%	9%	4%
Ward 3							
33,100	26.10%	74%	12%	3%	1%	7%	3%
Ward 4							
62,000	35.50%	83%	9%	4%	1%	3%	1%
Total							
112,300	-	78%	11%	3%	1%	5%	2%

5.6.4 Goods Movement

Based on York Region proposed strategic good movement network, Highway 400 and Kirby Road are designated as highway and primary arterial corridors to accommodate goods movement demands, respectively. However, Teston Road, Major Mackenzie Drive, Jane Street, Keele Street, Dufferin Street and Bathurst Street are identified as secondary arterial good movement corridors.

5.6.5 Active Transportation

Table 5-11 below describes the active transportation facilities along the roadways within the study area. Refer to **Appendix D** for more details.

Table 5-11: Existing Active Transportation Facilities

Road Name	Cross-section Type	Cycling Facilities	Pedestrian Facilities	Shoulder
Teston Road (York Region Road 49)	Urban between Highway 400 and Keele Street Rural between Keele Street and Rodinea Drive Semi-urban between Dufferin Street and Bathurst Street	None between Highway 400 and Keele Street Cyclists share travel lanes with vehicular traffic Future cycling facilities are proposed along Teston Road between Weston Road and Jane Street, and between Keele Street and Dufferin Street (2016 TMP)	1.5 m concrete sidewalk on south side 3.0 m multi-use path (MUP) east of Jane Street to Keele Street	Wide shoulders between Keele Street and Rodinea Drive with barely defined ditches Shoulder and ditch on north side only between Dufferin Street and Bathurst Street
Kirby Road	Rural	Bike lanes on both sides of the roadway	Concrete sidewalk 2.0 m MUP on south side from Keele Street to Dufferin Street Gated, at-grade crossing of the Barrie GO Rail approximately 300 m west of Keele Street	Narrow shoulders
Major Mackenzie Drive (York Regional Road 25)	Urban between Highway 400 and Peter Rupert Avenue Rural between Peter Rupert Avenue and Bathurst Street	None Future cycling facilities will be provided from west of Highway 27 to Woodbine Avenue (2016 TMP)	Concrete sidewalk on both sides from Highway 400 to Dufferin Street North sidewalk continues until Sir Benson Drive Sidewalks resume from west of Ilan Ramon Boulevard to Bathurst Street	Shoulders between Peter Rupert Avenue and Bathurst Street
Bathurst Street (York Regional Road 38)	Urban between Major Mackenzie Drive and Teston Road	None between Major Mackenzie Drive and Teston Road	Concrete sidewalk on east side between Major Mackenzie Drive and Mill Street	Shoulder on west side between Teston Road and Shaftsbury Avenue

Road Name	Cross-section Type	Cycling Facilities	Pedestrian Facilities	Shoulder
	Semi-urban between Teston Road and Shaftsbury Avenue	Future cycling facilities will be provided between Steeles Avenue and Kirby Road (2016 TMP)	Concrete sidewalk on both sides between Mill Street and Teston Road Concrete sidewalk on east side between Teston Road and Shaftsbury Avenue	
Dufferin Street (York Regional Road 53)	Rural	Bike facilities on shoulders between Major Mackenzie Drive and Kirby Road	Concrete sidewalk on east side between Major Mackenzie Drive and Eagles Landing Road	Wide paved shoulders
Keele Street (York Regional Road 6)	Urban between Major Mackenzie Drive and McNaughton Road Rural between Teston Road Barrie GO Line grade separation structure	Dedicated on-street bike lanes between Masters Avenue and north of McNaughton Road Future cycling facilities will be provided between Rutherford Road and Kirby Road (2016 TMP)	Sidewalks on both sides from Major Mackenzie Drive and McNaughton Road Sidewalk on west side between McNaughton Road and Teston Road	Gravel shoulders between Teston Road Barrie GO Line grade separation structure
Jane Street (York Regional Road 55)	Urban between Major Mackenzie Drive and Teston Road Rural from Teston Road to Kirby Road	None Future cycling facilities will ne provided from Major Mackenzie Drive to Teston Road (2016 TMP)	Sidewalks on both sides between Major Mackenzie Drive and Teston Road Sidewalk on east side from Teston Road to approximately 500 m north of Teston Road	Gravel shoulders from Teston Road to Kirby Road

5.6.6 Existing Intersection Operational Performance Analysis (2020)

An evaluation of the performance of the following signalized intersections within the study area was completed using Synchro 10 for the existing conditions (2020) during the morning peak hour:

- Teston Road and Cityview Boulevard
- Teston Road and Highway 400
- Teston Road and Jane Street
- Teston Road and Cranston Park Avenue
- Teston Road and Keele Street
- Teston Road and Dufferin Street
- Teston Road and Via Romano Boulevard
- Teston Road and Bathurst Street
- Major Mackenzie Drive and Highway 400 West Ramp
- Major Mackenzie Drive and Highway 400 East Ramp
- Major Mackenzie Drive and Jane Street
- Major Mackenzie Drive and Keele Street
- Major Mackenzie Drive and Dufferin Street
- Major Mackenzie Drive and Bathurst Street
- Kirby Road and Jane Street
- Kirby Road and Keele Street
- Kirby Road and Dufferin Street
- Kirby Road and Bathurst Street

The evaluation found that the existing condition includes several turning movements operating at, or slightly above, capacity along with congested and failing conditions (i.e., LOS E and F) as a result of delays experienced during the A.M. peak hour within the study area. The overall intersection performance within the study area was noted to be at a LOS E or better (see **Figure 5-18**). Refer to **Appendix D** for more information.

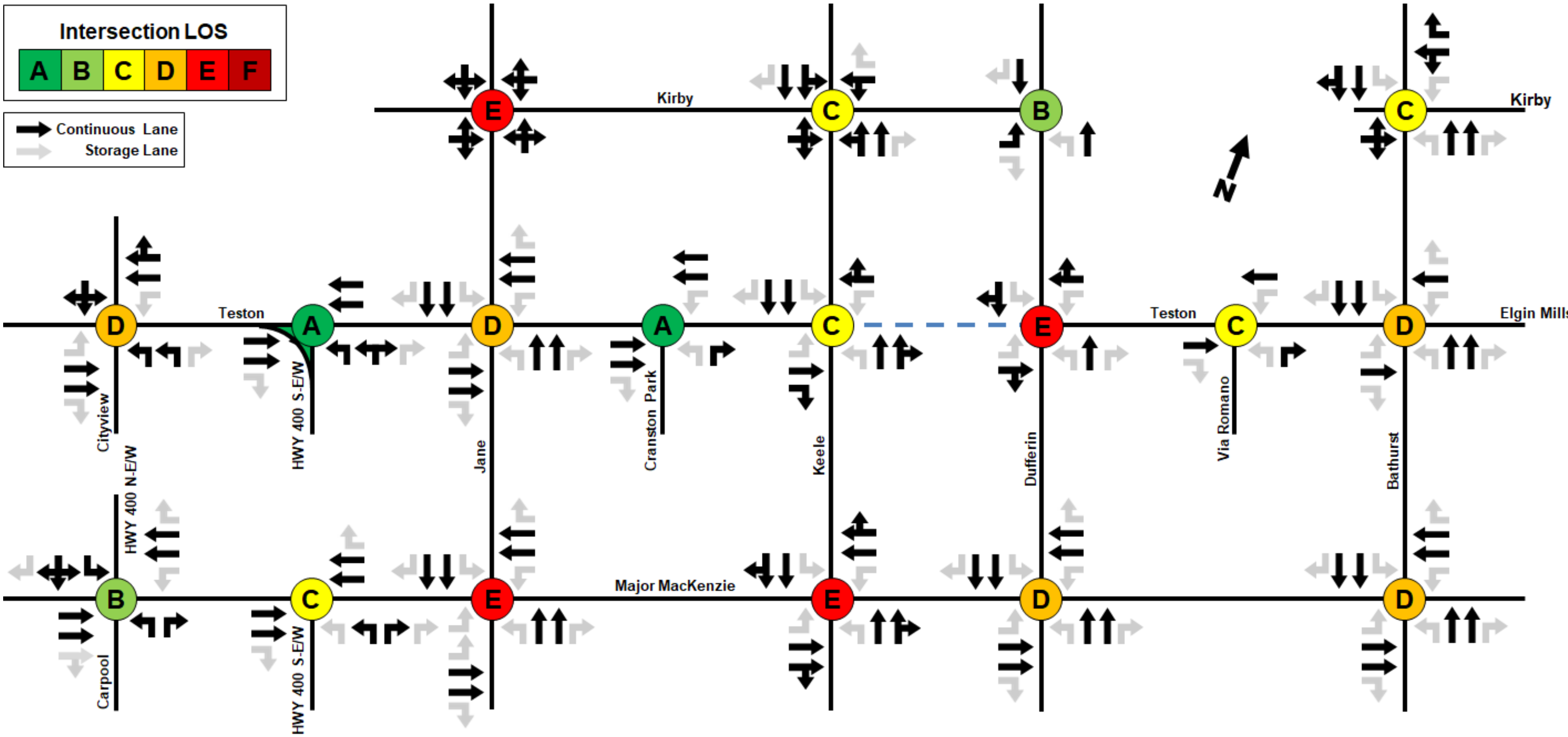

Figure 5-18: Existing Intersection Operational Performance (2020)

5.6.7 Active Transportation Facility Assessment on Teston Road

The evaluation of the active transportation facilities for Teston Road was performed using the York Region's Transportation Mobility Plan Guidelines (November 2016). For this assessment, the evaluation of the active transportation facilities was performed at each major intersection crossing of Teston Road and the roadway segments in-between for automobiles, transit, pedestrians and bicycles.

Table 5-12 shows the intersections where modes of transportation did not meet LOS targets. See **Appendix D** for more information.

Table 5-12: Summary of Multimodal Level of Service Failures within the Study Area

Intersection/ Segment	Mode of Transportation	Explanation
Teston Road and Jane Street	Pedestrian	In the southbound and westbound directions, the pedestrian LOS is failing since no facilities are provided in the primary direction of travel.
	Bicycle	Bicycle facilities are only provided on the southbound approach to the intersection of Teston Road and Jane Street in the form of a narrow (<1.5m) dedicated bike lane resulting in a LOS 'D'. The remainder of the approaches do not have a cycling facility resulting in a failing LOS 'F'. The lack of cycling cross-rides at the intersection, in addition to the absence or narrow width of the existing cycling facilities, does not encourage the average recreational cyclist from using this intersection as part of their cycling route.
Teston Road between Jane Street to Keele Street	Pedestrian	The pedestrian LOS along this segment is LOS 'A' in the eastbound direction but LOS 'F' in the westbound direction. However, the multi-use pathway on the south side of Teston Road can currently serve the pedestrian needs in both directions along the corridor as majority of the pathway users are presumed to live in the abutting communities primarily located on the south side of the corridor while the north side mainly consists of undeveloped agricultural farmland.
	Bicycle	The bicycle LOS in the eastbound direction is LOS 'A' with a failing LOS 'F' in the opposing westbound direction. The separated multi-use pathway on the south side of Teston Road in the corridor serves cyclists needs in both directions complementing the side where most residents live, providing a comfortable facility for users of all ages and experiences.

Intersection/ Segment	Mode of Transportation	Explanation
Teston Road and Keele Street	Transit	At the intersection, the transit headway is 19 minutes for YRT Route #107 and ranges between 25 - 32 minutes for YRT Route #96, during the weekday peak hour, resulting in LOS that exceeds the target LOS 'C'.
	Pedestrian	Pedestrian facilities are limited at the intersection of Teston Road and Keele Street with a LOS 'F' for all approaches except the eastbound approach with a LOS 'A'. Based on the existing conditions, there are many gaps in the pedestrian network at this intersection.
	Bicycle	The bicycle LOS at all approaches for the intersection of Teston Road and Keele Street are LOS 'F' except for the eastbound approach. In the eastbound direction, the multi-use pathway provides a cycling connection to the intersection resulting in a bicycle LOS 'A' for the approach. The remainder of the approaches lack any form of a cycling facility towards the intersection, resulting in a LOS 'F'.
Teston Road and Dufferin Street	Automobile	The southbound and westbound approaches currently fail to meet the target LOS 'D'. For the northbound and eastbound approaches, the LOS targets are achieved. The configuration of the intersection at Teston Road and Dufferin Street includes a dedicated left turn auxiliary lane and a through-right lane on three of the four approaches with the northbound approach having a dedicated lane for each left, through and right movement. Based on the current signal timing plan, the northbound left turn is the only movement with a permitted phasing with the remainder of the left turns protected-permitted.
	Pedestrian	Pedestrian facilities are limited at the intersection of Teston Road and Dufferin Street with a LOS 'F' for all approaches except the eastbound approach which has a 1.5m sidewalk with a grassed buffer approaching the intersection.
	Bicycle	On Teston Road, the LOS in the eastbound direction is 'F' due to the lack of bicycle facilities, while the LOS in the westbound direction is 'D' with a 1.5m paved shoulder bike lane.

Intersection/ Segment	Mode of Transportation	Explanation
Teston Road between Dufferin Street to Bathurst Street	Automobile	The mid-block segment of Teston Road between Dufferin Street and Bathurst Street has a three lane cross section with the third lane being a two-way left turn lane (TWLTL), providing access to residential properties and side streets, reducing the delays caused by left turning vehicles with the single lane in the eastbound and westbound directions. The LOS in both directions is LOS 'F' based on the delays and v/c ratios approaching each of the respective intersections. The LOS for the eastbound direction is based on the eastbound approach to Bathurst Street while the westbound direction is based on the westbound approach to Dufferin Street.
	Pedestrian	The majority of Teston Road between Dufferin Street and Bathurst Street does not have any pedestrian facilities except for a section east of Torah Gate adjacent to the Forest View Park subdivision. The pedestrian facility between Torah Gate and Bathurst Street is a 1.5m wide sidewalk with a varying grassed boulevard approximately 6.5m wide which connects to a sidewalk that runs parallel to Teston Road in the Forest View Park subdivision. Since there is no continuous pedestrian facility along this section of Teston Road, the pedestrian LOS targets are not achieved.
Teston Road and Bathurst Street	Automobile	Only the southbound approach meets the automobile LOS target of 'D'. The remaining three legs of the intersection all experience long delays greater than the 80 second with the accompanying critical movements operating at LOS 'F'. The configuration of the existing intersection includes a dedicated right and left turn lane in addition to the through lanes.
	Transit	From the current transit data, the transit LOS target is only met for the northbound approach. However, in terms of transit performance, the LOS target of 'D' is achieved by all approaches.
	Bicycle	There are no cycling facilities resulting in a LOS 'F'. The shoulder bike lanes that are present on Teston Avenue from Dufferin Street do not continue to the intersection. In the area around the intersection per York Region's TMP Map 4, there are limited and discontinuous cycling facilities providing not much desire for bicyclists to use this intersection as part of their bike route.

5.6.8 Collisions Review

General historical collision records from the Automatic Identification System were obtained from York Region for all arterial roads within the study area for a 5-year period between 2015 to 2019. The collision history database provides the detail of collisions reported within the project limits, including details such as the time and location, classification, environment (weather and light condition), as well as other related information to describe the collision event. **Table 5-13** below provides a summary of the number of collisions within the study area between 2015 and 2019. Refer to **Appendix D** for more details.

Table 5-13: Summary of Collisions within the Study Area from 2015 to 2019

Road Name	Number of Collisions	Number of Fatalities	Number Involving Pedestrians	Number Involving Cyclists
Teston Road	300	0	0	3
Kirby Road	73	0	0	0
Major Mackenzie Drive	1,066	2	25	14
Bathurst Street	200	0	4	1
Dufferin Street	78	1	N/A	1
Keele Street	297	0	6	5
Jane Street	135	0	14	5

5.6.9 Future Road Network

5.6.9.1 The City of Vaughan and York Region's Road Improvements

Figure 5-19 illustrates the proposed road network in York Region's 2016 TMP for the year 2041.

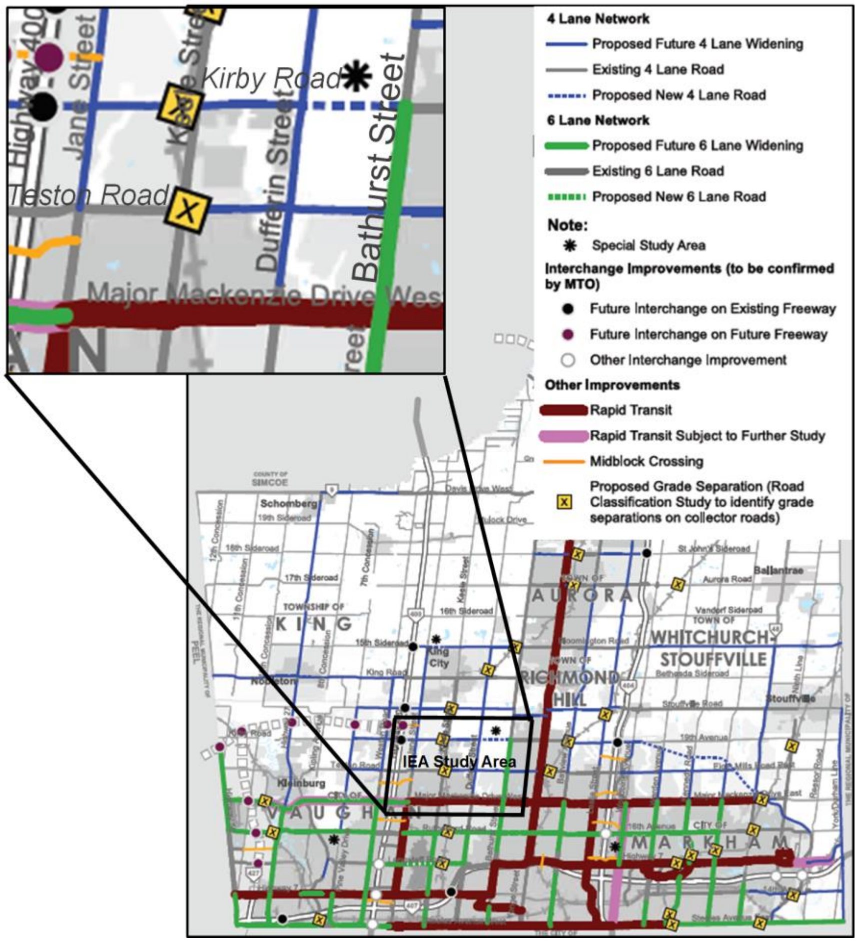

Figure 5-19: York Region Recommended Road Network for 2041 (2016 TMP)

The City of Vaughan and York Region have both identified the following planned improvements and additions to the transportation system:

5.6.9.1.1 Teston Road (York Region Road 49)

York Region's TMP includes widening of the existing Teston Road to four lanes between Pine Valley Drive and Weston Road and from Dufferin Street to Yonge Street. In addition, it is recommended to extend Teston Road between Keele Street and Dufferin Street as a four-lane roadway to accommodate additional traffic from anticipated developments.

5.6.9.1.2 Kirby Road (City of Vaughan)

York Region's TMP includes widening of Kirby Road between Pine Valley Drive and Dufferin Street from two to four lanes and the extension of Kirby Road between Dufferin Street and Bathurst Street as a four-lane roadway including a potential Kirby Road interchange with Highway 400.

5.6.9.1.3 Major Mackenzie Drive (York Regional Road 25)

The York Region's TMP includes the widening of Major Mackenzie Drive between Highway 50 and Jane Street from four to six lanes. Based on the York Region's TMP, there will be a dedicated transit rapidway on Major Mackenzie Drive (occurring 2027-2031).

5.6.9.1.4 Bathurst Street (York Regional Road 38)

The York Region's TMP includes widening of Bathurst Street between Highway 7 and Kirby Road from four to six lanes.

5.6.9.1.5 Dufferin Street (York Regional Road 53)

The York Region's TMP includes widening of Dufferin Street between Major Mackenzie Drive and 15th Sideroad (Y.R. 40), located north of Kirby Road, from two to four lanes.

5.6.9.1.6 Keele Street (York Regional Road 6)

There are no identified recommended improvements along Keele Street in the York Region TMP.

5.6.9.1.7 Jane Street (York Regional Road 55)

York Region's TMP includes widening of Jane Street between Teston Road and 15th Sideroad (Y.R. 40) from two to four lanes.

5.6.9.2 Other Road Improvements

5.6.9.2.1 Highway 400

Currently there is ongoing construction on Highway 400 (between Major Mackenzie Drive north to King Road) to widen Highway 400 from six to eight lanes.

5.6.9.2.2 Canada Drive-America Avenue Bridge

The City of Vaughan's Official Plan identifies the need to establish a primary road connection over Highway 400 between Major Mackenzie Drive and Teston Road in Block 33. This road connection is not only a key component of the area multi-modal transportation system (accommodating vehicles, cyclists and pedestrians) but also a means of providing the residents in the communities on either side of Highway 400 with better access to community services, reduced travel times and improved emergency response services. Subsequently, the location of the mid-block connection between Canada Drive and America Avenue was identified through the development planning process for Block 33. The preferred design includes a 2-lane roadway, sidewalks and bicycle lanes on a mostly straight alignment slightly shifted to the south side of the right of way and intersections at Cityview Boulevard/Canada Drive (requiring re-grading) and John Deisman Boulevard/ America Avenue.

5.6.9.2.3 GTA West Highway Corridor

MTO is in the process of confirming the Preferred Route for a new 400-series highway and transit corridor across York, Peel and Halton regions to make commuting and travel easier in the Greater Toronto Area.

The GTA West corridor will include a four-to-six lane 400-series highway, separate infrastructure dedicated for transit and passenger stations, as well as intelligent transportation features and truck parking. The EA for the GTA West Corridor is expected to be complete by the end of 2022. **Figure 23** illustrates the GTA West route planning study area.

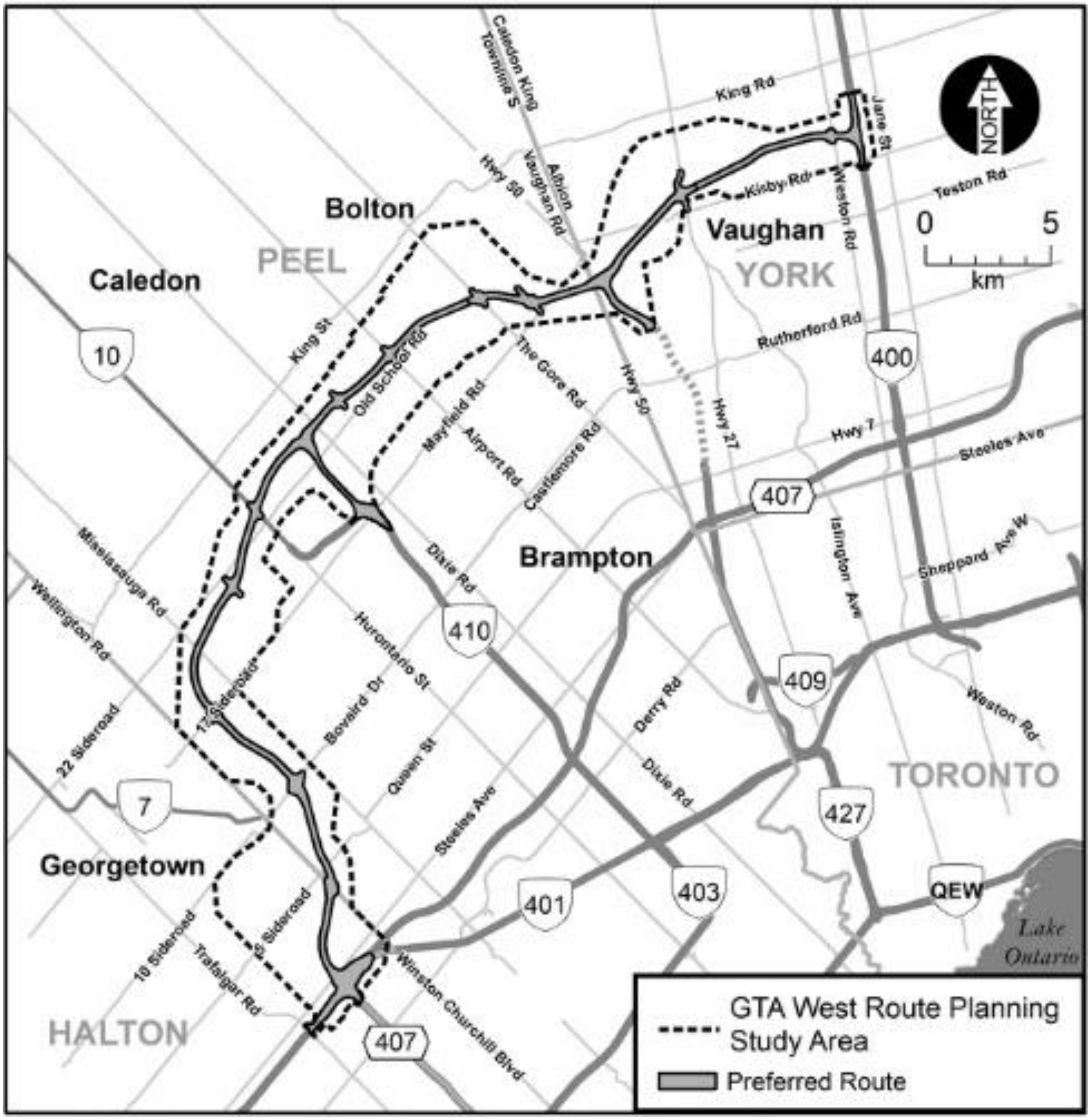

Figure 5-20: GTA West Route Planning Study Area

5.6.9.2.4 Highway 427 Expansion and Extension

The MTO and Infrastructure Ontario (IO) have completed the Highway 427 expansion project which includes an extension of the highway corridor by 6.6 km from Highway 7 to Major Mackenzie Drive, widening of the existing highway to 8 lanes between Finch Avenue and Highway 7, and new interchanges at Langstaff Road, Rutherford Road and Major Mackenzie Drive. The extension project included 8 lanes between Highway 7 and Rutherford Drive and 6 lanes from Rutherford to Major Mackenzie Drive. The project began in August 2017 and was completed in September 2021, with Link 427 providing ongoing highway maintenance for the next 30 years. Refer to **Figure 5-21** illustrating the improvements for Highway 427.

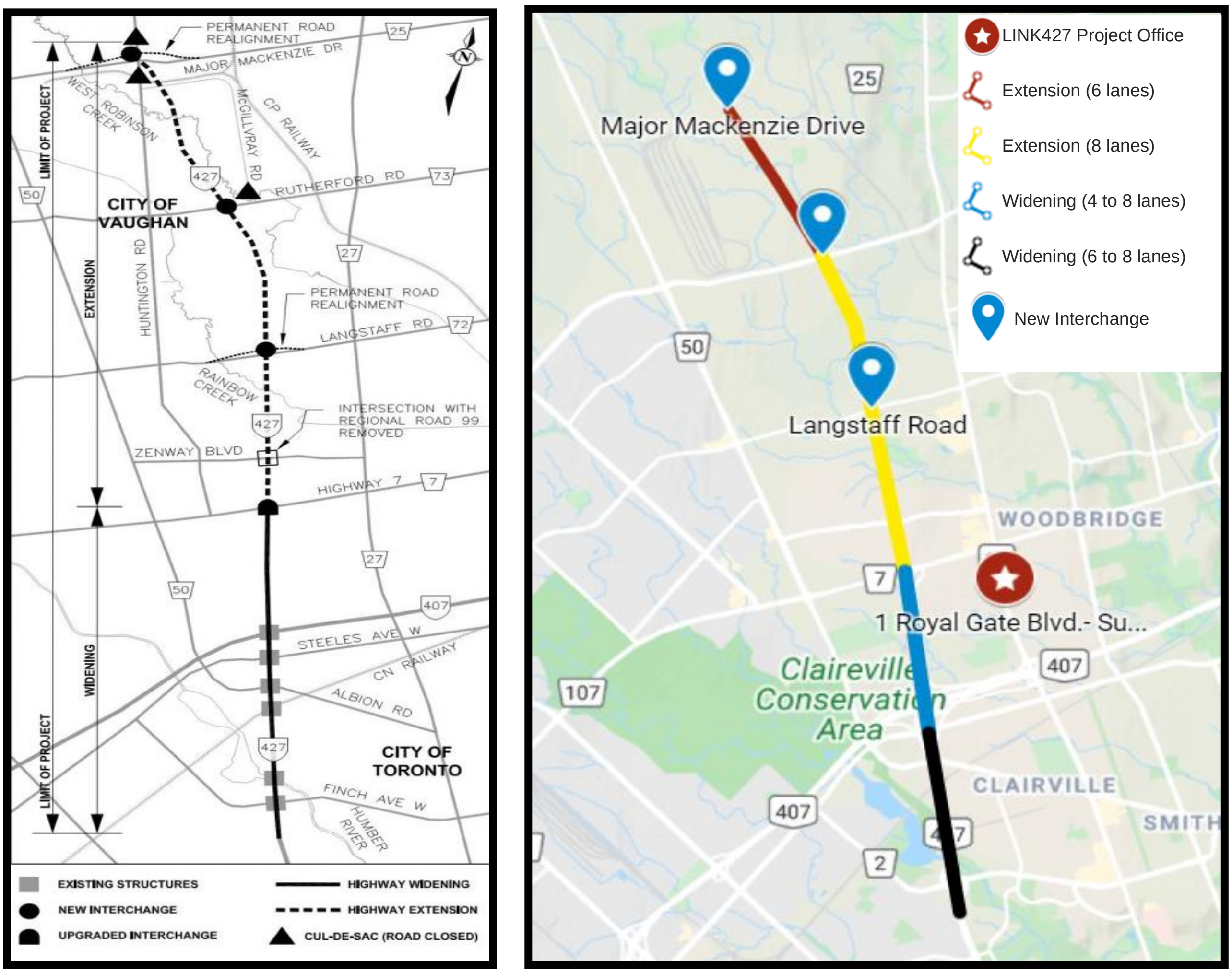

Figure *5-21*: Highway 427 Expansion and Extension

5.6.10 Sewage, Water and Stormwater

5.6.10.1 Drainage Infrastructure

Teston Road within the study area predominantly has a rural cross-section, with pockets of urbanization near intersections. Roadway drainage is serviced through a combination of roadside ditches and storm sewers. These drainage systems direct runoff from the right-of-way to various outlets along the corridor. A total of ten (10) outlets have been identified, with seven (7) of them representing either storm sewer or enclosed drainage systems.

There are five (5) centerline culvert crossings within the study area, as well as two (2) side road culverts parallel to Teston Road crossing the railway. Site investigation was conducted on October 26th, 2022.The characteristics of the existing culverts and conditions are presented in **Table 5-14.**

Table 5-14: Inventory of Existing Culverts

Culvert ID	Configuration	Size (mm)	Conditions (U/S)	Conditions (D/S)	Preliminary Recommendation
Teston Road Mainline Culverts					
WD07	Corrugated Steel Pipe	1300mm Ø	Good condition; 50mm standing water	Collapsed End	Relocation
ED02	Concrete Pipe w. Headwalls	800mm Ø	Good Condition; 10mm sediment within pipe	Good Condition	Extension
ED03	Concrete Pipe w. Headwalls	900mm Ø	Good Condition	Good Condition	Extension
ED04 (McNair Creek)	Rigid Frame Open Footing	5700 mm (span) *1500 mm (vertical opening)	Good Condition	Good Condition	To be retained; Add headwall if needed

Culvert ID	Configuration	Size (mm)	Conditions (U/S)	Conditions (D/S)	Preliminary Recommendation
ED05	Concrete Pipe with Gabion Headwall (Upstream side)	1050mm Ø at Upstream End	Good Condition	Connect to a manhole chamber; Not inspected	To be retained; modification on the upstream headwall if required
Side Road (Go Rail) Culverts					
RN (Railway North)	Concrete Pipe	900mm Ø	Good Condition; 1800mm standing water; 50mm sedimentation	Good Condition	Relocation
RN (Railway South)	Concrete Pipe	300mm Ø	Good Condition	Buried; Could not be located	To be retained; Rehabilitation

There are seven (7) existing storm sewer systems. An inventory of the existing storm sewers, together with the preliminary recommendation of improvement are presented in **Table 5-15.**

Table 5-15: Inventory of Existing Storm Sewers

Locations	Discharge Outlets	Descriptions	Preliminary Recommendation
West of Keele	Outlet 1; Part of Teston Road Storm Sewer	300mm Ø	No impacts
West of Keele	Outlet 2; Discharge to a larger storm system running to the south	300mm Ø to 450mm Ø	To be modified and direct flow to the proposed pond (SWMF1)
Dufferin/Teston Intersection	Outlet 3; Discharge into Dufferin St storm sewer system	Multiple segments 300mm Ø	To be retained with adjustments of catch basin locations
Dufferin to Via Romano	Outlet 7; discharge to 1050mm STM along Via Romano Blvd	Dls and 525mm Ø STM along EBL	To be replaced by a new storm sewer system
East of Quail Run	Outlet 8; Discharge to McNair Creek upstream side of ED04	85m – 375/525mm Ø along WBL	To be replaced by a new storm sewer system

Locations	Discharge Outlets	Descriptions	Preliminary Recommendation
Quail Run to Torah Gate	Outlet 9; Discharge to 975mm STM along Torah Gate	360m – 525mm Ø to 900mm Ø STM connecting between Quail Run and Torah Gate	Maintain the mainline pipes with a parallel storm line along WBL for stormwater management and conveyance
Torah Gate to Bathurst St	Outlet 10; Discharge to a drainage conduit (ED05)	300mm – 450mm ØSTM	Maintain the mainline pipes with a parallel storm line along WBL for stormwater management and conveyance

5.6.10.2 Existing Stormwater Management Facilities

There are no documented stormwater management facilities within the right-of-way, except for grassed swales along the road. Nevertheless, runoff from various sections of the existing road is directed into storm sewers, which outlet to the existing stormwater management facilities outside of right-of-way as part of subdivisions in the City of Vaughan. There are 3 stormwater facilities currently servicing runoff from Teston Road. The existing Pond 3 and Pond 4 within Block 12 of the City of Vaughan provides quantity and quality treatment of runoff originating from the Teston Road right-of-way. Two ponds were designed to meet stormwater treatment targets defined in the relevant MESP/EIS, in accordance with Stormwater Management Plan for Brock 12 (Schaeffers, 2005) and Stormwater Management Pond 4 Final Report (Schaeffers 2013). However, the SWM Pond 4 was only sized to accommodate the 5-year flow from Teston Road (approximate 1.5 ha with imperviousness of 79%).

5.6.10.3 Existing Municipal Servicing

In additional to the storm sewer system, there are various sanitary and water servicing infrastructure within the right-of-way of Teston Road. The details of these infrastructure were presented in the Subsurface Utility drawings. Storm sewers and sanitary sewers within the study area are owned and operated by the City of Vaughan and the Region of York.

Sanitary servicing pipes are located at the intersection of Keele Street and Teston Road with the diameters ranging between 200 to 375mm and at the intersection of Dufferin Street and Teston Road with the diameters ranging between 200 to 600mm.

A pumping station owned by the Region is situated on the east side of Keele Street, north of Teston Road. There are 900 mm trunk watermains running along Keele Street and Teston Road east of Keele. These watermains converge at the intersection. Additionally, a 300 mm watermain pipe runs along the south side of Teston Road, stretching from Keele Street to Rodinea Road.

A 900 mm trunk watermain runs along the eastbound boulevard of Teston Road, extending from Dufferin Street to Bathurst Street. This trunk is accompanied by several branch pipes measuring 200 mm and 300 mm in diameter. In addition to the 900 mm trunk line, there are three other trunk lines (two in 750 mm diameter and one in 1050 mm diameter) running within the right of way of Teston Road, extending from Quail Run Boulevard to Bathurst Street.

5.6.11 Utilities

HydroOne, Alectra, Bell, Rogers and Enbridge utility infrastructure is present within the study area. Record documents indicate proposed gas mains north of Teston Road near Keele Street. Further investigation would be required to confirm the presence and determine the alignment of the abandoned gas mains.

Telecommunications within the project area is owned and operated by Bell and Rogers. Records obtained indicate the Bell and Rogers infrastructure is present within the study area. Field investigations did not confirm the alignment of the buried telecommunications.

5.6.12 Contamination and Hazardous Materials

A Contamination Overview Study (COS) Report was prepared for the Teston Road Class EA Study. The full report is provided in **Appendix M** and the review and evaluation of information is summarized below.

Based on the findings of the COS report, ten (10) areas of potential environmental concern (APEC) were identified on the project study area. The contaminants of potential concern include Petroleum Hydrocarbons (PHC), Volatile Organic Compounds (VOC), Polycyclic Aromatic Hydrocarbons (PAH), Polychlorinated Biphenyls (PCB), Organochlorine (OC) Pesticides, Phenols, Metals and Inorganic Parameters. Additional investigation, including Phase I Environmental Site Assessment (ESA) and/or soil and groundwater assessment, should be conducted within any APEC which may be impacted by the proposed construction activities.

Twelve (12) potentially contaminating activities (PCA) were identified within the study area. According to the historical documentation search that was completed during this investigation, the inspection of the project study area and surrounding properties and their historical use, the following environmental concerns, including all three landfill sites, have been identified:

- The potential contaminants from the Vaughan Landfill and Keele Valley Landfill within the central portion of the study area.
- The potential contaminants from the industrial operations west of the Keele Valley Landfill, within the study area.
- The potential contaminants from the Metrolinx Barrie Corridor railroad tracks and spurs that cross the study area west of the landfills.
- The potential contaminants from the multiple service stations located throughout the study area.
- The potential contaminants from the multiple dry cleaning businesses located throughout the study area.

Ontario's *Environmental Protection* Act (1990) includes provisions for administration and enforcement of requirements related to pollution, waste management, waste disposal, litter management and litter disposal, for the purpose of the protection and conservation of the natural environment. There are currently three known landfills/waste disposal sites within the study area. These include the Keele Valley Landfill, the Vaughan Waste Disposal site and the Disposal Services landfill. All three sites are situated roughly between the block of land bordered by Dufferin Street in the east, Keele Street in the west, Kirby Road to the north, and Major Mackenzie Drive West to the south. Refer to **Figure 5-22** for the locations of the three sites. The sections below are intended to highlight the legislative framework and requirements for this study based on proximity to the landfill sites.

Figure *5-22*: Landfill Sites

5.6.12.1 Keele Valley Landfill

The Keele Valley Landfill began operation in 1983 and remained in operation until 2003. Similar to the Vaughan Landfill the Keele Valley Landfill was set in the footprint of the former gravel pit. Unlike the Vaughan Landfill, the Keele Valley Landfill was constructed with a compacted 1.2 m thick clay liner with a minimum permeability of 1 x 10-8 cm/sec along the base and side slopes used to contain leachate and gas. The liner was constructed in four stages with the final stage being completed in 1994. The Keele Valley Landfill is also equipped with a leachate collection system.

During its time of operation Keele Valley Landfill accepted 28.1 million tonnes of domestic, commercial and industrial waste, including biomedical waste and asbestos. The waste area is approximately 99.1 hectares in size.

The Keele Valley Landfill operates under a Certificate of Approval (CoA) and is subject to the CoA, as well as requirements under Section 46 of the *Environmental Protection Act* and the MECP's D-4 Guideline: Land Use On or Near Landfills and Dumps (1994). Per Section 5.2.2 of the D-4 Guideline, no land use may take place within 30 m of the perimeter of the fill area of a non-operating site where technical controls for leachate are required. As the IEA progresses, further discussions with the City of Toronto (currently own and maintain the Keele Valley Landfill) will be required to delineate the site boundaries, determine limitations of the CoA, and request input to the alternatives.

5.6.12.1.1 Groundwater Contaminant Plumes

Two distinct chloride plumes have been identified traveling under the Keele Valley Landfill. The first plume has originated from the Vaughan Landfill and the second from the industrial park. The chloride concentrations are known to be greater than 15 mg/L and up to 750 mg/L. Both plumes are traveling in southeastern direction.

5.6.12.1.2 Landfill Infrastructure

The Keele Valley Landfill's leachate collection system consists of 200-millimeter (mm) diameter perforated high density polyethylene pipes and gravel drains located above the liner. The leachate is directed towards the pumping station and discharged into the sanitary sewer system.

An additional purge well system is located at the southern limit of the Keele Valley Landfill. The Southern Purge Well System (SPWS) is operated by the City of Toronto and consists of three (3) purge wells. The SPWS collects approximately 641 m3 /day of contaminated groundwater. The collected groundwater is discharged to the sanitary sewer system. This system is scheduled to stay in operation until the year 2200 at minimum (City of Toronto, personal communication during meetings).

A system of horizontal gas collection trenches and supplementary vertical gas wells are installed in the waste area at regular intervals. A vacuum is applied to these trenches by means of a multi-stage blower and header pipe system that draws the landfill gas out of the waste. The system collects approximately 7.0 m3 /s of landfill gas which contains approximately 47% methane. The gas is used to power a 30 megawatt electrical generation plant that is located south of landfill. The remaining unused gas is burned in back-up incinerators.

A summary of the landfill infrastructure includes:

- Gas extraction wells (Across landfill in regular intervals).
- Maintenance chambers for landfill gas infrastructure (location unknown).
- Landfill gas plant incorporating a flare and electricity generation facilities (Southern limit, west of SPWS).
- Groundwater purge wells (SPWS, southern limit of landfill).

- Leachate pumping chamber (2 located near Teston Rd north of landfill, 4 located at southern limit of the Keele Valley Landfill).
- Leachate collection pipe clean-outs (2 located at west limit, 5 located at south limit of landfill).
- Stormwater ponds (1 west of landfill near Rodinea Road, 1 east of LF on golf course, 1 south of landfill on golf course).
- Groundwater monitoring wells (200+, throughout landfill).

MH carried out a conflict check for the proposed road design with the purge wells and observation wells, and no direct conflicts were identified. Some observation wells including, but not limited to, 8/83, 16/88 and 17/88 may be directly impacted by the ground disturbance associated with the construction and excavation activities.

MH also carried out a conflict check for the proposed road design with gas probes located south of the proposed road (yellow triangles, south of proposed road, between the Keele Vally Landfill entrance and Vaughan Landfill entrance). These gas probes may be impacted by ground disturbance associated with the construction and excavation activities.

5.6.12.2 Vaughan Landfill

The site was originally operated as a gravel pit and transitioned into a landfill in the mid-1960s. The landfill accepted domestic, commercial and industrial waste until its closure in 1984. The landfill was never equipped with a liner or leachate collection system. The original final cover was composed of a sandy till with varying thicknesses from 0.5 to 6.5 metres. In 1997, the final cover was upgraded to a clayey soil with a thickness ranging from 1.5 to 6.5 m. The waste is approximately 20 to 23 m thick in the central portion of the site and decreases to approximately 15 m near the east and west ends.

5.6.12.2.1 Groundwater Contaminant Plumes

Due to the lack of liner or leachate collection system, multiple chloride plumes have migrated south and southeasterly from Disposal Services Landfill and the Vaughan Landfill underneath the Keele Valley Landfill. Two distinct chloride plumes and at least six isolated chloride plumes have been identified. The largest plume that covers the Disposal Services Landfill and Vaughan Landfill, and migrating through the Keele Valley Landfill is referred to as the “Vaughan Landfill Chloride Plume”. The plume located to the west of the Keele Valley Landfill is referred to as the “Industrial Park Chloride Landfill”. The groundwater is impacted from leachate and possibly road salt. The chloride concentrations are known to be greater than 15 mg/L and up to 750 mg/L. It should be noted that elevated concentrations of multiple volatile organic compounds (VOC) have also been identified in wells along the southeastern limit of the landfill. The groundwater travels in a southeasterly direction with flow rate of approximately 60 m/year.

One of the isolated plumes, investigated by Dixon Hydrogeology in 1996, migrates easterly towards the East Branch of the Don River and is confined to the upper aquifer. The chloride concentrations were determined to be within the Ontario Drinking Water Standards.

The maximum concentration of chloride measured in 2019 in the Vaughan Landfill groundwater monitoring wells located east of the landfill, was reported to be 148 mg/L. The concentration measured in ten (10) other monitoring wells ranged from 2.9 mg/L to 21.2 mg/L. The plume tracked during the Vaughan Landfill groundwater monitoring round in 2019 was similar to that identified by Dixon Hydrogeology Ltd. in 1996.

5.6.12.2.2 Landfill Infrastructure

In order to intercept the Vaughan Landfill Chloride Plume, a purge well system was installed in 1984 at the southern limit of the landfill. The Teston Road Purge Well System (TPWS) is operated by the City of Toronto and consists of thirteen (13) purge wells in addition to approximately 21 observation wells. The TPWS collects approximately 384 m3 /day of contaminated groundwater that is discharged to the sanitary sewer system. This system is scheduled to stay in operation until at least 2040. MH carried out a conflict check for the proposed road design with these purge wells and no conflicts were identified. Although no direct conflicts were identified, the wells may be impacted by ground disturbance associated with the construction and excavation activities.

A leachate main collecting leachate from all the purge wells runs underneath the proposed road in a north-south orientation between 21 Rodinea Road and Keele Valley Landfill and is considered a direct conflict with the proposed road design.

A system of landfill gas extraction wells was also installed in 1984 and later upgraded in 1997 and 1998. As of 2019 there are twenty-seven (27) gas wells located along the south and southwest limit of the landfill. The gas is collected and flared at a plant located west of the TPWS. The flare facility emits combusted gases that are released into the atmosphere which may induce exposure to the construction workers and future road users. MH carried out a conflict check of the proposed road design with these gas extraction wells based on a review of available information and satellite image. The following conflicts and issues were identified:

- Gas Manhole MH1, gas wells GW4/97 and GW597, and a gas header connecting them are within 2 m (and possibly underneath) of the proposed multi-use pathway (MUP), and may be impacted by ground disturbance associated with the construction and excavation activities.
- Some of the on-site and off-site gas probes may be impacted as they most likely fall under the proposed pavement and/or MUP.

5.6.12.3 Disposal Services Landfill

The Disposal Service Landfill began operations in the mid-1960s and remained in operation until the mid 1980s.

The Disposal Services Landfill is a privately owned and operated landfill located north of the intersection of Teston Road and Rodinea Road. Based on a review of ‘Teston Road from Keele Street to Bathurst Street, Individual Environmental Assessment, Terms of Reference, MH noted the following information on the Disposal Services Landfill:

- It is owned by Teston View Holdings Inc. and was operated between 1974 and 1986.
- Soil was imported to this landfill in 1999 following an Environmental Compliance Approval (ECA) amendment.
- An additional 390,200 m3 of apparently clean fill was imported to the landfill between 2006 and 2015 with no formal design plans or specific ECA amendment.
- This landfill is no longer accepting material.

6. Alternatives To the Undertaking

The Problem and Opportunity Statement provided the foundation for the generation of alternatives discussed in this report. Additionally, the Teston Road Area Improvements IEA Terms of Reference provided guidance on the range of alternatives to be considered.

The selection of a preferred Alternative To the Undertaking followed a multi-step process as depicted in **Figure 6-1**.

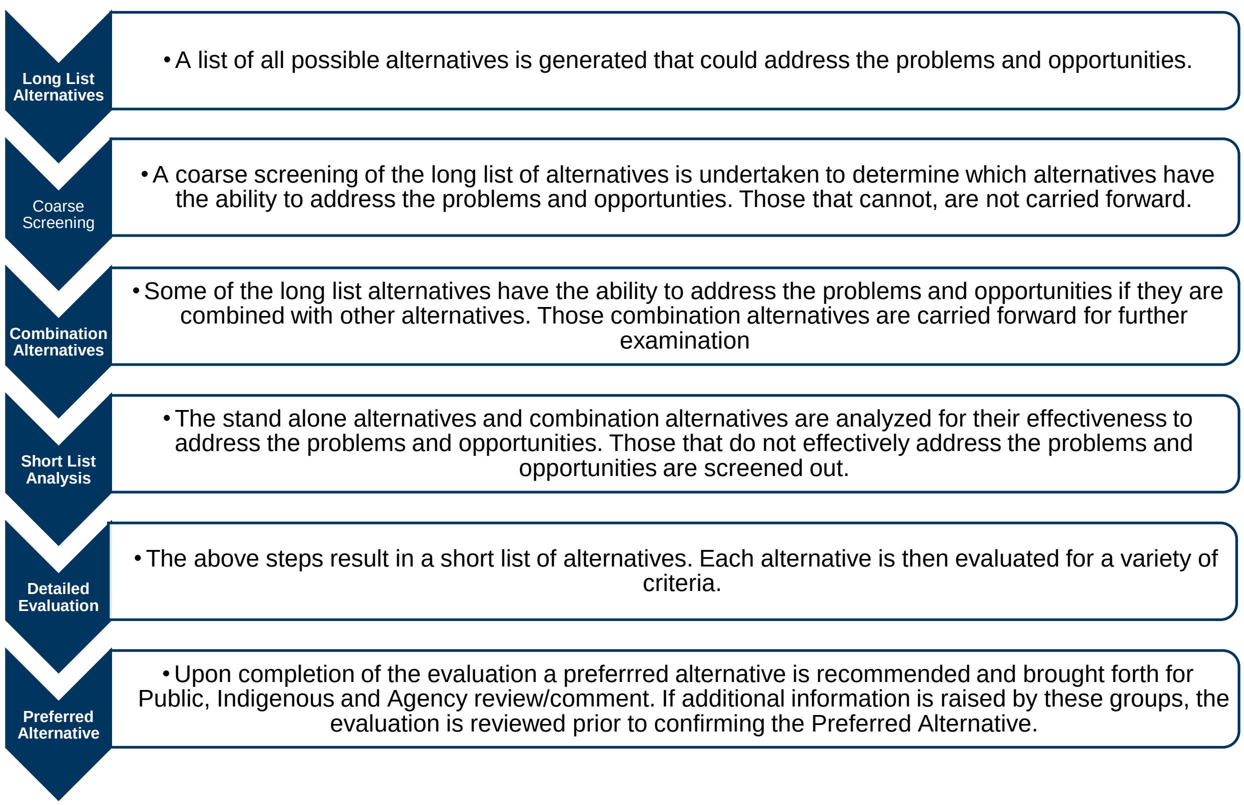

Figure 6-1: Generation & Evaluation Process for Alternatives To

Alternatives To examine functionally different ways to address transportation problems and opportunities and must be examined to determine their effectiveness at addressing these problems and opportunities. The first step in this process was to generate a list of all possible Alternatives To.

The Terms of Reference (WSP, 2018, available in **Appendix A**), provided the following principles to be considered when generating Alternatives To:

- Make effective and efficient use of existing infrastructure.
- Develop a network that focuses on:
  - Encouraging economic growth and vitality of the Region.
  - Improving livability, health, and social well-being to the residents.
  - Protecting and sustaining the natural and built environment.
  - Maintaining the financial sustainability, openness, accessibility, transparency, accountability and reliability of the Region's government and related programs and services.
- Ensure effective coordination with other York Region and local planning initiatives.

These principles, along with the identified Problem and Opportunity Statement are the foundation of the Alternatives To process and were consistently reviewed throughout the process.

Additional guidance for the evaluation of Alternatives To the Undertaking is included in Section 5.2 of the Terms of Reference in **Appendix A**.

6.1 Long List of Alternatives

A long list of potential alternatives was identified during the Terms of Reference stage. The long list was screened at a coarse level to determine a medium list of alternatives for further analysis and evaluation.

The Terms of Reference (ToR) (WSP, 2018) identified several categories of Alternatives To, to be examined during the IEA process. The IEA Study Team used these categories and the examples provided in the ToR to generate a long list of alternatives as shown in **Table 6-1**.

Table 6-1: Long List of Alternatives To

Alternative	Description
1.0 Do Nothing	
1.1 Future Do Nothing	All planned Provincial, Regional, and local Municipal infrastructure (to the horizon year of 2041) is implemented within the study area excluding the planned Teston Road ‘missing link’ connection between Keele Street and Dufferin Street, as documented in York Region’s 2016 Transportation Master Plan. The Future Do Nothing alternative is carried forward through this phase of the study to provide a baseline to compare against should none of the alternatives be implemented.
2.0 Travel Demand Management	
2.1 Shifting Demand to Off-Peak Periods	Travel Demand Management (TDM) alternatives attempt to address the problems and opportunities by shifting the demand on infrastructure away from peak periods. This often involves promoting additional transportation options (i.e., active transportation and transit). While TDM is an important aspect of optimizing the transportation network it is assumed that York Region already maximizes TDM to the extent that is possible and that additional measures would not be feasible to address the Problems and Opportunities. This alternative was screened out as it would not address the Problems and Opportunities either as a standalone alternative or in combination with other alternatives.
2.2 Promoting Alternative Transportation Options (e.g., Transit, Cycling, Walking, Etc.)	
3.0 Travel Systems Management	
3.1 Prioritize transit	This alternative was not carried forward as either a standalone or combination alternative as it would not fully address the Problems and Opportunities despite a projected increase in transit usage in the study area. While routes exist within the study area, prioritizing them would have only minor impacts on improving the network efficiency.
3.2 Intelligent Transportation System (ITS) Strategies	ITS strategies refer to the implementation of technology to increase the efficiency of the transportation network. This can include variable message signage telling users about accidents or travel times, using cameras to monitor traffic conditions and to dispatch emergency services to accidents, or using automated enforcement (such as red-light cameras). ITS could also play a key role in the implementation of autonomous or driverless vehicles (discussed below). ITS Strategies were not carried forward as they would not fully address the Problems and Opportunities either alone or in combination with other alternatives.

Alternative	Description
3.3 Carpooling	Carpooling does assist in the reduction of vehicles on the road as it decreases the number of vehicles required to carry the same number of travelers. However, this alternative was not carried forward as either a standalone or combination alternative. Carpooling infrastructure (i.e., carpool lots and high-occupancy vehicle lanes) is being implemented by the Province of Ontario and the Region at large to increase the appeal of carpooling. However, these measures would not fully address the Problems and Opportunities either alone or in combination with other alternatives
3.4 Autonomous/Driverless & Connected Vehicles	Autonomous/driverless and connected vehicles refer to advancements in automobile technology that allows for vehicles to make decisions based on the surrounding environment. Generally, this is thought to prevent accidents and increase safety but can also include decisions that result in more efficient use of the transportation network. This may include more efficient use of routes, speed control and/or more efficient turning movements at intersections. The decrease in accidents would also alleviate traffic as a result of blocked lanes or closures due to accidents. At present, this technology is not yet advanced enough to address the study's Problems and Opportunities, as such it was not carried forward.
3.5 Providing Real-Time Information to Users (i.e., Traffic & Transit Delays via Phone Apps)	Providing real-time information to users (i.e., traffic & transit delays via phone apps) can create some efficiencies within the transportation network by providing information that can assist in decision making, such as changing routes or travelling at different times. Generally, traffic information is readily available through various phone applications (e.g., Waze, Google Maps) and transit information is provided in various ways throughout the transit network (e.g., via signage at bus stops). This alternative was not carried forward as it is already heavily used and increasing usage is not likely to have a material impact in addressing the Problems and Opportunities.
3.6 Ride-Sharing Services	Ridesharing services refer to website/applications that match passengers to a driver to complete a specific trip (e.g., Uber, Lyft). Ridesharing services are available in the study area but likely do not account for a significant amount of traffic during peak periods. The Region could implement a ridesharing program of its own or subsidize trips made via private ridesharing companies, however, this would not fully address the study's Problems and Opportunities. Generally, ridesharing trips do not reduce the density of passenger trips because there is often only one traveler in each vehicle (plus a driver who would not have made the trip otherwise). Ridesharing differs in this way from carpooling as generally people carpooling are all heading to the same destination and as such, it reduces the number of vehicles on the road. As ridesharing is available throughout the Region, and in most instances does not reduce the number of vehicles on the road, it was not carried forward.

Alternative	Description
3.7 Park & Ride Facilities	Park and Ride facilities provide parking at transit hubs to attract users to take transit for most of their trip but provides convenience of travelling to the nearest transit hub in their vehicle. While park and ride facilities are available in the study area and throughout the Region at various provincial and regional transit hubs, there are no additional locations within the study area that would warrant park and ride facilities, as such, this alternative was not carried forward.
3.8 High Occupancy Vehicle (HOV) Lanes	HOV lanes dedicate lane(s) to vehicles that carry more than 1 passenger, be it a transit vehicle or passenger car. HOV lanes may be active during peak times or at all times. HOV lanes will be examined during the assessment of alternatives that provides new roadway lanes. But this alternative is not carried forward as a standalone. This is because it is recognized that converting existing lanes to HOV lanes would likely be a detriment to the transportation network, but, adding an HOV lane to an existing or new roadway, may help address the Problems and Opportunities.
3.9 Reserved Bus Lanes	Like HOV lanes, reserved bus lanes are dedicated lanes for transit vehicles only. These lanes may be reserved for buses at all times or just during peak travel times. Reserved bus lanes were not carried forward either as a standalone or combination alternative as transit will not make up a significant enough portion of user trips in the study area to be able to fully address the Problems and Opportunities.
3.10 Intersection Improvements	Intersection improvements refer to a variety of changes that can be made at intersection to increase the efficiency of vehicle movements through the intersection, thus reducing congestion. This could include making adjustment to traffic signal timing to allow more vehicles to pass through the intersection or providing new or additional turning lanes, so that through-traffic is not impeded by turning traffic. To improve network performance issues identified from the 2041 Future Do Nothing scenario, localized intersection improvement techniques were considered (e.g., traffic signal improvements, channelization, etc.). Several mitigation measures were considered to improve operations and provide substantial reductions in vehicle delays at study area intersections. However, this alternative was not carried forward as it would not fully address the Problems and Opportunities either as a standalone or combination with other alternatives.

Alternative	Description
4.0 New Cycling and/or Pedestrian Infrastructure	
4.1 New Cycling and/or Pedestrian Infrastructure	New infrastructure for cycling and/or pedestrians could include bike paths, multiuse paths, sidewalks, cycle-tracks and/or on-road bike lanes. While this type of infrastructure could not address the study's Problems and Opportunities as a standalone alternative it could work in combination with other alternatives to address connectivity or create more opportunities for pedestrians and cyclists, thereby reducing vehicle use. These types of improvements will be examined for inclusion with the preferred alternative if a new roadway or expanded roadway is preferred.
5.0 Improved and/or New Transit Services	
5.1 Expand Transit System Capacity By Increasing Service Frequency	Increased transit service, facilities and ridership are expected to make a significant contribution to accommodating future travel demand within and across the study area (likely 14% of transit mode share in 2041). A sensitivity analysis was conducted to increase 2041 transit ridership/transit mode share by 10 to 15%. Consequently, a link analysis was performed for the year 2041 using York Region's 2041 travel demand (Origin-Destination Matrix with 15% reduction) and 2041 Future Do Nothing network. The analysis suggests that it is very unlikely that transit alone can address the Problems and Opportunities as the network will not adequately accommodate the trip patterns of many travelers and a growth in transit mode share to up to 30% to 40% is likely unrealistic in 2041. While this alternative is not carried forward as a standalone due to the above, it could work in combination with other alternatives.
5.2 Create New Routes on Existing Corridors	York Region uses other studies to determine appropriate routes for new transit and implements them as feasible. Similarly to Alternative 5.1, it is very unlikely that transit alone can fully address the Problems and Opportunities as the network will not adequately accommodate the trip patterns of many travelers and the growth in travel demand, therefore this alternative is carried forward in combination with other alternatives but not as a standalone alternative.
5.3 Build Bus Rapidways/ Reserved Bus Lanes on Existing Corridors	Providing additional bus rapidways or Bus Only Lanes (BOL) on expanded existing corridors (above and beyond planned Major Mackenzie Drive rapidway) has the potential to address the problem/opportunities in combination with other alternatives. To implement this alternative, it would likely require some new roadway capacity (at least one lane per direction on an existing corridor) which constrains the feasibility of this alternative. This alternative was not carried forward.

Alternative	Description
6.0 Improved Existing/Planned Transitways	
6.1 Improved Existing/ Planned Transitways	While the provision of improved capacity and operations on existing transitways may increase the performance of the transportation network, opportunities to do so within the study area are limited and this would not be in conformance with Regional policy. The only planned existing transitway is along Major Mackenzie Drive West which has not yet been implemented. One way to improve this planned transitway would be to provide grade separation but this would be cost-prohibitive and not likely to attract significant additional transit ridership. This alternative was not carried forward.
7.0 New Transitways	
7.1 New Transitways	New Transitways would require a new corridor through the study area to provide dedicated infrastructure exclusive to transit. This alternative was determined to not be feasible as there is no undeveloped area that could serve as a dedicated transitway serving peak period east-west travel demand. In addition, as discussed previously, it is very unlikely that transit alone can fully address the Problems and Opportunities as the network will not adequately accommodate the trip patterns of many travelers and the growth in travel demand, therefore this alternative is not carried forward in combination with other alternatives or as a standalone alternative.
8.0 Improved Existing Roadways	
8.1 Improved Existing Roadways	Improving existing roadways includes widening roads to provide more capacity. This could include additional lanes for general purpose use (i.e., General Purpose Lanes (GPLs)), HOV, or reserved bus lanes. Improving existing roadways beyond currently planned improvements could address the problem/opportunities either as a stand-alone alternative or in combination with other alternatives. Therefore, this alternative was carried forward.
9.0 New Roadways	
9.1 New Roadways	New roadways beyond currently planned improvements could address the problem/opportunities either as a stand-alone alternative or in combination with other alternatives. This alternative was carried forward.
10.0 Combinations of the Above	
10.1 Combinations of the Above	Combinations of the above alternatives that independently do not address the problems and opportunities but when combined they may.

The long list of alternatives was screened to produce a “medium list” of general types of alternatives. Alternatives that could not significantly address the problems and opportunities as either a stand-alone alternative or in combination with other alternatives were not carried forward. Alternatives categorized under Travel Demand Management and Transportation Systems Management were not carried forward from the long list; however, they are still anticipated to contribute to future transportation needs. Alternatives 5.3, 6.1 and 7.1 from the long list were not carried forward given that existing transit corridor plans for Major Mackenzie Drive will address future east-west rapid transit needs within the study area.

The screening of the long list of alternatives led to the following alternatives to be carried forward:

- Future Do Nothing: Carried forward for comparison only
- New Roadways (9.0)
- Combination Alternatives:
  - New Cycling and/or Pedestrian Infrastructure (4.0)
  - Improved and/or New Transit Services (5.0)
    - Expand transit system capacity by increasing service frequency (5.1)
    - Create new routes on existing corridors (5.2)
  - Improved Existing Roadways (8.0)

6.2 Short List of Alternatives

The alternatives were further refined by analyzing the combination alternatives to determine their ability to address the problems and opportunities. A new cycling and pedestrian only link across the Don River Valley along the approximate area of the Teston Road extension alignment between Dufferin Street and Keele Street was included in all combinations of alternatives.

The potential for improved and/or new transit services to carry a significantly increased share of trips was assessed. Transit mode share of total westbound morning peak hour trips is already projected to increase from 3% in 2016 to up to 13% in 2041. While transit will make a significant key contribution to future travel, it is not considered likely to accommodate significantly increased travel by 2041 above and beyond a 13% Transit Mode Share within the study area. Therefore, Improved and/or New Transit Service was not carried forward as part of the short-listed combination alternatives as this is already accounted for as part of future plans and projections for the study area.

The Improved Existing Roadway alternative considered adding one to two general purpose lanes or one HOV lane per direction to various roadways above and beyond planned future (2041 TMP) improvements.

Roadway widening was proposed for sections of Kirby Road, Major Mackenzie Drive, Dufferin Street, Keele Street and/or Teston Road. However, York Region policy does not support eight lane roadways and only supports six lane roadways where one lane in each direction is dedicated to transit and/or HOV. Therefore, most of the roadway improvement/widening concepts were screened out. Two of the Improved Existing Roadway alternatives were carried forward (2 & 3 below). These alternatives also included a new Cycling and Pedestrian Only Link along the Teston Road Extension (Dufferin Street to Keele Street) alignment.

Overall, four Alternatives To the Undertaking were short-listed and carried forward for further assessment and evaluation:

1. **Future Do Nothing:** Planned 2041 transportation network excluding Teston Road Extension (Keele Street to Dufferin Street).
2. **Widen Kirby Road:** This alternative proposes to widen Kirby Road (from Bathurst Street to Highway 400) from four to six lanes with new transit/HOV lanes and install a pedestrian/cycling crossing over Don River.
3. **Widen Kirby Road & Keele Street:** This alternative proposes to widen Kirby Road (from Dufferin Street to Keele Street) and Keele Street (from Kirby Road to Teston Road) from four to six lanes and install a pedestrian/cycling crossing over Don River.
4. **Teston Road Extension:** This alternative proposes to build a new four-lane Teston Road from Dufferin Street to Keele Street with pedestrian/cycling facilities and transit service.

The sections below describe each alternative in greater detail. Refer to **Appendix D** for more information on the 2041 planning horizon analysis that was undertaken for each short-listed alternative from a traffic perspective.

6.2.1 Alternative 1: Future Do Nothing

As show in **Figure 6-2**, the Future Do Nothing Alternative includes planned/ proposed 2041 transportation network improvements identified in the York Region’s TMP (e.g., GTA West) but without the Teston Road extension between Keele Street and Dufferin Street.

A link analysis (See **Section 4**) was conducted for Alternative 1 (Future Do Nothing) using the 2041 traffic volumes reported from the model during the morning peak hour. The analysis indicates that virtually all westbound movements on parallel arterial roads to the north and south of Teston Road and all southbound movements along north-south arterial roads are expected to exceed capacity.

This emphasizes that the need to complete the direction of travel along Teston Road the traffic flow causes increased vehicle movements on adjacent arterial roads (e.g., Keel Street) and creates a barrier to people from other subdivisions (e.g., Drummond Drive) to access these already congested roadways.

The results of the link analysis discussed in **Appendix D** also concludes that the demand exceeds the available capacity at two of the five screenlines in the study area for the 2041 Future Do Nothing alternative.

Appendix D further discusses the results of an intersection capacity analysis. The results indicate that the projected traffic volumes cannot be accommodated by the Future Do Nothing scenario. Numerous levels of service (LOS) failing turning movements were reported along with some locations reporting failing conditions for the whole intersection.

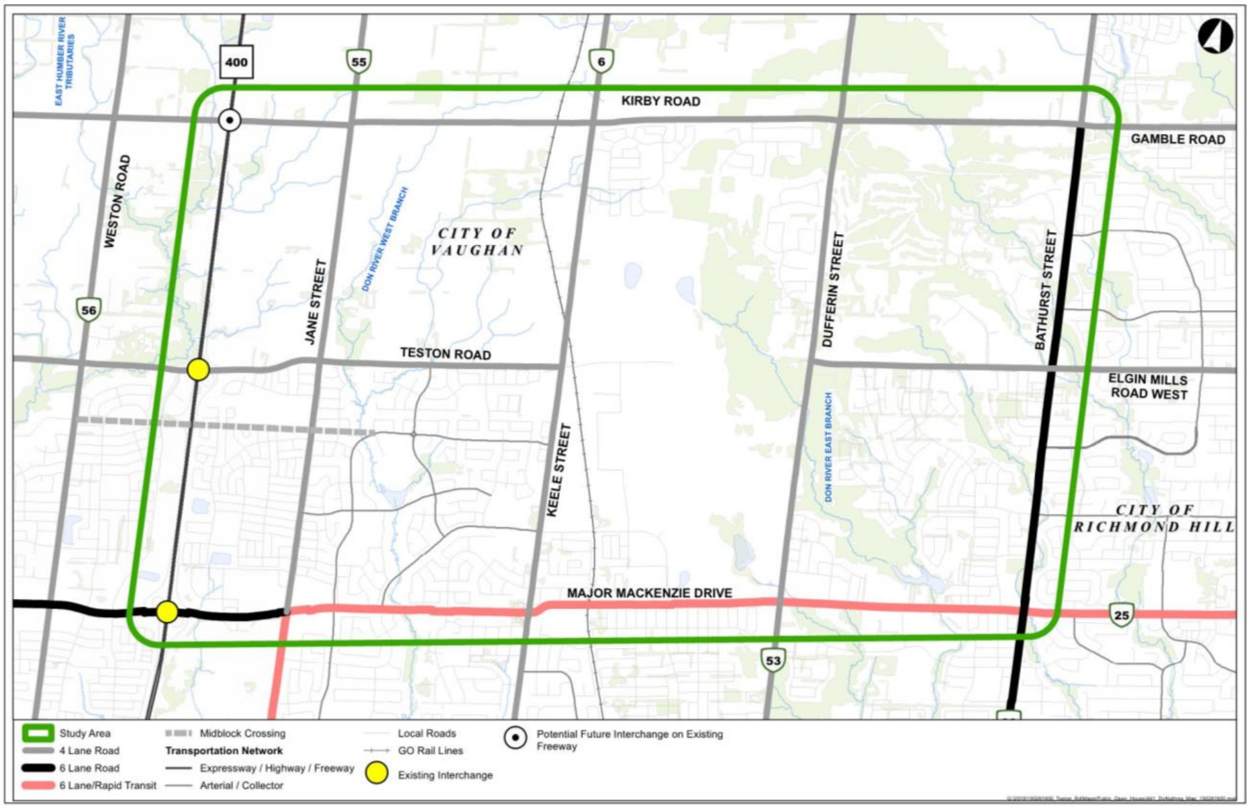

Figure 6-2: Alternative 1 – Future Do Nothing

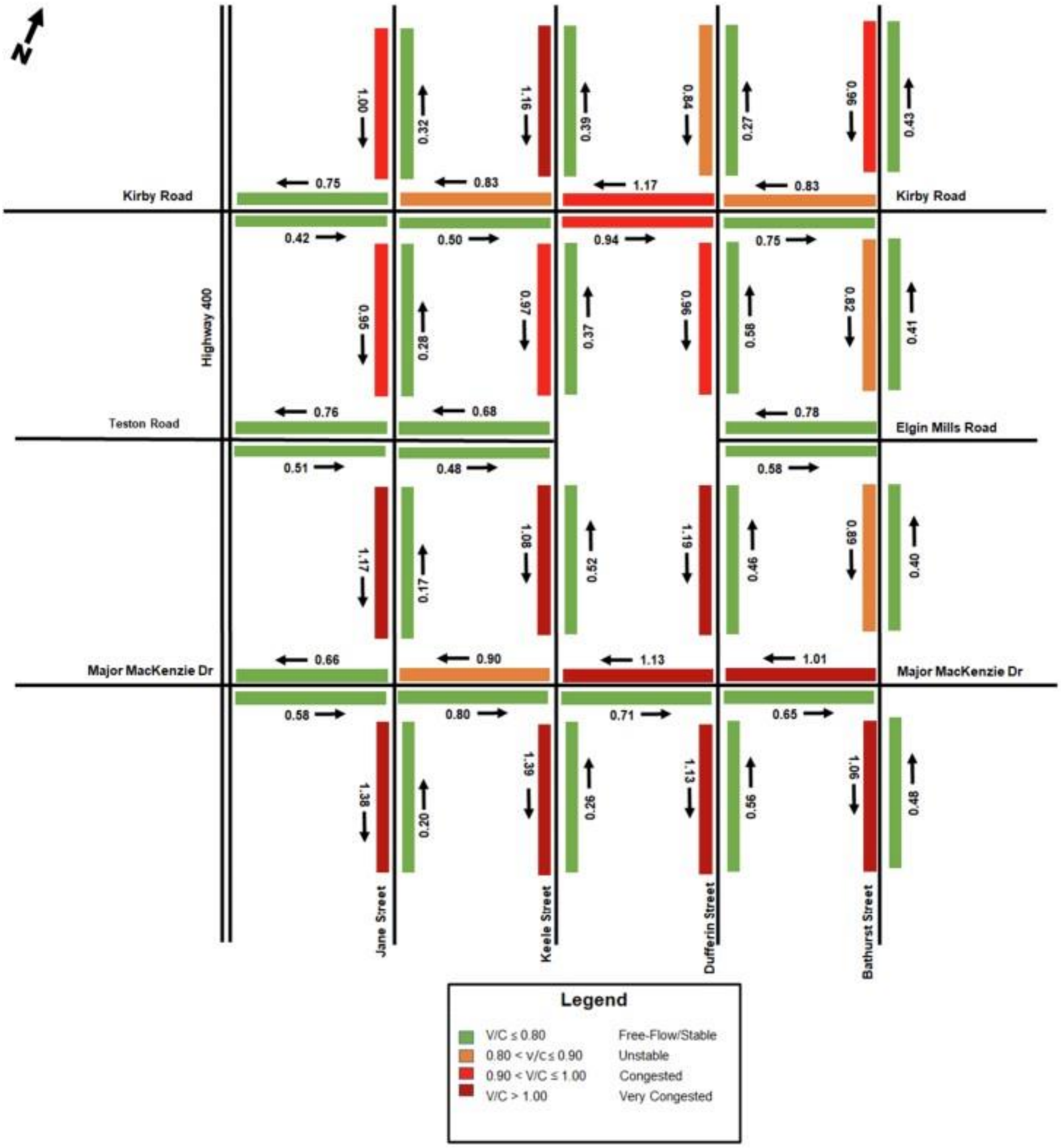

Figure 6-3: 2041 Link Analysis for Future Do Nothing – AM Peak Hour

The advantage of the Future Do Nothing alternative is that it would not cause any additional impacts on environmental 'footprint', cultural heritage, landfills, and contaminated properties, terrestrial or aquatic environments, However, it does not address the discontinuity on Teston Road, future east-west travel demand, travel times, congestion causing safety issues, and does not benefit the local economy. **Figure 6-3**, illustrates the V/C ratio for each key roadway for the 2041 Future Do Nothing Option.

It was evident from examining planned/proposed roadway and intersection operations and reviewing forecast traffic flow demands that the 2041 Future Do Nothing Alternative is not a viable option. Attempting to redirect the existing and forecasted Teston Road traffic flow demand will have a detrimental impact on the operations of numerous area roads and intersections.

The 2041 Future Do Nothing alternative is carried forward through this phase of the study to provide a baseline to compare against if none of the alternatives are implemented.

6.2.2 Alternative 2: Widen Kirby Road

Currently Kirby Road has a two-lane rural cross-section without any cycling facilities. Narrow shoulders offer limited space for users and disabled/stopped vehicles. A concrete sidewalk of approximately 2.0 meters in width is available on the south side beyond the ditch from Keele Street to Dufferin Street. Utility poles and some vegetation are located relatively close to the edge of pavement. There is also a gated at-grade crossing of the Barrie GO Rail line approximately 300m west of Keele Street.

York Region's TMP includes widening of Kirby Road between Pine Valley Drive and Dufferin Street from two to four lanes and the extension of Kirby Road between Dufferin Street and Bathurst Street as a four-lane roadway including a potential Kirby Road interchange with Highway 400.

Based on York Region's recommended cycling network for 2041, Kirby Road (between Highway 27 and Dufferin Street) will be a component of the overall bicycle network for York Region. Moreover, based on York Region's proposed strategic goods movement network for 2041, Kirby Road is designated as a primary arterial corridor to accommodate goods movement demands.

Alternative 2 involves modifying the planned four-lane cross-section along Kirby Road to incorporate additional widening between Bathurst Street and Highway 400 (from four GPL lanes to four GPL lanes plus two HOV lanes) to accommodate the increased demand along the corridor due to background growth and new developments in the study area.

Alternative 2 also includes a new dedicated pedestrian/cycling crossing over the Don River Tributary between Keele Street and Dufferin Street. The crossing would likely be a combination bridge structure with approach embankments.

Figure 6-4 shows Alternative 2 which includes York Region's 2041 EMME model network with all planned/proposed network improvements identified in the York Region's TMP (e.g., GTA West) except for the Teston Road extension between Keele Street and Dufferin Street.

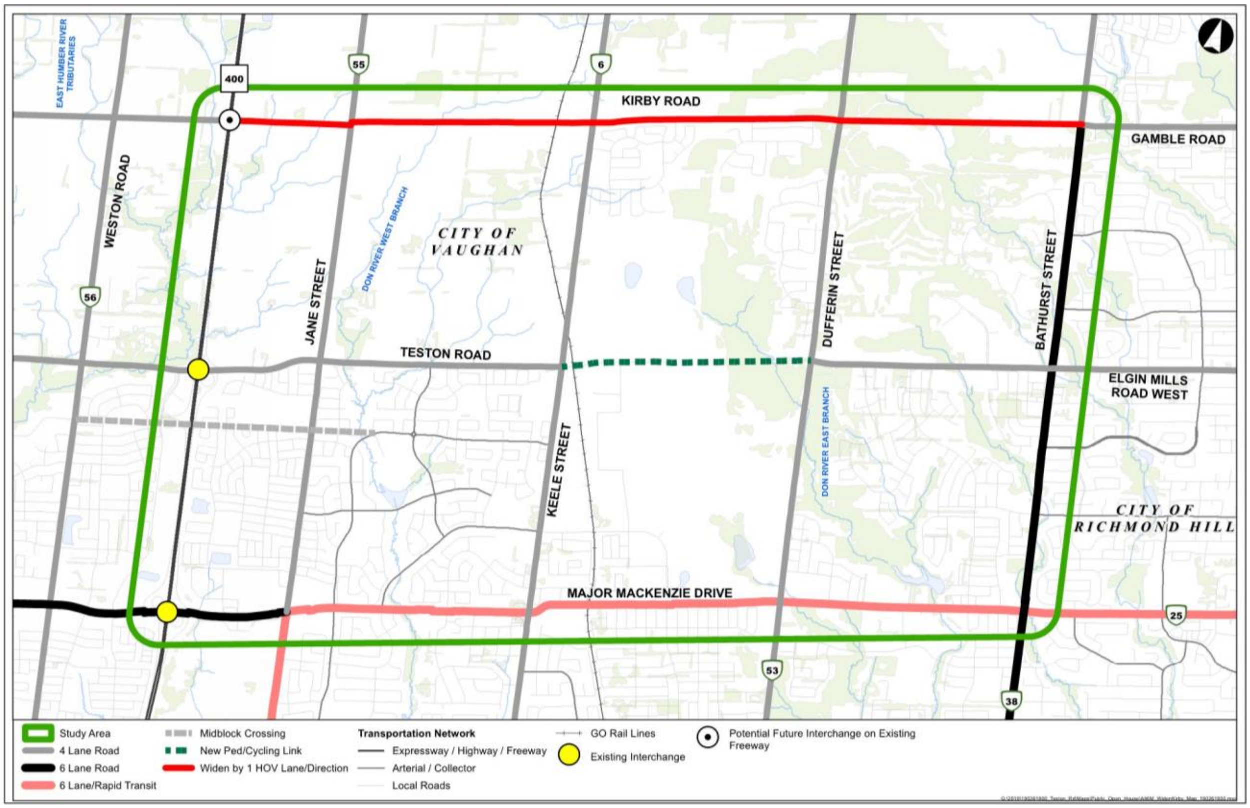

Figure 6-4: Alternative 2: Widen Kirby Road

A link analysis was conducted for Alternative 2 using the 2041 traffic volumes reported from the EMME model during the morning peak hour.

Figure 6-5 illustrates the 2041 V/C ratios for each key roadway. This figure indicates that by 2041 with the Kirby Road widening to six lanes, the V/C ratios in the eastbound (-23%) and westbound (-13%) directions along Kirby Road (between Bathurst Street and Highway 400) are expected to improve significantly compared to Alternative 1. However, the V/C ratios improvements in the eastbound and westbound directions along Major Mackenzie Drive (between Bathurst Street and Highway 400) are negligible.

It is evident that to complete the direction of travel along Teston Road, the travel flow would still impact adjacent arterial roads (e.g., Dufferin Street and Keele Street) and create a barrier to travelers to access these already congested roadways. The figure indicates that virtually all southbound movements along north-south arterial roads are expected to exceed capacity.

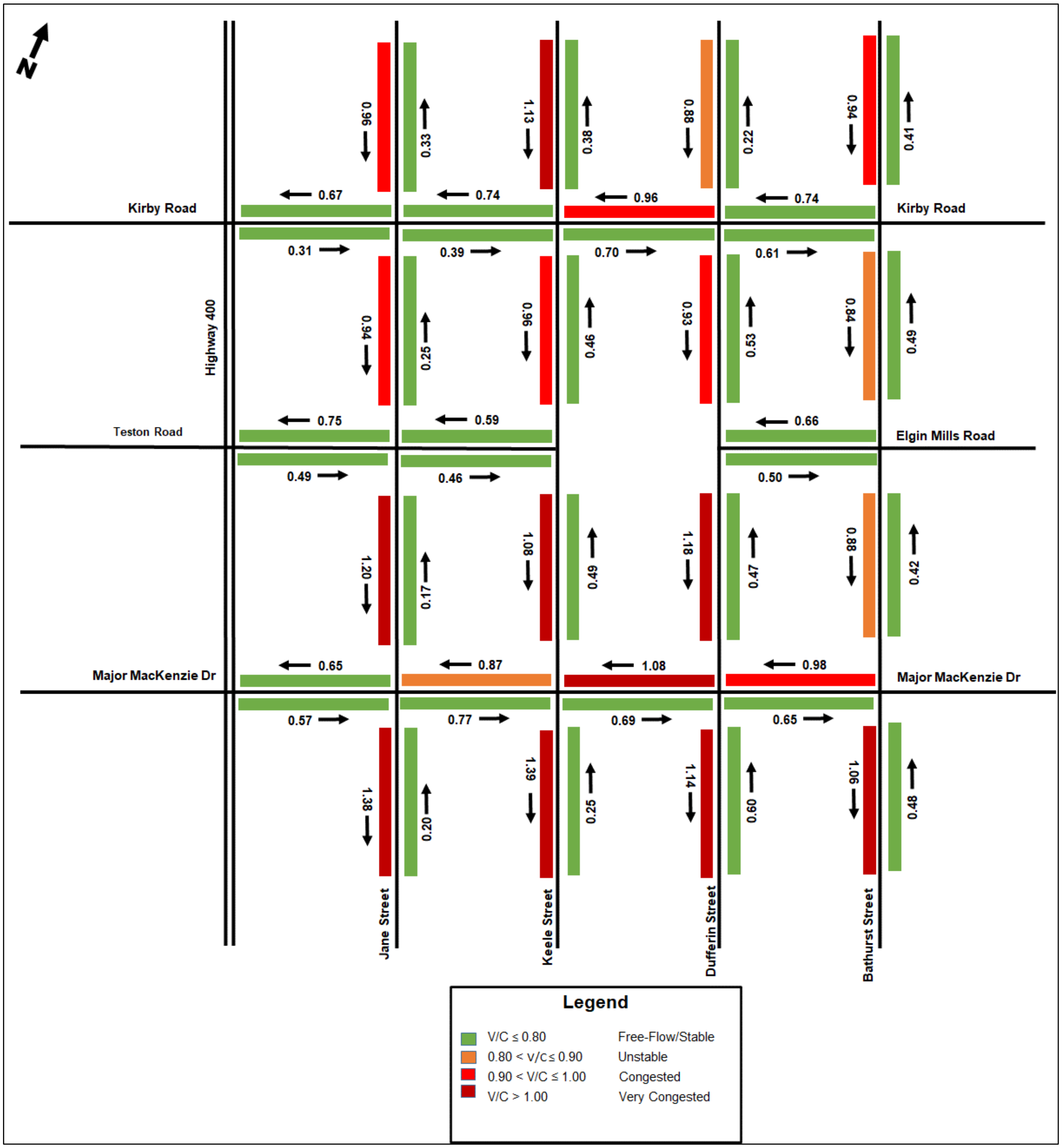

Figure 6-5: 2041 Link Analysis for Alternative 2 - AM Peak Hour

Like Alternative 1, the results of the link analysis for Alternative 2 also concludes that the demand exceeds the available capacity at two of the five screenlines in the study area (although on average approximately 6% better than Alternative 1) (refer to **Appendix D**[2]).

[2] Alternative 2 is referred to as Alternative 6M in **Appendix D**.

An intersection capacity analysis could not be conducted for Alternative 2 as Synchro is not a suitable tool to conduct an analysis of HOV lanes since it cannot adequately replicate the on-street conditions.

Alternative 2 would provide some benefit to the economy with the increased movement of goods and people as it would address the discontinuity of Teston Road for active transportation users. This alternative also has the opportunity for High Occupancy Vehicle (HOV) lanes and improved access to Kirby GO Station. Alternative 2 however, does not address the discontinuity for vehicles along Teston Road and only partially addresses travel demand, reduction in travel times, and safety. The Kirby Road intersections at Keele Street and Jane Street would be well over capacity and the value of this alternative is reduced if the interchange at Highway 400 and Kirby Road is not built. This alternative would also impact a larger area of the Oak Ridges Moraine and increase traffic near noise sensitive areas.

6.2.3 Alternative 3: Widen Kirby Road & Keele Street

Currently Keele Street (York Regional Road 6) is a north-south urban arterial road with a 4-lane cross-section and a posted speed limit of 50 km/h. Keele Street is generally surrounded by residential and agricultural lands as well as industrial lands to the north-east and south-east of the Teston Road intersection. The road is generally urban with sidewalks on both sides from Major Mackenzie Drive to McNaughton Road. The west side sidewalk continues to Teston Road. Keele Street then becomes a rural road with gravel shoulders to the north of Teston Road beyond the Barrie GO Line grade separation structure. Dedicated on-street bike lanes are present on Keele Street between Masters Avenue to the north of McNaughton Road.

Based on York Region's recommended cycling network for 2041, dedicated facilities will be provided along Keele Street between Rutherford Road and Kirby Road to protect cyclists from vehicular traffic. There are no identified recommended improvements along Keele Street in the TMP.

Alternative 3 involves modifying the planned four-lane cross-section along Kirby Road to incorporate additional widening between Dufferin Street and Keele Street (from four GPL lanes to six GPL lanes) and modifying the existing four-lane cross-section along Keele Street to incorporate widening Keele Street between Kirby Road and Teston Road (from four GPL lanes to six GPL lanes) to accommodate the increased demand along the corridor due to background growth and new developments in the study area. The alternative also includes a dedicated pedestrian/cycling crossing over the Don River Tributary between Keele Street and Dufferin Street.

Figure 6-6 shows Alternative 3 which includes York Region's 2041 EMME model with all planned/proposed network improvements identified in the York Region's TMP (e.g., GTA West) except for the Teston Road extension between Keele Street and Dufferin Street.

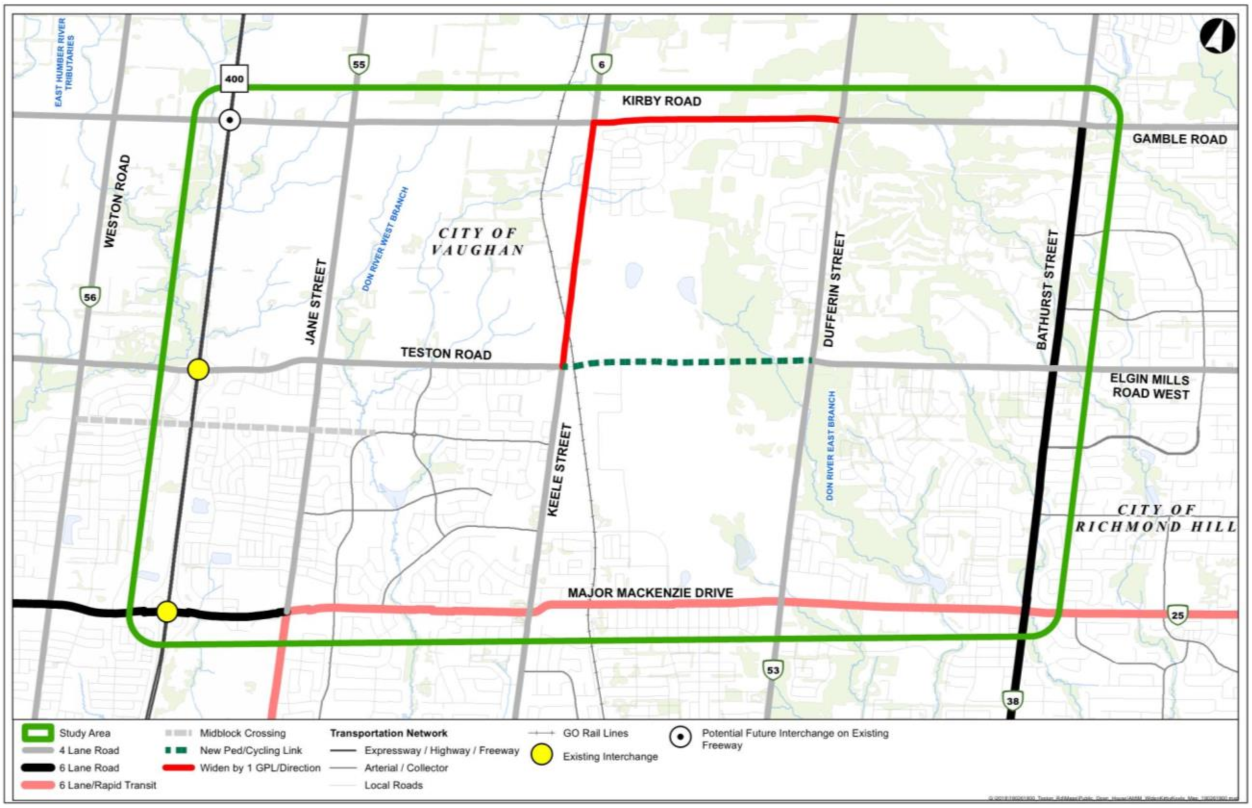

Figure 6-6: Alternative 3: Widen Kirby Road & Keele Street

A link analysis was conducted for Alternative 3 using the 2041 traffic volumes reported from the EMME model during the morning peak hour. **Figure 6-7** illustrates the 2041 V/C ratios for each key roadway. The figure shows that virtually all westbound movements on parallel arterial roads north and south of Teston Road and all southbound movements along north-south arterial roads are expected to exceed capacity.

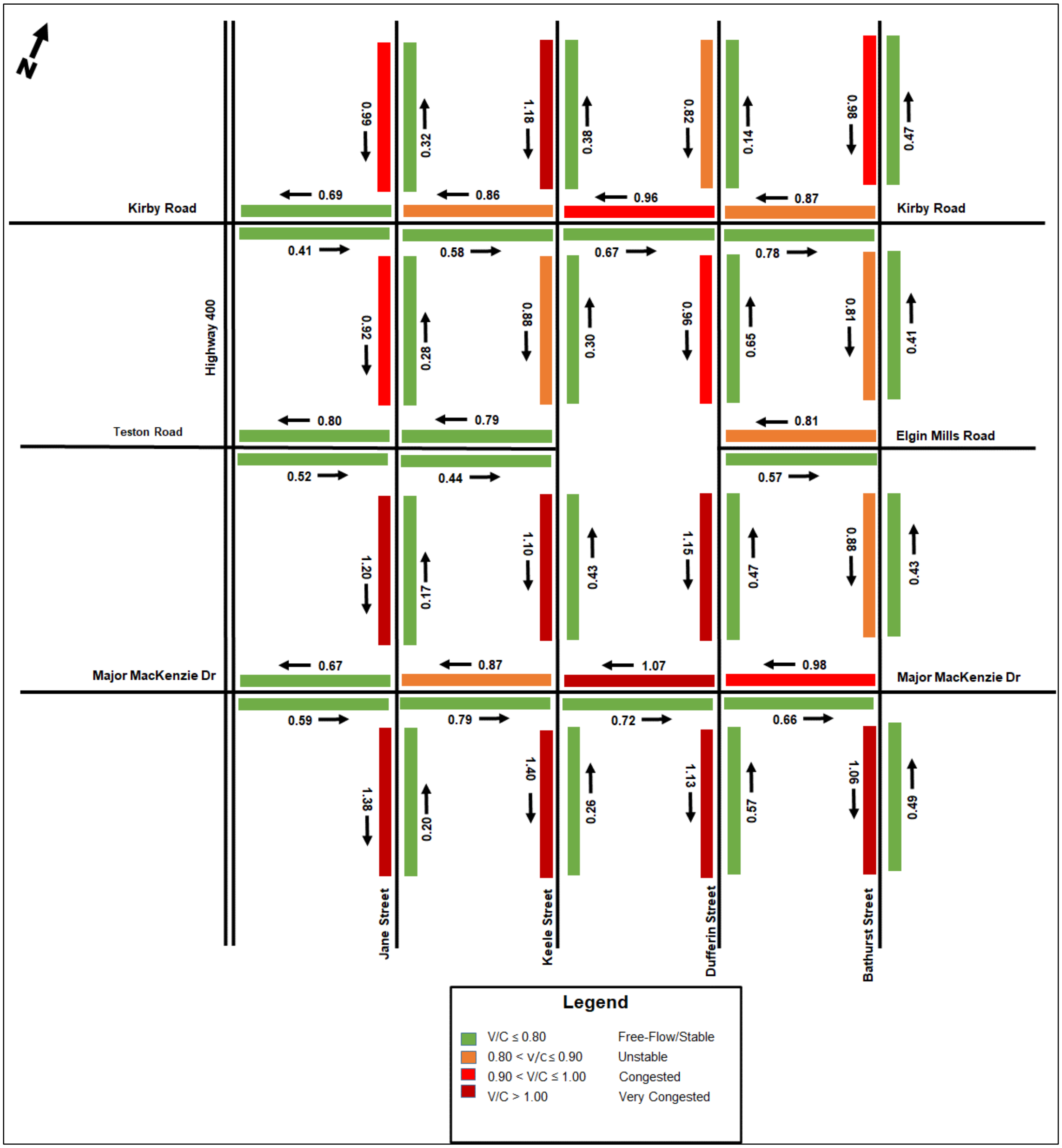

Figure 6-7: 2041 Link Analysis for Alternative 8M - AM Peak Hour

The results of the link analysis for Alternative 3 concludes that the demand exceeds the available capacity at two of the five screenlines (See **Section 4** for a discussion on screenlines) in the study area (although on average approximately 7% better than Alternative 1) (refer to **Appendix D**[3]).

[3] Alternative 3 is referred to as Alternative 8M in **Appendix D**.

A 2041 traffic analysis was completed for Alternative 3 to provide an assessment of the projected traffic volume condition at intersections along the proposed widening routes. To improve network performance, localized intersection improvements (e.g., traffic signal improvements, channelization, etc.) were considered.

The results of traffic analysis indicate that the 2041 projected traffic volumes cannot be accommodated by Alternative 3. Numerous failing (i.e., LOS F) turning movements were reported along with some locations reporting failing conditions for the whole intersection. Refer to **Appendix D** for more details.

The advantages of implementing Alternative 3 include less impacts to terrestrial and aquatic environments, landfills, and the Oak Ridges Moraine area compared to other alternatives. Other benefits of implementing this alternative include easier construction, no impacts to any wetlands, benefit to the economy through increased goods/people movement, and it addresses the discontinuity of Teston Road for active transportation users. Alternative 3 however, does not address the discontinuity for vehicles along Teston Road and only partially addresses travel demand, reduction in travel times, and safety. As the Kirby Road intersections at Keele Street and Jane Street will be well over capacity, this will result in higher emissions and impacts to air quality and climate change from idling vehicles.

6.2.4 Alternative 4: Teston Road Extension

Teston Road (York Region Road 49) is an east-west arterial road with a four-lane cross-section (between Highway 400 and Keele Street) and two-lanes (from Keele Street to Rodinea Road and from Dufferin Street to Bathurst Street). There is a discontinuity along Teston Road between Keele Street and Dufferin Street.

Between Highway 400 and Keele Street, Teston Road is currently an urbanized roadway with curbs. Pedestrian facilities are only provided on the south side of Teston Road with a 1.5m concrete sidewalk with a boulevard west of Jane Street and a 3m multi-use pathway with a grassed boulevard east of Jane Street to Keele Street. Between Keele Street and Rodinea Drive, Teston Road has a rural cross-section with wide shoulders and ditches. Between Dufferin Street and Bathurst Street, a semi-urban cross-section is present with a curb and gutter, boulevard and sidewalk on the south side and a shoulder and ditch on the north side.

Currently there are no cycling facilities on Teston Road, and cyclists share the travel lanes with vehicular traffic. Based on York Region’s recommended cycling network for 2041, separate facilities will be provided along Teston Road between Weston Road and Jane Street, and between Keele Street and Dufferin Street to protect cyclists from vehicular traffic.

York Region’s TMP includes widening of the existing Teston Road to four lanes between Pine Valley Drive and Weston Road, and from Dufferin Street to Yonge Street. In addition, it is recommended to extend Teston Road between Keele Street and Dufferin Street as a four-lane roadway to accommodate additional traffic from anticipated developments.

Based on York Region’s recommended transit network for 2041, Teston Road will be served by frequent transit service.

Alternative 4 includes a new four-lane Teston Extension between Keele Street and Dufferin Street including new pedestrian/cycling facilities and transit service/routes on the corridor to accommodate the increased demand along the corridor due to background growth and new developments in the study area.

As shown in **Figure 6-8**, Alternative 4 includes York Region's 2041 EMME model with all planned/proposed network improvements identified in the TMP (e.g., GTA West) including the Teston Road extension between Keele Street and Dufferin Street.

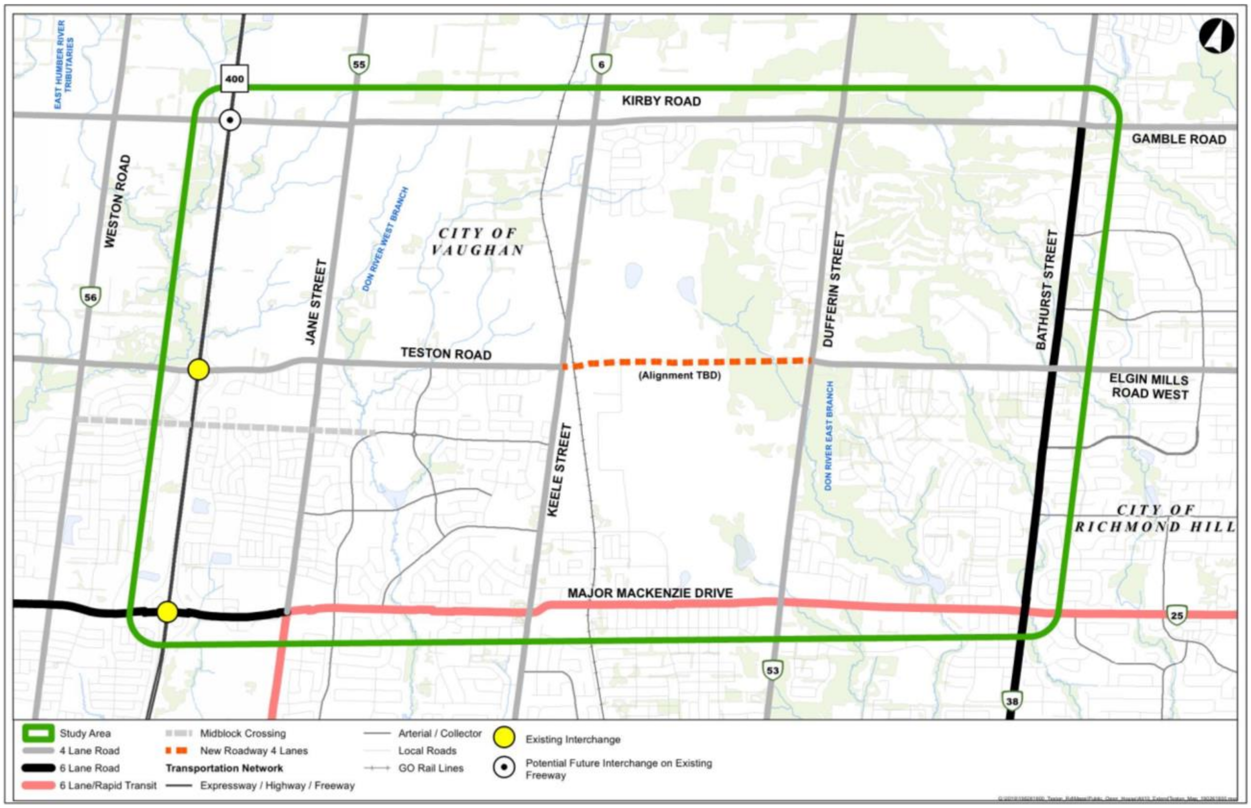

Figure 6-8: Alternative 4: Teston Road Extension

A link analysis was conducted for Alternative 4 using the 2041 traffic volumes reported from the EMME model during the morning peak hour. **Figure 6-9** illustrates the 2041 V/C ratios for each key roadway. The figure indicates that virtually all southbound movements along arterial roads exhibit over-capacity conditions, particularly south of Teston Road. All westbound movements along Kirby Road, Teston Road and Major Mackenzie Drive function with a V/C ration of 0.90 and less, meaning that the capacities of the roadways would be able to meet the future demand.

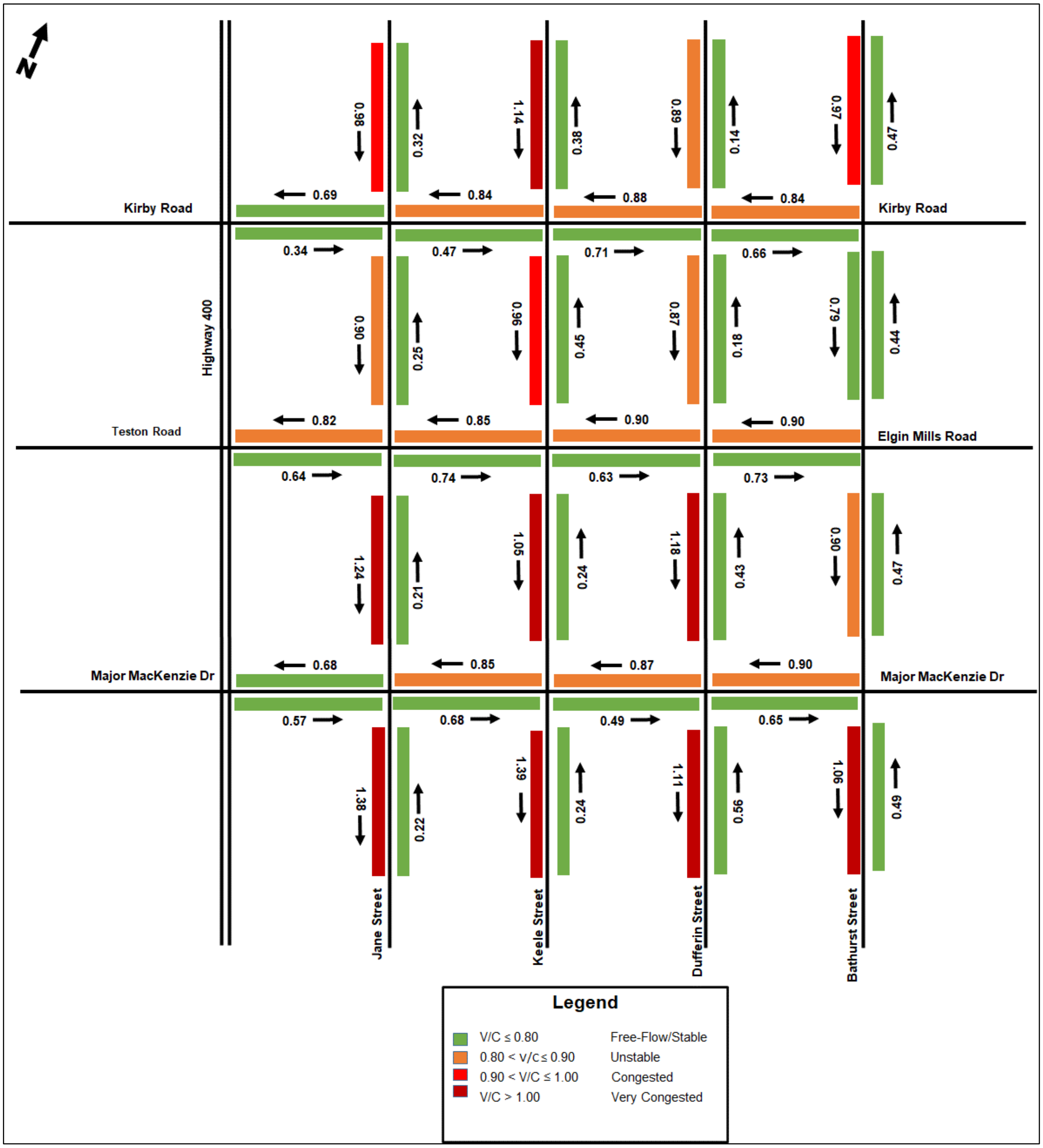

Figure 6-9: 2041 Link Analysis for Alternative 4 - AM Peak Hour

The V/C ratio for each key roadway at four of the five screenlines in the study area for the year 2041 is 0.89 or less, suggesting that the proposed capacity would accommodate future demand. One of the five screenlines has a V/C of 1.06 which is over-capacity and shows that all southbound traffic flows south of Teston Road are expected to be congested by the year 2041. Refer to **Appendix D**[4] for more details.

It is evident that by 2041 with the GTA West freeway in place and with the Kirby Road and Teston Road extensions available the area roads examined prove to be capable of accommodating primary peak hour peak direction demand flows.

Traffic analysis was completed for the 2041 Alternative 4 to provide an assessment of the projected traffic volume condition at study area intersections. To improve network performance, localized intersection improvements (e.g., traffic signal improvements, channelization, etc.) were considered. The overall LOS at intersections along Teston Road is expected to remain unchanged with the exception of the Teston Road and Bathurst Street intersection that decreased from LOS D to E.

Implementing Alternative 4 would address the Teston Road discontunity for all users and complete the transportation network, enhance east-west mobility and accessibility for all modes, increase safety for all travel modes, improve access for emergency vehicles, reduce out-of-way trips and travel times which will effectively reduce emissions, and provide benefit to the economy through the increased goods/people movement. Alternative 4 would also have reduced impacts to the Oak Ridges Moraine compared to Alternative 2. Alternative 4 however has the largest potential impact to the natural environment, potential impact to cultural heritage resources, and potential loss of property access at the GO line crossing. Alternative 4 is also more complex to construct and is located in close proximity to the landfills which may result in conflicts during construction.

6.3 Analysis & Evaluation of the Alternatives

Per the MECP Code of Practice for undertaking Environmental Assessments, the principles to be followed to ensure good environmental planning are transparency, traceability, and replicability. As such, the evaluation of the Alternatives To the Undertaking to identify the Preferred Alternative To the Undertaking to be carried forward to the next phase of the EA process is presented herein. The evaluation considers feedback received from the public, Indigenous communities, and other stakeholders.

The IEA's Terms of Reference determined that a Reasoned Argument method would be undertaken to evaluate the alternatives. This approach identifies net effects, after consideration of appropriate mitigation measures, associated with each alternative, compares advantages, and disadvantages, and uses the relative significance of the effects to determine a clear rationale for the preferred Alternative To and Alternative Method. Additionally, the Terms of Reference provided a set of evaluation criteria which describe the features/considerations that will be accounted for during the evaluation process. The criteria are divided into the following categories: Natural environment, socio-economic environment, cultural environment, and

[4] Alternative 4 is referred to as Alternative 10 in **Appendix D**.

transportation. **Table 6-2** lists the criteria and describes the features and/or considerations that were measured for evaluation. **Table 6-3** to **Table 6-6** show the evaluation of the Alternatives To the Undertaking against the established criteria. A summary of the evaluation is provided in **Table 6-7** and detailed evaluation tables are provided in **Appendix T**.

Table 6-2: Alternatives to the Undertaking Evaluation Criteria

Criteria	Features/Considerations
Natural Environment	The degree to which the proposed transportation system modification has the potential to impacts natural features, species of conservation concern, and SAR, such as: aquatic ecosystems, terrestrial ecosystems, groundwater, surface water and source water. The degree to which the proposed transportation system modification supports federal, provincial, municipal and conservation authority environmental protection policies and guidelines.
Socio-Economic Environment	The degree to which the proposed transportation system modification supports: ▪ Existing and planned future land use and growth including recognition of growth management plans and policies as articulated in provincial policies and municipal OPs and regulatory requirements for the perpetual care and control of the landfills. ▪ Provincial, regional, and municipal economy including manufacturing and trade; tourism and recreation; and agriculture. The degree to which the proposed system modification impacts features such as communities, resources, air quality, noise etc.
Cultural Environment	The degree to which the proposed transportation system modification impacts cultural features, such as: ▪ Properties of cultural heritage value, including archaeological sites, built heritage resources and cultural heritage landscapes. ▪ Indigenous sites.
Transportation	The degree to which the proposed transportation system modification: ▪ Supports federal/provincial/municipal transportation policies/goals/objectives. ▪ Improves system capacity & efficiency for the movement of people and goods. ▪ Improves system capacity & efficiency to reduce growth in peak travel demand. ▪ Makes effective and efficient use of the existing road and transit system using Transportation Demand Management and Transportation System Management strategies. ▪ Improves system reliability and redundancy during adverse conditions. ▪ Improves traffic safety through congestion reduction. ▪ Enhances goods movement by linking communities within the York Region. ▪ Improves mobility and accessibility through enhanced modal integration/choice for a more balanced transportation system.

Table 6-3: Natural Environmental Evaluation of Alternatives to the Undertaking

	Factor	Alternative 1: Future Do Nothing	Alternative 2: Widen Kirby	Alternative 3: Widen Kirby Road & Keele Street	Alternative 4: Teston Road Extension
1.0: Natural Environment	1.1: Fish and Fish Habitat	MOST PREFERRED	LEAST PREFERRED	MODERATELY PREFERRED	MODERATELY PREFERRED
	1.2: Terrestrial Ecosystems	MOST PREFERRED	LEAST PREFERRED	MODERATELY PREFERRED	LEAST PREFERRED
	1.3: Landfills/Contaminated Properties	MOST PREFERRED	MODERATELY PREFERRED	MODERATELY PREFERRED	LEAST PREFERRED
	1.4: Air Quality	LEAST PREFERRED	MODERATELY PREFERRED	LEAST PREFERRED	MOST PREFERRED
	1.5: Climate Change	MODERATELY PREFERRED	LEAST PREFERRED	MODERATELY PREFERRED	MODERATELY PREFERRED
1.0: Natural Environment Summary		MOST PREFERRED	LEAST PREFERRED	MODERATELY PREFERRED	LEAST PREFERRED

Legend:

Least Preferred to Most Preferred

Table 6-4: Socio-Economic Environment Evaluation of Alternatives to the Undertaking

	Factor	Subfactor	Alternative 1: Future Do Nothing	Alternative 2: Widen Kirby	Alternative 3: Widen Kirby Road & Keele Street	Alternative 4: Teston Road Extension
2.0: Socio-Economic Environment	2.1: Land Use	2.1.1: Provincial Land Use & Planning	LEAST PREFERRED	MODERATELY PREFERRED	LEAST PREFERRED	MOST PREFERRED
		2.1.2: Regional Policies & Municipal Land Use Planning	LEAST PREFERRED	MODERATELY PREFERRED	LEAST PREFERRED	MOST PREFERRED
		2.1.3: Local Development	LEAST PREFERRED	MODERATELY PREFERRED	MODERATELY PREFERRED	MOST PREFERRED
	2.2: Noise	2.2.1 Transportation Noise	LEAST PREFERRED	LEAST PREFERRED	LEAST PREFERRED	MOST PREFERRED
	2.3: Economic Activities	2.3.1: Regional & Municipal Economy	LEAST PREFERRED	MODERATELY PREFERRED	MODERATELY PREFERRED	MOST PREFERRED
2.0: Socio-Economic Environment Summary			LEAST PREFERRED	MODERATELY PREFERRED	LEAST PREFERRED	MOST PREFERRED

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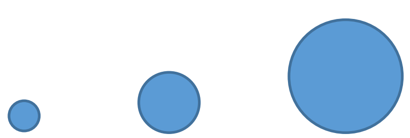

Least Preferred to Most Preferred

Table 6-5: Cultural Environment Evaluation of Alternatives to the Undertaking

	Factor	Subfactor	Alternative 1: Future Do Nothing	Alternative 2: Widen Kirby	Alternative 3: Widen Kirby Road & Keele Street	Alternative 4: Teston Road Extension
3.0: Cultural Environment	3.1 Cultural Heritage Resources	3.1.1 Built Heritage/Cultural Heritage Landscapes	MOST PREFERRED	LEAST PREFERRED	LEAST PREFERRED	MODERATELY PREFERRED
		3.1.2 Archaeological Resources	MOST PREFERRED	MODERATELY PREFERRED	LEAST PREFERRED	MOST PREFERRED
		3.1.3 Indigenous Sites	MODERATELY PREFERRED	MODERATELY PREFERRED	MODERATELY PREFERRED	MODERATELY PREFERRED
	3.0 – Cultural Environment Summary		MOST PREFERRED	LEAST PREFERRED	LEAST PREFERRED	MODERATELY PREFERRED

Legend:

Least Preferred to Most Preferred

Table 6-6: Transportation Evaluation of Alternatives to the Undertaking

	Factor	Subfactor & Measure	Alternative 1: Future Do Nothing	Alternative 2: Widen Kirby	Alternative 3 Widen Kirby Road & Keele Street	Alternative 4: Teston Road Extension
4.0: Transportation	4.1: Planning & Design	4.1.1: TDM/TSM	All the short-listed Alternatives include a range of TDM and TSM measures and strategies as part of York Region's 2041 TMP network, plans, and policies as well as other applicable provincial/municipal plans and policies. While neither TDM nor TSM were selected as stand-alone Alternatives they are considered important elements of all short-listed Alternatives and will contribute to addressing the identified study area problems and opportunities.			
		4.1.2: Enhanced Modal Integration	LEAST PREFERRED	MOST PREFERRED	MODERATELY PREFERRED	MOST PREFERRED
		4.1.3: Travel Demand	LEAST PREFERRED	MODERATELY PREFERRED	LEAST PREFERRED	MOST PREFERRED
		4.1.4: Discontinuity	LEAST PREFERRED	LEAST PREFERRED	LEAST PREFERRED	MOST PREFERRED
		4.1.5: Reduce Travel Time	LEAST PREFERRED	MODERATELY PREFERRED	LEAST PREFERRED	MOST PREFERRED
		4.1.6: Safety	LEAST PREFERRED	MODERATELY PREFERRED	LEAST PREFERRED	MOST PREFERRED
		4.1.7: Constructability	MOST PREFERRED	MODERATELY PREFERRED	MODERATELY PREFERRED	LEAST PREFERRED
	4.0: Transportation Summary			LEAST PREFERRED	MODERATELY PREFERRED	LEAST PREFERRED

Legend:

Least Preferred to Most Preferred

Morrison Hershfield now Stantec

Table 6-7: Evaluation Summary of Alternatives to the Undertaking

	Alternative 1: Future Do Nothing	Alternative 2: Widen Kirby	Alternative 3: Widen Kirby Road & Keele Street	Alternative 4: Teston Road Extension
Natural Environment	**MOST PREFERRED**	**LEAST PREFERRED**	**MODERATELY PREFERRED**	**LEAST PREFERRED**
Socio-Economic Environment	**LEAST PREFERRED**	**MODERATELY PREFERRED**	**LEAST PREFERRED**	**MOST PREFERRED**
Cultural Environment	**MOST PREFERRED**	**LEAST PREFERRED**	**LEAST PREFERRED**	**MODERATELY PREFERRED**
Transportation	**LEAST PREFERRED**	**MODERATELY PREFERRED**	**LEAST PREFERRED**	**MOST PREFERRED**
Evaluation Summary	**MODERATELY PREFERRED OVERALL** While the Future Do Nothing option is preferred because of its mostly low environmental impacts, it is least preferred for Socio-economic and Transportation factors. Given the intent of this study is to address the problems and opportunities for the transportation network within the study area, this alternative is moderately preferred overall.	**MODERATELY PREFERRED OVERALL** This alternative has somewhat higher Natural Environment impacts while addressing some transportation issues. It is least preferred under Cultural Environment.	**LEAST PREFERRED OVERALL** While this alternative does not adequately address the Transportation factors it does have moderate impacts on the Natural Environment. It is least preferred under Socio-economic and Cultural Environment factors.	**MOST PREFERRED OVERALL** This alternative best addresses all Transportation factors and is most preferred for the Socio-economic Environment factors. While it does have potentially higher impacts on the Natural Environment, these impacts can likely be greatly reduced during design and mitigations implemented to further reduce the impacts.

Legend:

Least Preferred to Most Preferred

6.4 Preliminary Preferred Solution

Based on the assessment and evaluation, the preliminary Preferred Planning Solution carried forward for public review at Open House 1 included:

- A future **Future Do Nothing** scenario of the planned 2041 transportation network excluding the Teston Road extension to provide a baseline for comparison.
- **Widening of Kirby Road** (from Bathurst Street to Highway 400) from four to six lanes with new transit or HOV lanes and a new pedestrian/cycle crossing over the Don River.
- **Widening of Kirby Road and Keele Street** from four to six lanes and install a pedestrian/cycle crossing over the Don River.
- **Teston Road Extension** which proposes to build a new four-lane Teston Road from Dufferin Street to Keele Street with pedestrian/cycling facilities and transit service.

6.5 Consultation During Alternatives to the Undertaking Process

The public consultation aspects of the Teston Road Area Improvements Individual Environmental Assessment Study are summarized in **Section 3** and are summarized here.

6.5.1 Notice of Study Commencement

The Notice of Study Commencement, issued on August 13, 2020, invited interested parties to provide comments or submit questions of relevance to the study. Community feedback was received in response to the notice. Comments provided included the following general themes:

- Interest in the project and desire to be included on the project mailing list.
- Construction and process timelines.
- Support for the connection and desire to advance the project quickly.
- Lack of signage on Keele Street and Teston Road regarding the discontinuation of Teston Road from Dufferin Street to Bathurst Street.
- Incorporation of bicycle lanes on Teston Road and extension of multiuse trails to new connections beyond Keele Street and towards Dufferin Street.
- Concerns for the environmental impacts from the construction of Teston Road.
- Concerns regarding increased noise from the improvements.
- Desire for grade separation for the Barrie GO line east of Keele Street.
- Introduction of traffic calming and safety measures on Teston Road to prevent street racing at night.
- Improvements to traffic lights at a few intersections including Oxford Street/Bathurst Street and Major Mackenzie Drive/Jane Street.

6.5.2 Open House 1

Open House 1 (OH1) was held virtually due to the ongoing COVID-19 pandemic. The purpose of OH1 was to explain the study process, share progress to date, and request feedback from the public. The session provided the public with:

- An opportunity to review and comment on the public consultation process.
- An introduction to the study background, process, and schedule.
- An overview of the problems, opportunities, and constraints.
- An understanding of alternatives to the undertaking and the evaluation of alternatives.
- Next steps for the project.

In general, comments received were supportive. Feedback received around OH1 included the following general themes:

- Lack of a continuous Teston Road is a major cause of surrounding area traffic issues.
- Suggestions for project to proceed in addition to surrounding area transportation improvements.
- Interest in the cost of Alternative 4 and expected government funding.
- Environmental concerns resulting from increased traffic including poor air quality, and increased noise and vibration.
- Interest in mitigation measures for environmental and noise concerns.
- Public interest in traffic calming methods and traffic signal plans.

6.5.3 Stakeholder & Agency Meetings

Meetings were held with various stakeholders and agencies in the beginning of the project to introduce the project and provide an overview of the purpose, scope, and schedule of the work. Meeting Minutes can be found in the Consultation Record in **Appendix C.1.** The meetings held include:

- TRCA Start Up Meeting: June 3, 2020
- City of Vaughan Start Up Meeting: June 16, 2020
- City of Toronto Start Up Meeting: June 17, 2020
- City of Vaughan EMME Travel Demand Modeling Meeting: July 15, 2020

6.6 Confirmation of the Preferred Alternative to the Undertaking

The results of the evaluation of the Alternatives to the Undertaking was made available to the public, agencies, and other stakeholders to provide the opportunity to receive comments and feedback on the evaluation process and confirm the results (see **Section 3** for details). After receiving feedback on the evaluation, the Project Team confirmed Alternative 4: Teston Road Extension as the Preferred Alternative To the Undertaking. Alternative 4 was therefore carried forward to the next phase of the project.

7. Alternative Methods

Confirmation of the Preferred Alternative To the Undertaking, Alternative 4: Teston Road Extension (Keele Street to Dufferin Street) including Active Transportation, provides the basis for generating and evaluating Alternative Methods, including corridors and alignments. Alternative Methods examine different ways to address the Problem and Opportunity Statement and must be evaluated to determine their effectiveness in addressing these problems and opportunities, after consideration of appropriate mitigation measures.

7.1 Alternative Methods Evaluation Process

The Teston Road Area Improvements IEA Terms of Reference (WSP, 2018) provides the following multi-step process to select a preferred Alternative Method:

- Refine/confirm the study area.
- Identify significant study area features.
- Generate Alternative Methods.
- Refine Alternative Methods.
- Assess Alternative Methods.
- Evaluate and select a preferred Alternative Method(s).
- Prepare the concept design.
- Prepare and submit IEA Report for public and agency review and comment and MECP approval.

Considerations for alternative methods include:

- Identification of Alternative Methods and measures to avoid/mitigate potential environmental impacts.
- Alternative Methods will look at various alignments for a new Teston Road connection.
- Design integration with public amenities such as existing or planned trails, parks, or natural areas.
- Ensuring a context sensitive and sustainable design solution.

7.2 Alternative Corridors

7.2.1 Screening

Following the selection of the preferred Alternative to the Undertaking, the study team generated alternative corridors to connect Keele Street and Dufferin Street in the vicinity of, but not limited to, Teston Road.

The Alternative Corridors outline different methods of achieving the Preferred Alternative to the Undertaking. Twelve Alternative Corridors were generated (**Figure 7-1**).

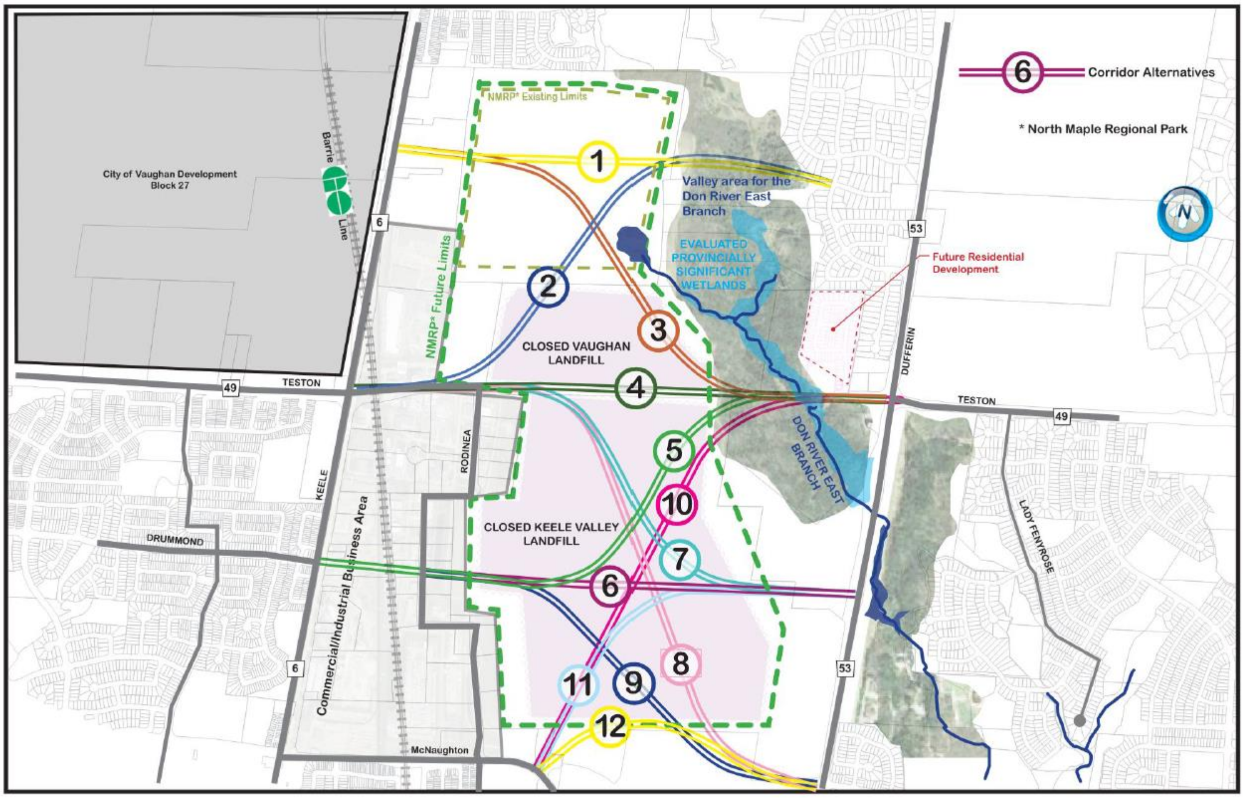

Figure 7-1: Alternative Corridors

The IEA Terms of Reference's guiding principles set further considerations for the generation of Alternative Methods including to:

- Utilize existing infrastructure efficiently and effectively.
- Minimize effects to existing and future planned (approved) land uses.
- Adhere to all relevant legislation, plans, policies, and guidelines.
- Avoid or minimize effects to natural systems.
- Avoid or minimize impacts to prime agricultural areas and individual agricultural operations.
- Minimize effects to urban/rural areas.
- Resolve transportation problems and take advantage of existing and future opportunity recognizing project need.

Additional guidance for the evaluation of Alternative Methods to the Undertaking is included in Section 6 of the Terms of Reference in **Appendix A**.

A long list of 12 corridors were evaluated against natural, cultural, socio-economic and transportation factors to determine a recommended Corridor Alternative to be carried forward for consultation and feedback and more detailed evaluation. A summary of the evaluation in **Table 7-1** shows how each Alternative Corridor performs against these criteria.

Table 7-1: Alternative Corridors Evaluation Results

Corridor Alternatives	Natural	Cultural	Socio-economic	Transportation	Summary
Alternative 1	•	●	•	•	•
Alternative 2	•	●	•	•	•
Alternative 3	•	●	•	●	•
Alternative 4	•	●	⬤	⬤	⬤
Alternative 5	•	⬤	•	●	●
Alternative 6	⬤	●	•	●	●
Alternative 7	⬤	⬤	●	•	●
Alternative 8	⬤	⬤	•	•	•
Alternative 9	⬤	⬤	•	•	•
Alternative 10	•	⬤	•	•	•
Alternative 11	⬤	⬤	●	•	●
Alternative 12	⬤	⬤	●	•	●

Legend:

• ● ⬤

Least Preferred to Most Preferred

7.2.2 Preferred Alternative Corridor

The evaluation of the twelve corridors led to the selection of Alternative Corridor 4 which connects Keele Street to Dufferin Street at the existing intersections of Teston Road. This connection provides the most direct east-west continuity.

The other corridor alternatives did not provide a direct east-west connection and most options had equal if not greater potential environmental effects compared to Corridor Alternative 4.

Alternative 4 provides the most potential to avoid the existing landfill areas and park infrastructure, and the most direct route to serve east-west travel demand. Alternative 4 was less preferred under Natural Environment and moderately preferred under Socio-Economic Environment but in both cases potential environmental effects may be able to be avoided, minimized, or mitigated. Therefore, Alternative 4 was selected to be carried forward to the next step for development of Alternative Alignments for this corridor.

None of the other corridor alternatives were considered attractive in comparison. None provided comparable east-west road network continuity and most came with equal or greater potential environmental effects. While considered less attractive in comparison, Corridor Alternatives 5, 6, 7, 11 and 12 were the next closest ranked alternatives although almost all of these would encroach directly on the Keele Valley Landfill which would pose significant technical and other challenges.

7.3 Alternative Alignments

7.3.1 Long List

Following the selection of a preferred Corridor Alternative, different Alignment Alternatives were developed for this corridor. Eight alignments were initially generated, as illustrated in **Figure 7-2**. Three of these alignments (4C, 4F and 4H), were considered obviously less desirable, and were screened out for a more streamlined evaluation process.

Alternative 4C was screened out because it has a potentially larger footprint and a longer river valley crossing with an S curve, a less desirable geometry. It also encroaches on the private landfill and the North Maple Regional Park (NMRP) Phase 3 area.

Alternative 4F was screened out because it is very similar to 4G but has no benefits over 4G and has a less desirable geometry.

Alternative 4H was screened out because it has a potentially larger footprint and longer crossing, with a curve in the bridge for crossing the valley. It also has the highest encroachment on the Keele Valley Landfill.

The remaining five alignments were carried forward for more detailed evaluation.

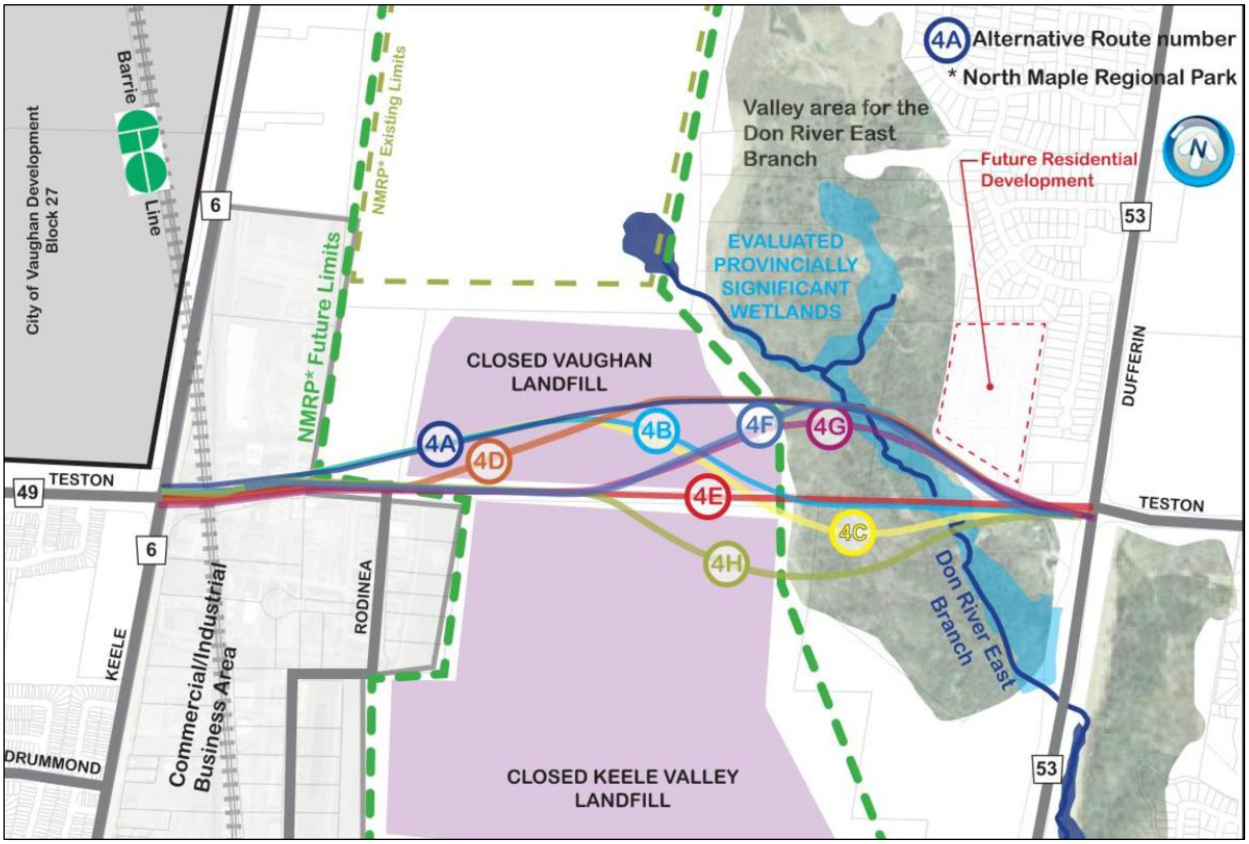

Figure 7-2: Alternative Alignments - Long List

7.3.2 Short List

Following initial screening, the shortlisted alternatives were evaluated based on the prescribed methodology outlined in the IEA Terms of Reference. The five Alignment Alternatives and Future Do Nothing Alternative were evaluated against 52 different criteria under Natural Environment, Land Use and Socio-Economic Environment, Cultural Environment and Transportation.

All Alternatives, require a new crossing of the Don Valley River East Branch & may require piers in the valley. All alternatives support local/regional development objectives, planned land uses, recreational opportunities, emergency services access and integration opportunities with the NMRP. The Alternatives do not have impacts to Indigenous Reserves but may impact traditional uses in the area.

All alternatives must pass through the Natural Core Area of the Oak Ridges Moraine which contains provincially significant wetlands, significant forests, and several environmentally sensitive areas, as shown in **Figure 7-8** and **Figure 7-9** captures the various Ecological Land Classifications (ELC) codes within the valley.

The following subsections provide a summary of the key differences between the Alternatives. The detailed evaluation is provided in **Appendix T**.

7.3.2.1 Alternative 4A

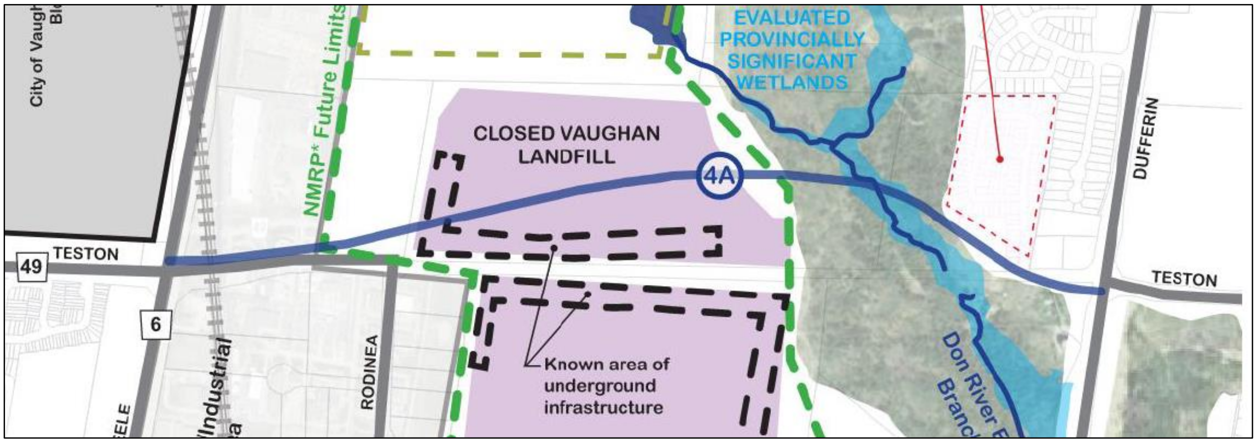

Figure 7-3: Alternative 4A

Alternative 4A has a slightly shorter valley crossing, avoids the Keele Valley Landfill infrastructure, mostly avoids the Vaughan Landfill gas collection system, and completely avoids the Keele Valley landfill.

Drawbacks of Alternative 4A include the encroachment on the Vaughan Landfill and the private landfill site which likely requires removal of landfill material. Alternative 4A passes through a potential cultural heritage resource west of Dufferin Street, as shown in **Figure 7-11** and bisects Phase 3 area of the NMRP, reducing Phase 3 park development potential, as shown in **Figure 7-10**. This alternative also contains a much less preferred road/bridge geometry over the East Don River. Alternative 4A is located in close proximity to nearby noise sensitive areas (i.e., existing residential properties and long-term care facilities) and has high encroachment on a proposed residential subdivision. Alternative 4A is located within various deciduous forest coniferous forest and marsh areas as shown in **Figure 7-9**.

7.3.2.2 Alternative 4B

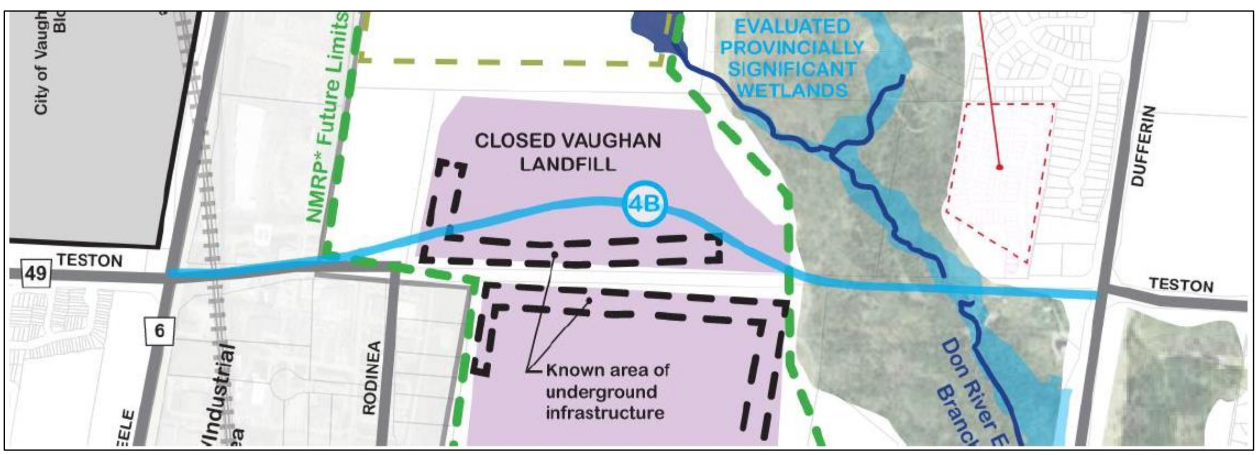

Figure 7-4: Alternative 4B

Alternative 4B also avoids the Keele Valley Landfill infrastructure and mostly avoids the Vaughan Landfill gas collection system. However, there is less encroachment on a proposed residential subdivision, and a straight structure is proposed for crossing the valley (although the road geometry is less preferred).

Drawbacks include encroachment on the private landfill site which likely requires the removal of landfill material, and also that the alignment bisects Phase 3 area of the NMRP as shown in **Figure 7-10**, reducing Phase 3 park development potential as with Alternative 4A. Alternative 4B is located within various deciduous forest, coniferous forest and marsh areas as shown in **Figure 7-9**.

7.3.2.3 Alternative 4D

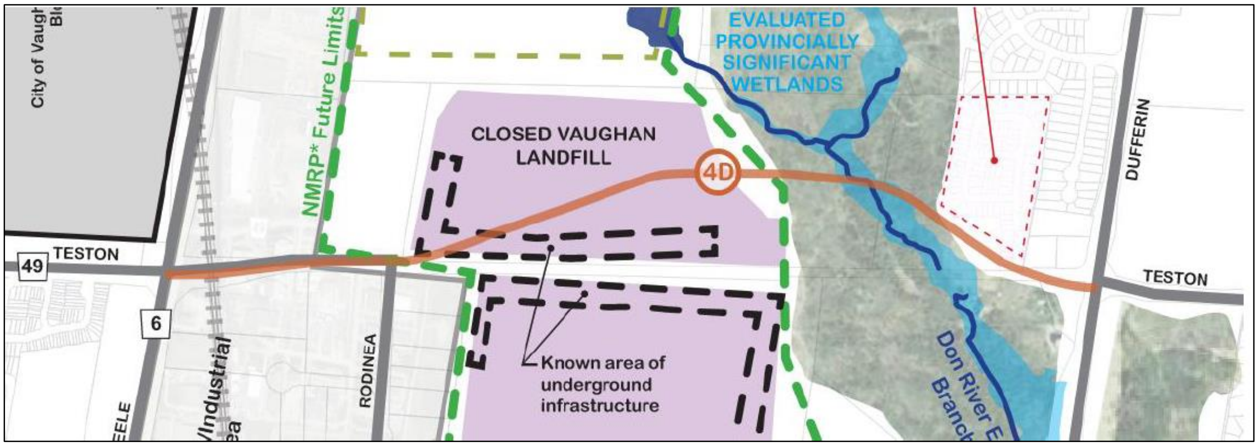

Figure 7-5: Alternative 4D

Alternative 4D has a slightly shorter valley crossing, avoids the Keele Valley Landfill infrastructure and private landfill site but has multiple less favourable characteristics. Alternative 4D is located within various deciduous forest, coniferous forest and marsh areas as shown in **Figure 7-9**.

Alternative 4D includes a much less preferred road/bridge geometry, due to its curves. Alternative 4D pass through a potential cultural heritage resource west of Dufferin Street as shown in **Figure 7-11** and bisects Phase 3 area of the NMRP, reducing Phase 3 park development potential as shown in **Figure 7-10**. This alternative is also located in close proximity to nearby noise sensitive areas (i.e., existing residential properties) and has high encroachment on a proposed residential subdivision.

The alignment also crosses and impacts some existing landfill infrastructure associated with the Vaughan Township landfill.

7.3.2.4 Alternative 4E

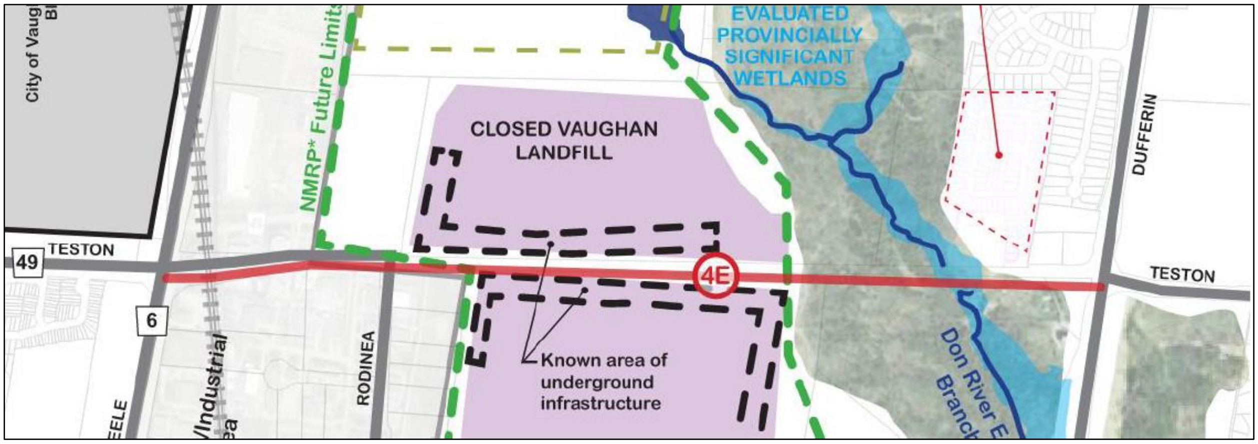

Figure 7-6: Alternative 4E

The advantages of Alternative 4E include maximizing the use of the existing 2-lane sections of Teston Road and rights-of-way, and avoidance of direct encroachment on the private landfill, the, Vaughan Township landfill and Keele Valley landfill. Alternative 4E provides the best roadway design for safety and user experience with a straight structure across the valley. Alternative 4E provides is located outside of the Phase 3 area of NMRP (but still bisects the overall planned area of expansion) as shown in **Figure 7-10**. This alternative also provides less encroachment on a proposed residential subdivision.

The primary disadvantage of this alternative is the risk of encroachment on Keele Valley Landfill infrastructure and the Vaughan Township gas collection system. Alternative 4E also passes through a potential cultural heritage resource west of Dufferin Street as shown in **Figure 7-11**. Like all the other alternatives Alternative 4-E passes through various ELC's including deciduous forest, coniferous forest, and marsh areas as shown in **Figure 7-9**.

7.3.2.5 Alternative 4G

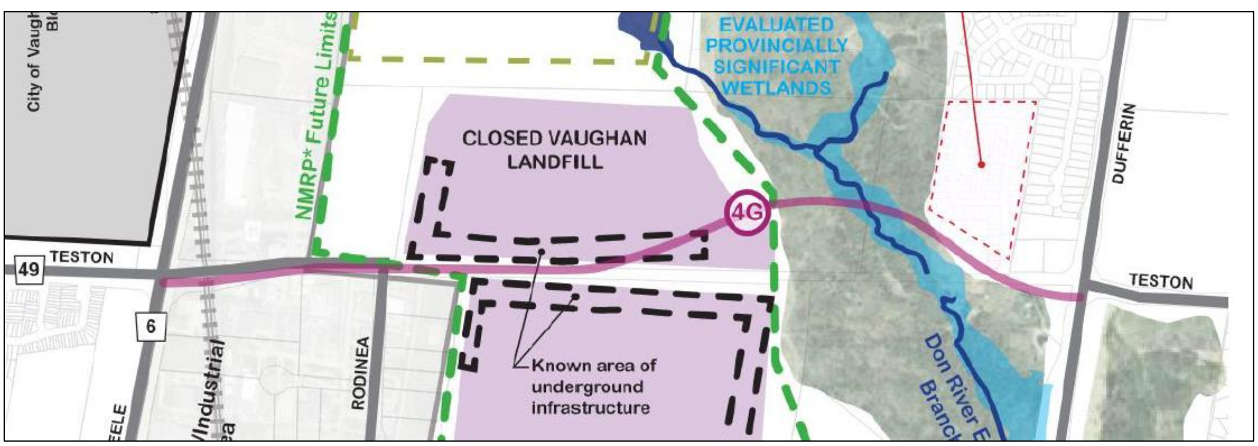

Figure 7-7: Alternative 4G

Alternative 4G has much less encroachment on the Vaughan Township landfill compared to 4A, 4B and 4D. It also avoids the private landfill site. Alternative 4G is located outside of the Phase 3 area of NMRP (but still bisects the overall planned area of expansion).

Drawbacks of Alternative 4G include a less preferred road/bridge geometry due to its curves and has a risk of encroachment on the Keele Valley Landfill infrastructure and Vaughan Township gas collection system. Like all other alternatives, Alternative 4G passes through various ELC's, including deciduous forest, coniferous forest, and marsh areas as shown in **Figure 7-9**. Alternative 4-G also passes through a potential cultural heritage resource west of Dufferin Street as shown in **Figure 7-11**. This alternative is located in close proximity to nearby noise sensitive areas (i.e., existing residential properties) and has high encroachment on a proposed residential subdivision.

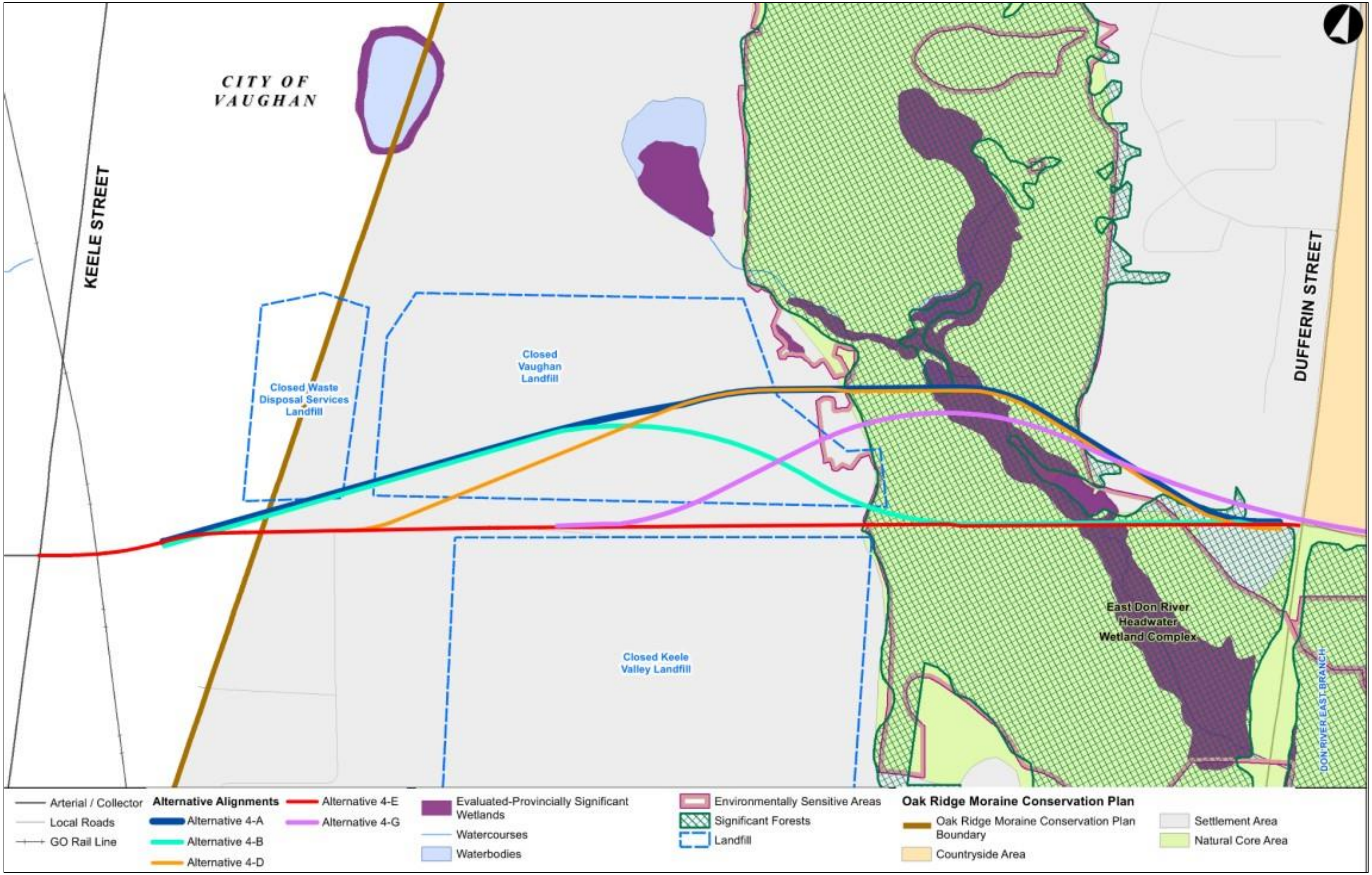

Figure 7-8: Natural Environment Impacts - Short List

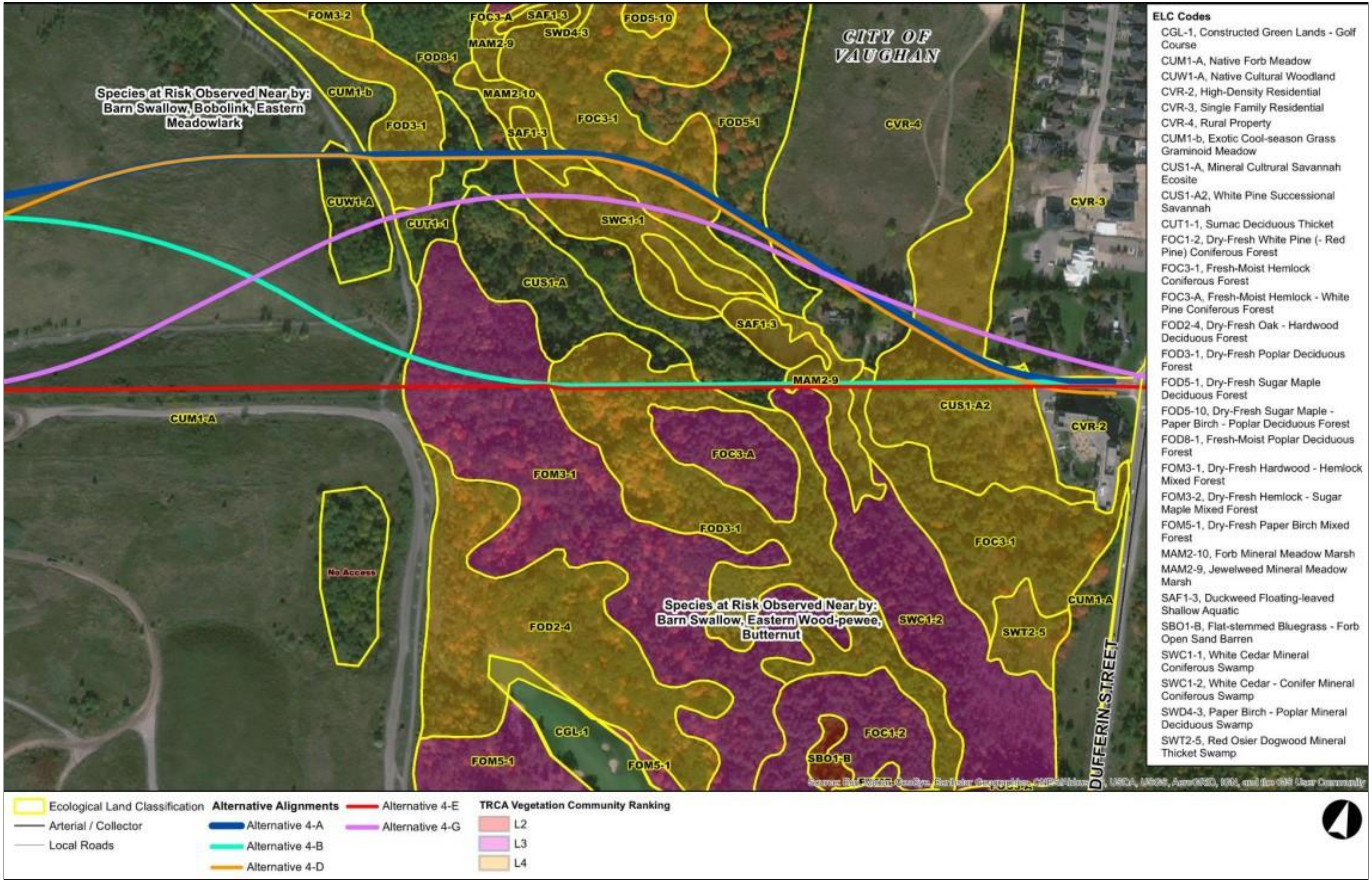

Figure 7-9: Natural Environment Impacts (ELC) - Short List

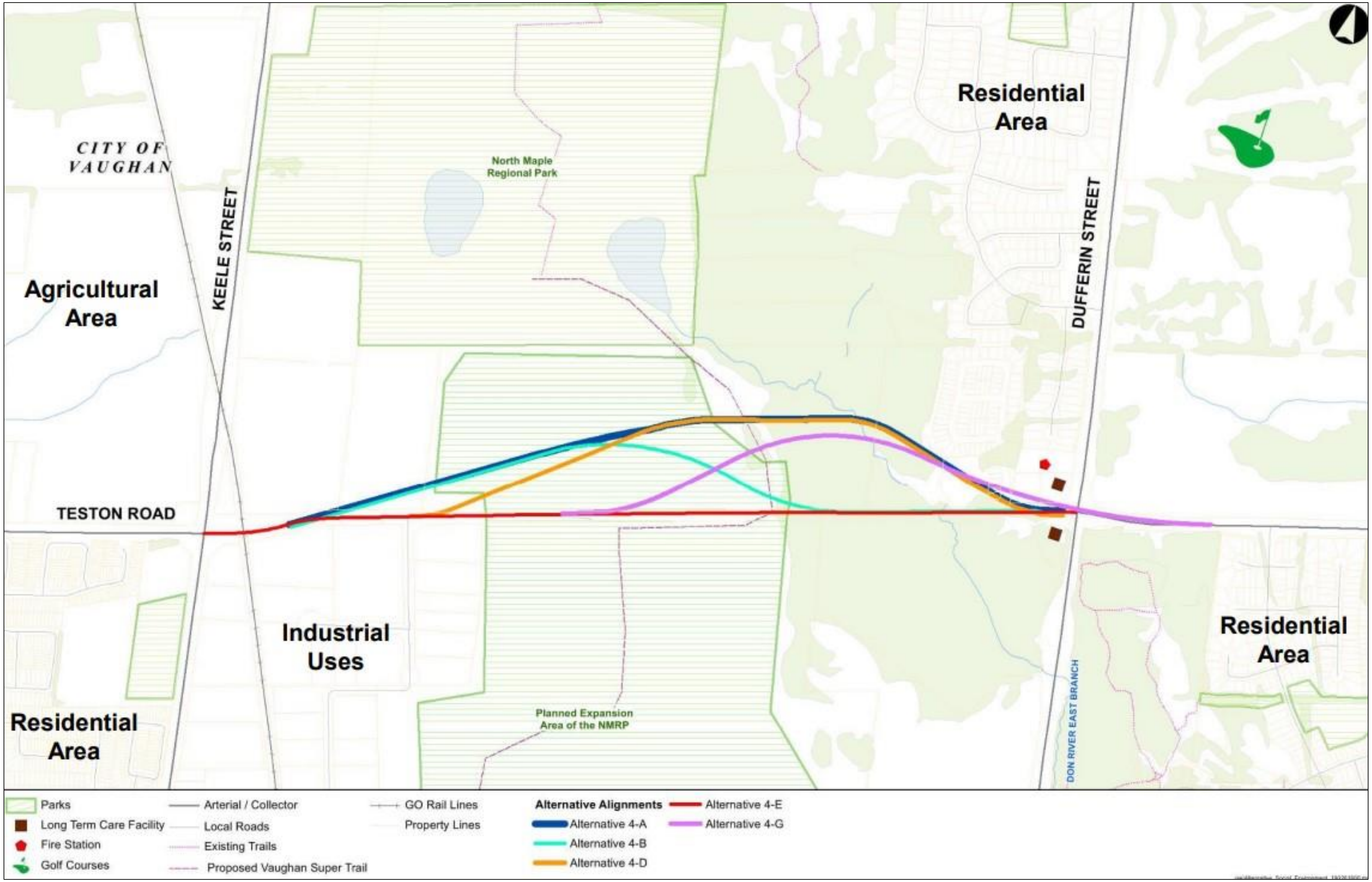

Figure 7-10: Socio-Economic Impacts - Short List

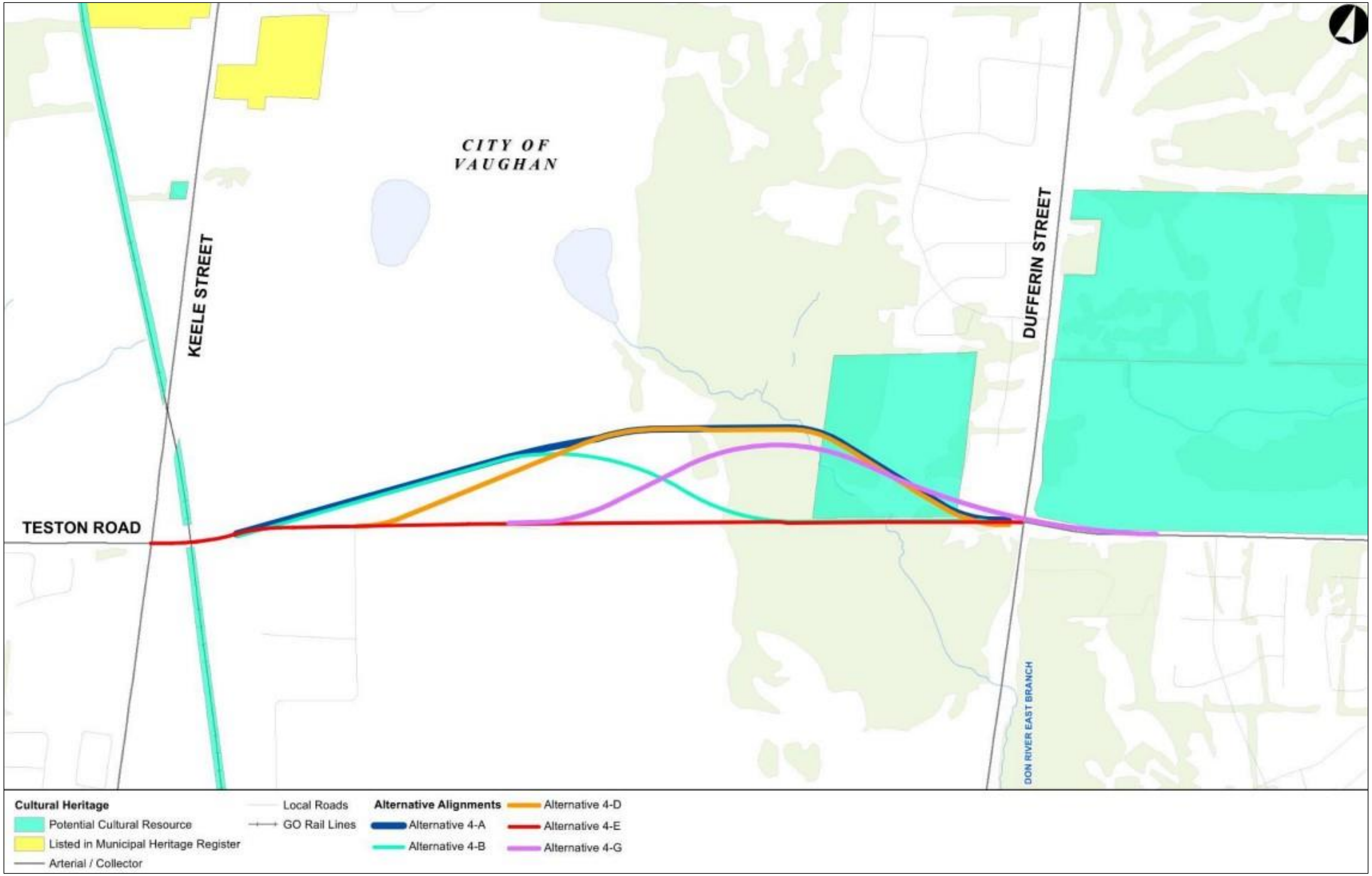

Figure 7-11: Cultural Impacts - Short List

7.3.3 Evaluation

Evaluation of the five short-listed alternatives followed the prescribed methodology outlined in the approved Terms of Reference. The IEA's Terms of Reference determined that a Reasoned Argument method would be undertaken to evaluate the Alternative Methods. This approach identifies net effects associated with each alternative, compares advantages, and disadvantages, and uses the relative significance of the effects to determine a clear rationale for the preferred Alternative Method. Additionally, the Terms of Reference provided a set of evaluation criteria which describe the features/considerations to be accounted for during the evaluation process. The five Alignment Alternatives and the Future Do Nothing Alternative were evaluated against 52 criteria under natural environment, land use and socio-economic environment, cultural environment, and transportation.

Alternatives were classified as either Most, More, Moderately, Less, or Least Preferred for each of the criteria.

Figure 7-12: Legend for Classification of Alternative Alignments

Table 7-2: Natural Environment Evaluation of Alignment Alternatives

Factors	Future Do Nothing	Alternative 4A	Alternative 4B	Alternative 4D	Alternative 4E	Alternative 4G
Fish & Fish Habitat	Most Preferred	Moderately Preferred	Moderately Preferred	Moderately Preferred	Moderately Preferred	Moderately Preferred
Terrestrial Ecosystems	Most Preferred	Less Preferred	Less Preferred	Less Preferred	Moderately Preferred	Less Preferred
Groundwater/ Contamination	Most Preferred	Least Preferred	Least Preferred	Less Preferred	More Preferred	Moderately Preferred
Surface Water	Most Preferred	Less Preferred	More Preferred	Less Preferred	More Preferred	Moderately Preferred
Natural Environment Summary	Most Preferred	Less Preferred	Less Preferred	Less Preferred	Moderately Preferred	Less Preferred

The most preferred alternative from a natural environment perspective is the Future Do Nothing Alternative. This is because it generally has no impacts on the natural environment compared to the other alignment alternatives. Of the others, Alternative 4E ranked second and was moderately preferred.

Table 7-3: Socio-Economic & Land Use Evaluation of Alignment Alternatives

Factors	Future Do Nothing	Alternative 4A	Alternative 4B	Alternative 4D	Alternative 4E	Alternative 4G
Land Use Planning, Policies, Goals, Objectives	◔	◑	●	◑	●	◑
Community Land Use	◔	◔	◕	◕	◕	◕
Noise	●	○	◑	○	◑	○
Land Use – Resources	◑	◑	◑	◑	●	◕
Waste Management/ Landfills	●	◔	◔	◑	◕	◑
Air Quality/ Climate Change	◑	◔	◕	◔	◕	◔
Socio-Economic & Land Use Summary	◑	◑	◕	◑	●	◕

The most preferred alternative considering socio-economic and land use factors is Alternative 4E. The Future Do Nothing alternative was considered moderately preferred overall.

Table 7-4: Cultural Environment Evaluation of Alignment Alternatives

Factors	Future Do Nothing	Alternative 4A	Alternative 4B	Alternative 4D	Alternative 4E	Alternative 4G
Built Heritage Resources	●	◑	◕	◑	◕	◑
Indigenous Archaeological Sites	●	◑	◑	◑	◑	◑
Cultural Environment Summary	●	◑	◑	◑	◑	◑

The Future Do Nothing is most preferred as it has no impacts. All other alternatives performed similarly and were moderately preferred overall.

Table 7-5: Transportation Evaluation of Alignment Alternatives

Factors	Future Do Nothing	Alternative 4A	Alternative 4B	Alternative 4D	Alternative 4E	Alternative 4G
System Capacity & Efficiency	○	●	●	●	●	●
System Reliability, Redundancy & Safety	○	●	●	●	●	●
Traffic Operations, Mobility & Accessibility	○	●	●	●	●	●
Network Compatibility	○	●	●	●	●	●
Design/ Constructability	◔	◔	◔	◔	◕	◔
Cost	●	○	◔	◔	◕	◔
Transportation Summary	○	◑	◑	◑	●	◑

The Future Do Nothing alternative was least preferred. All other alignments performed reasonably well however Alternative 4E scored better across almost all factors ranked most preferred overall.

Table 7-6: Evaluation Results

Factors	Future Do Nothing	Alternative 4A	Alternative 4B	Alternative 4D	Alternative 4E	Alternative 4G
Natural Environment	●	◔	◔	◔	◑	◔
Land Use/Socio-Economic Environment	◑	◑	◕	◑	●	◕
Cultural Environment	●	◑	◑	◑	◑	◑
Transportation	○	◑	◑	◑	●	◑
Alternative Rank	**#6**	**#5**	**#2 (Tie)**	**#4**	**#1**	**#2 (Tie)**
Evaluation Results	**Not Recommended**	**Not Recommended**	**Carry Forward (Alternate)**	**Not Recommended**	**Carry Forward As Recommended**	**Carry Forward (Alternate)**

Alternative 4E was chosen as the Recommended Alternative based on a review and ranking of the 52 criteria. This alternative provided the greatest benefit to transportation and comparable impacts relative to the other alternatives.

Alternatives 4B and 4G were initially carried forward as alternate (fallback) options. These alternatives were re-examined for their impacts to the natural environment. Alternative 4B was screened out because it would break up existing natural habitat for grassland birds, whereas 4E would make use of the existing access road on the western portion of the landfills. 4B would also have relatively more impact to the Vaughan Township Landfill which made it less desirable than 4E in this regard.

A more detailed evaluation of each factor and subfactor is detailed in **Appendix T**.

7.4 Preliminary Preferred Design Alternative

Based on the assessment and evaluation, the preliminary Preferred Design Alternative carried forward for public review at Open House 2 was Alternative 4E. This alternative is preferred as it maximizes use of existing roads to the east and west resulting in a smaller footprint impact, it allows for crossing of the Don River valley on a tangent (best horizontal geometry overall), it avoids significant encroachment on the Keele Valley, Vaughan Township, and private landfills, minimizes encroachment on the proposed NMRP – Phase 3, and avoids impacting the future Teston Sands subdivision property lots.

7.5 Consultation During Alternative Methods Process

7.5.1 Open House 2

Open House 2 (OH2) was held virtually due to the COVID-19 pandemic. The purpose of OH2 was to explain the current phase of the study process, share progress to date, and request feedback from the public. The session provided the public with:

- An overview of the project and schedule.
- An understanding of the process for the generation of alternative methods (corridors and alignments).
- An understanding of alternative methods and the evaluation of alternatives.
- Next steps for the project and for consultation.
- An opportunity to provide feedback on the preliminary preferred design alternative.

In general, comments received were supportive. Feedback received around OH2 included the following general themes:

- Concern over increased noise in the Teston Road area and quality of life impacts during construction.
- Public interest in the timing of the start of the operation.
- Support for the project in addition to suggestions for the extension of Gamble Road to Kirby Road and connection of King-Vaughan Road to Jefferson Side Road.
- Suggestion to ban nearby trucking on Eglin Mills Road from Yonge Street to Dufferin Street.
- Concern regarding impacts to the East Don Valley, Richview Retirement Residence and private residents and suggestions for traffic calming measures.

92% of survey respondents indicated that Corridor Alternative 4 was the preferred corridor alternative, 88% of respondents voted that Alternative Alignment 4E was their preferred option after reviewing the pros and cons, and 83% agreed with the recommendation to proceed with Alternative 4E as the Preferred Alternative Method.

7.5.2 Stakeholder & Agency Meetings

Meetings were held with various stakeholders and agencies prior to the second open house to provide an update on the project, discuss the generation and assessment of the alternative methods, provide feedback received from the first open house, and discuss next steps. The Meeting Minutes, reflecting what was discussed, can be found in the Consultation Record in **Appendix C.1**. The stakeholders and agencies that the Project Team met with included:

- City of Vaughan – September 28, 2021
- Toronto and Region Conservation Authority (TRCA): October 4, 2021
- Ministry of the Environment Conservation and Parks (MECP): October 5, 2021
- Metrolinx: October 5, 2021
- City of Toronto: October 7, 2021
- Ministry of Transportation (MTO): October 25, 2021
- Ministry of Northern Development, Mines, Natural Resources and Forestry (NDMNRF): November 23, 2021

7.6 Confirmation of Preferred Alternative Method

The results of the evaluation of the Alternative Methods were made available to the public, agencies, and other stakeholders to provide the opportunity to receive comments and feedback on the evaluation process and confirm the results (see **Section 3** for details). After receiving feedback on the evaluation, the Project Team confirmed Alternative Alignment 4E as the Preferred Alternative Method. Alternative Alignment 4E was therefore carried forward to the next phase of the project.

8. Design Alternatives

Section 7 considered corridor and alignment alternatives for the ‘Missing Link’ portion of the study area for Teston Road between Keele Street and Dufferin Street which led to confirmation of the Preferred Alternative Method, Alternative Alignment 4E, for Teston Road (Keele Street to Dufferin Street).

Section 8 will consider more refined Design Alternatives for both the above as well as for the existing two-lane section of Teston Road between Dufferin Street and Bathurst Street for which significantly different alignment alternatives were not considered necessary given the ample relatively unconstrained existing right-of-way. See **Figure 8-1**.

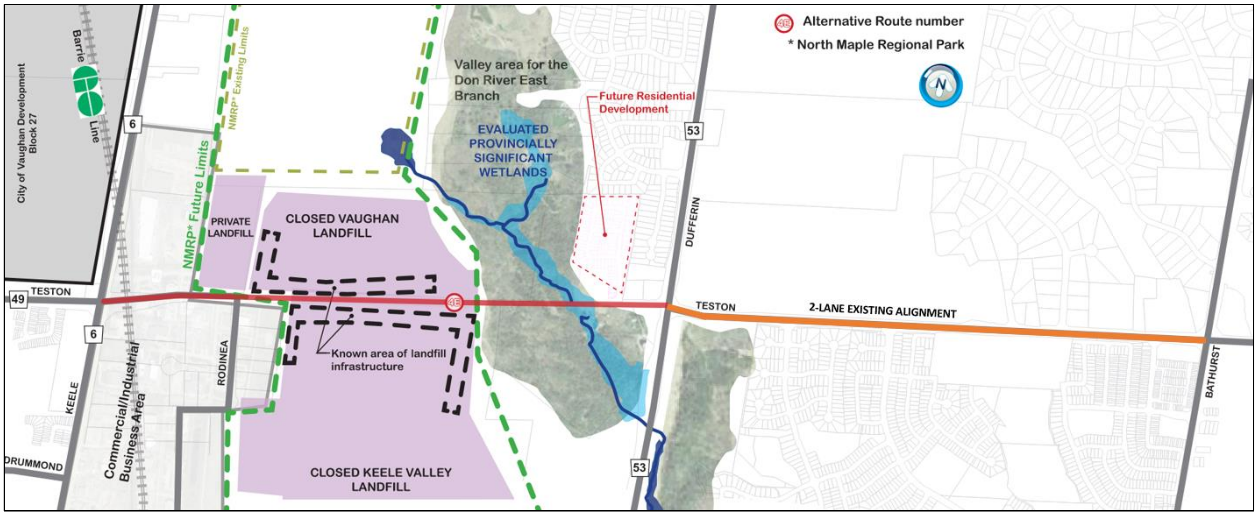

Figure 8-1: Preferred Alternative Alignments for Teston Road

8.1 Design Alternatives Process

The Teston Road Area Improvements IEA Terms of Reference (WSP, 2018) provides guidance for the development of the Concept Design level of detail for the Undertaking. The evaluation factors and subfactors applied in the evaluation of Alternative Methods are also used for the development of the Concept Design, and includes consideration of the natural environment, land-use/socio-economic environment, cultural environment, and transportation.

A Reasoned Argument evaluation method is followed to assess the advantages and disadvantages of the conceptual Design Alternatives under consideration.

There are four sections of the Project, each with unique design challenges. These sections are illustrated in **Figure 8-2** and include:

- Section 1: Teston Road (Keele Street to Rodinea Road) including the GO rail crossing and a private landfill.
- Section 2: Teston Road at Rodinea Road to West Edge of Don River Valley (the area of the road that would pass between the Vaughan Township and Keele Valley landfills.
- Section 3: Valley Crossing of the Don River.
- Section 4: Teston Road (Dufferin to Bathurst).

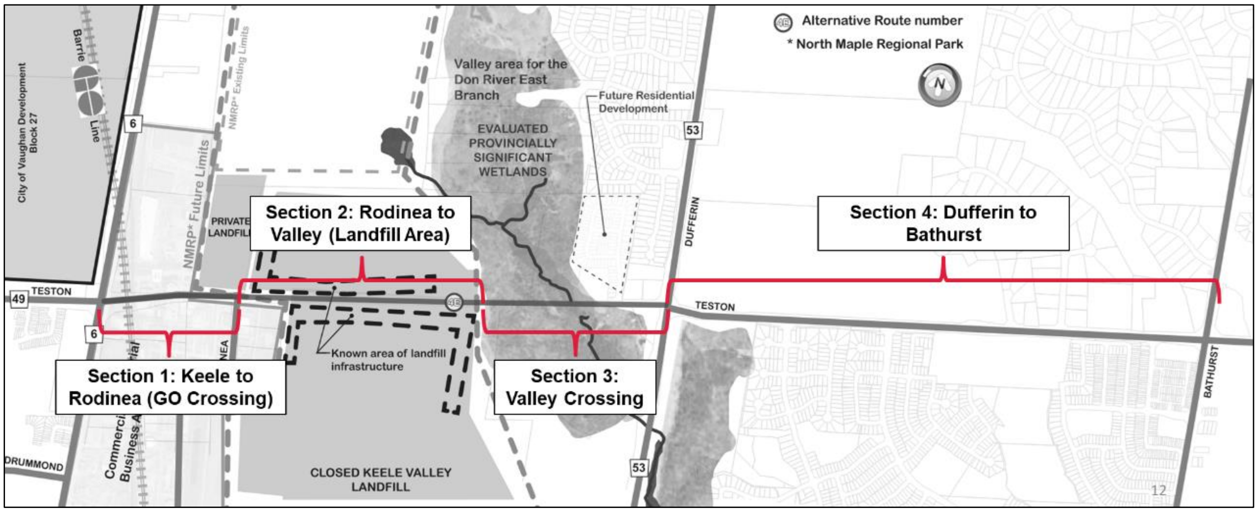

Figure 8-2: Sections for Design Alternative Development

8.2 Section 1: Keele Street to Rodinea Road

Section 1 includes the Keele Street and Teston Road intersection and is generally comprised of industrial lands. The section includes an existing at-grade rail crossing for the Barrie GO line just 80m east of the intersection and a private landfill.

The considerations for Design Alternatives within Section 1 include:

- At grade versus grade separated GO rail crossing
- Teston Road alignment
- Keele Street alignment
- Road-over-rail or road-under-rail if grade separated GO rail crossing

During the initial review of grade separation alternatives, it was determined that road-under-rail options would be screened out as these would be much more costly, more difficult to construct and maintain, and would be more disruptive to rail service during construction. As a result, all grade separated alternatives generated for this section are road-over-rail options.

Four alternatives were carried forward for a Grade-Separated GO Rail Crossing along with the Future Do Nothing alternative:

- Alternative 1: Existing Teston, Existing Keele, Overpass
- Alternative 2: Shift Teston North, Existing Keele, Overpass
- Alternative 3: Existing Teston, Shift Keele West, Overpass
- Alternative 4: Shift Teston North, Shift Keele West, Overpass
- Future Do Nothing

8.2.1 Section 1, Alternative 1

As shown in **Figure 8-3**, this alternative includes the GO Rail overpass and keeps both Keele Street and Teston Road on their existing alignments. While this alternative would have a smaller construction footprint and maintains the Keele Street alignment, it would impact several of the driveways of nearby commercial properties. It also keeps a less desirable alignment for Teston Road which features what is known as a reverse curve or two curves back-to-back which curve in the opposite direction.

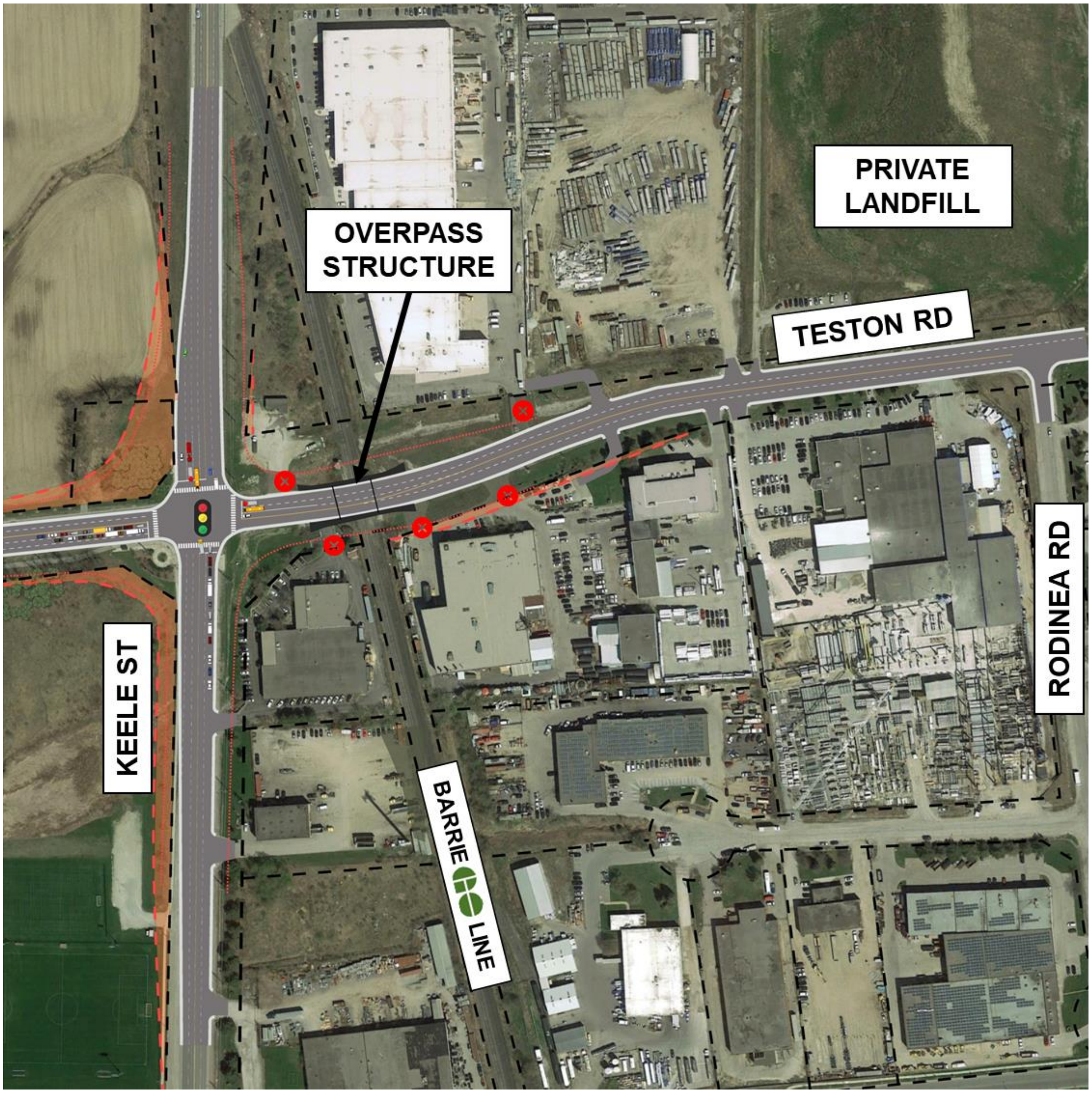

Figure 8-3: Section 1, Alternative 1

8.2.2 Section 1, Alternative 2

As shown in **Figure 8-4**, Alternative 2 includes a GO Rail overpass and shifts Teston Road slightly to the north from its current alignment while keeping Keele Street the same.

This alternative also has a relatively small construction footprint, though larger than Alternative 1, and removes the reverse curve, but it still impacts several driveways for the nearby commercial properties.

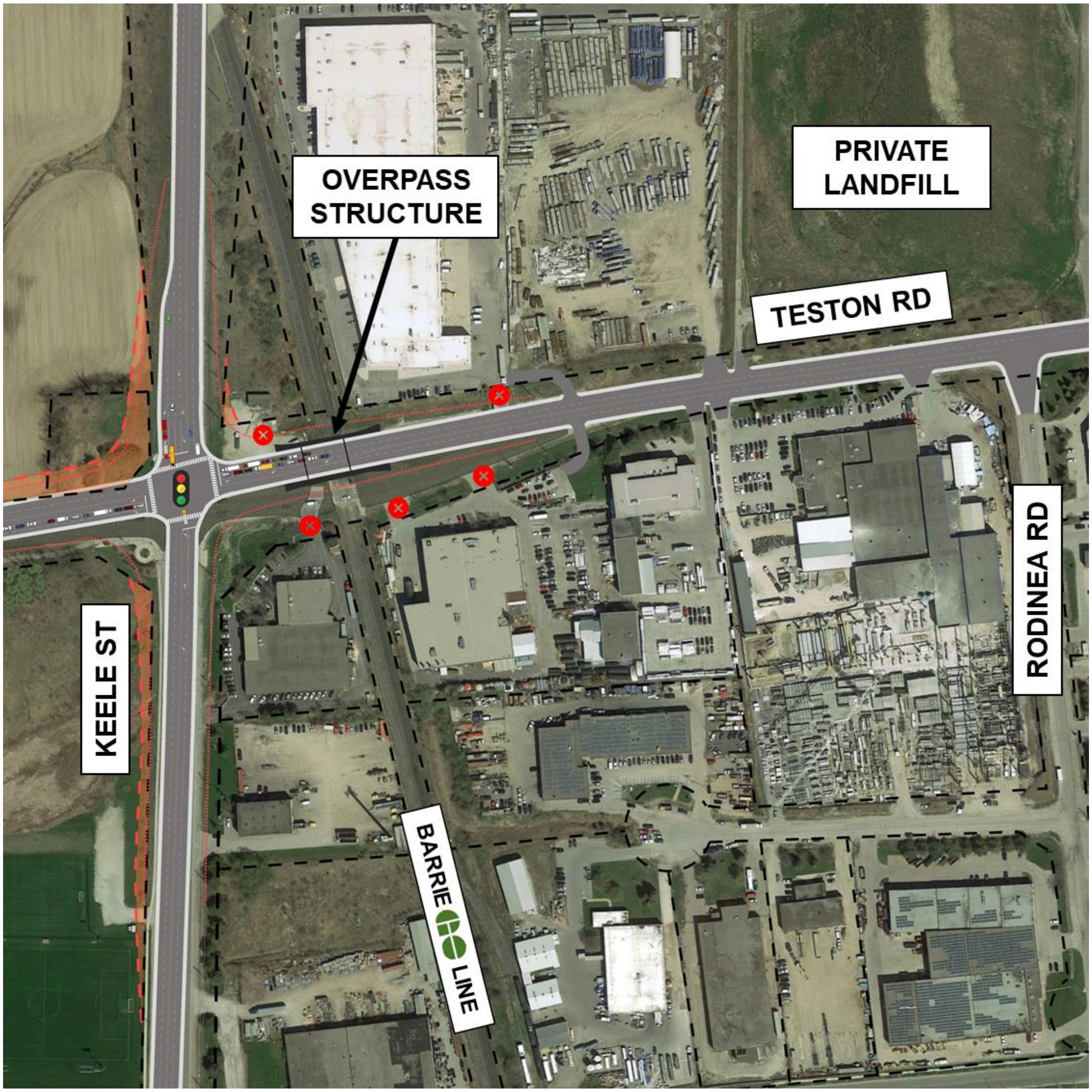

Figure 8-4: Section 1, Alternative 2

8.2.3 Section 1, Alternative 3

As shown in **Figure 8-5**, Alternative 3 includes a GO Rail overpass and shifts Keele Street westerly while maintaining the existing Teston Road alignment.

This alternative does maintain access to all properties through use of an access road under the overpass structure, however, it has a high impact on the property to the northwest of the intersection to accommodate the road shift and impacts the City of Vaughan's Maple Reservoir Park to the southwest. It would also have a higher cost and large construction footprint versus the first two alternatives and does not address the reverse curve along Teston Road. Increased grade-separation construction costs would also be necessary due to the longer structure.

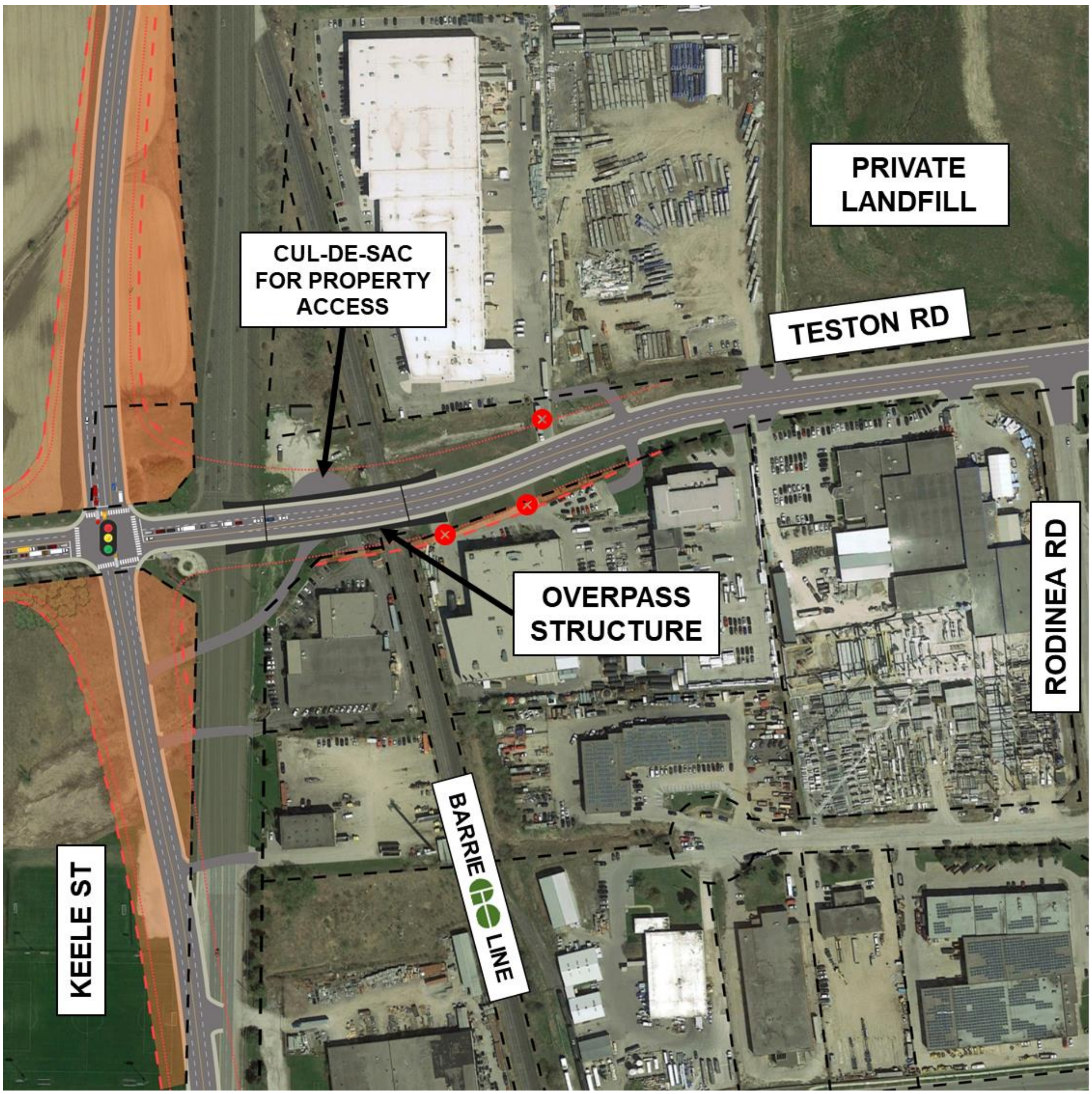

Figure 8-5: Section 1, Alternative 3

8.2.4 Section 1, Alternative 4

As shown in **Figure 8-6**, Alternative 4 includes a GO rail overpass and shifts Keele Street westerly and Teston Road northerly. This alternative also maintains access to all properties through use of an access road under the overpass structure. It also eliminates the reverse curve on Teston Road. Like Alternative 3, it has a high impact on the property to the northwest of the intersection and impacts the City of Vaughan's Park to the southwest. It would also have a higher cost and large construction footprint versus the first two alternatives due to the longer structure.

Figure 8-6: Section 1, Alternative 4

8.2.5 Evaluation

In the evaluation of alternatives (**Table 8-1**), alternatives were classified as either Most, More, Moderately, Less or Least Preferred for each of the criteria as depicted in **Figure 8-7**.

Figure 8-7: Legend for Classification of Design Alternatives

To determine the recommendation for the future grade separation, the team evaluated the different grade separated alternatives and determined that Alternative 2 (shift Teston North) would be carried forward for implementation when grade separation is warranted. This is because Alternative 2 would perform well from a transportation perspective while also having fewer impacts on property, development areas, and the recreational facility in the southwest.

A full evaluation table for Section 1, including factors and subfactors, is included in **Appendix U**.

Based on a review of warrants, design constraints, and challenges within this section, York Region would proceed in the interim with an At-Grade GO Rail Crossing with an improved Teston Road Alignment, shifting the road to the north. Proceeding now with an at-grade crossing will have no impacts on property and all accesses can be maintained. The IEA recommends the long-term property protection for a grade-separated GO Rail Crossing.

Table 8-1: Section 1 Evaluation Results

Factors*	1. Existing Alignments/ GO Rail Overpass	2. Shift Teston North/GO Rail Overpass	3. Shift Keele West/GO Rail Overpass	4. Shift Teston North, Keele West/GO Rail Overpass	5. Future Do Nothing
Natural Environment	◐	◕	◔	◔	●
Land Use/Socio-Economic Environment	◕	◕	◐	◐	◐
Transportation	◔	◐	◕	●	○
Alternative Rank	◐	◕	◐	◐	◐
Evaluation Results	**Not Recommended**	**Carry Forward As Recommended**	**Not Recommended**	**Not Recommended**	**Not Recommended**

* Cultural Heritage Resources were not impacted by these alternatives; therefore, it was removed from the evaluation criteria.

8.3 Section 2: Rodinea Road to the East Don River Valley

Section 2 is the section of road that passes between the Vaughan Township landfill and future North Maple Regional Park to the north and the Keele Valley landfill to the south, from Rodinea Road to the west side of the valley area. This section includes three landfills: a private landfill, the Vaughan Township landfill, and the Keele Valley landfill. All landfills have associated monitoring wells and infrastructure that contribute to the design constraints.

To avoid the complicated landfill infrastructure present in this section, two basic roadway cross-sections were generated. The first cross-section is a full width section that is the standard design for new roads within York Region. The second is a smaller cross-section that could allow the roadway to pass between the landfills to the north and south.

Two active transportation variations to each of these cross-sections were considered and are explained in further detail below.

8.3.1 Section 2, Full Width Cross-Section

Figure 8-8 shows the full width cross-section which features a 36-metre right-of-way, active transportation on both sides of the roadway, and a combination of 3.5m and 3.3m lanes, two in each direction. It also features boulevards for a wider separation from pedestrians and utility zones. The active transportation could feature either a multi-use path on each side or a separated sidewalk and cycle track. A determination of the active transportation facility will be made during a future stage.

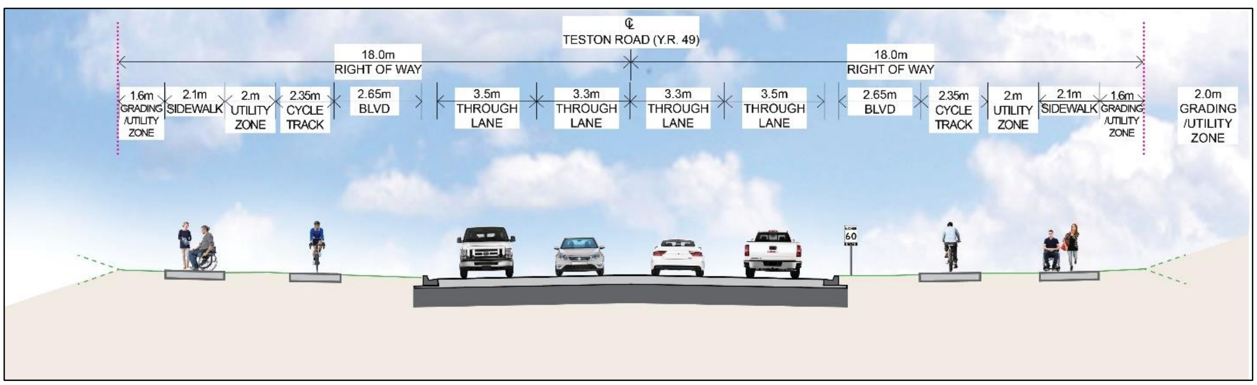

Figure 8-8: Section 2, Full Widith Cross-Section

8.3.2 Section 2, Constrained Cross-Sections

The constrained cross-section alternatives also feature a combination of 3.5m and 3.3m lanes, again with two lanes in each direction (see **Figure 8-9**). However, the boulevards and utility zones have been reduced to decrease the total width of the cross-section. This could allow the roadway to fit better in between the landfill infrastructure while maintaining the same lanes and active transportation facilities. The active transportation elements could feature either a multiuse path on each side or a separated sidewalk and cycle track. A further variation would be to construct a multiuse path on only side of the roadway (likely the north side) – possibly as an interim phase of work which could potentially also be applied to Sections 1 and 3 of the project as well.

A final determination of the active transportation facility will be made during a future stage of project design.

Figure 8-9: Section 2, Constrained Cross Section

The aerial map of Section 2 (**Figure 8-10**) provides context to the constraints in the area by showing the proposed road with the constrained cross-section. The proposed road is surrounded by industrial sites and landfill infrastructure to the north and south. The northwestern portion contains the private landfill and associated access road. Directly north, the Vaughan Township landfill includes several monitoring sites in addition to an access road and additional infrastructure. To the south there is an industrial property as well as the Keele Valley Landfill which contains similar monitoring wells to the Vaughan landfill in addition to access roads.

It is important to understand that there is a large difference in elevation between the north and south sides of the proposed alignment. The road is anticipated to be built on top of the narrow strip of raised elevation, adding to the justification of the constrained cross-section.

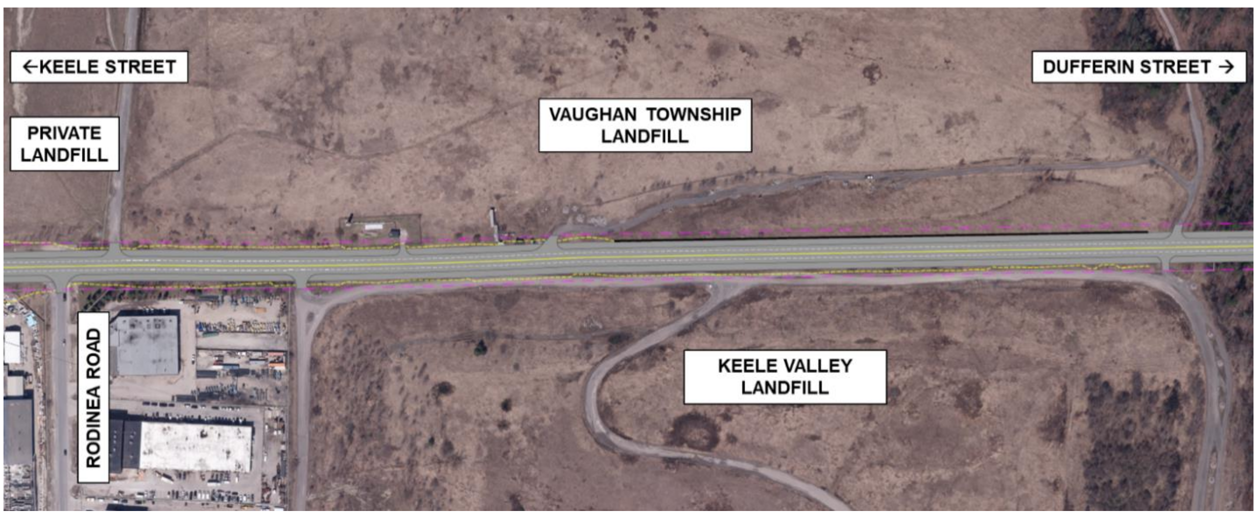

Figure 8-10: Section 2, Constrained Cross-Section (Aerial)

8.3.3 Evaluation

Table 8-2: Evaluation Table

Factors**	Full Cross-Section (36m)	Constrained Cross-Section (23m)	Future Do Nothing*
Natural Environment	◔	◑	●
Land Use/Socio-Economic Environment	◕	●	◔
Transportation	◕	●	○
Ranking	◕	●	◑
Evaluation Results	**Not Recommended**	**Carry Forward As Recommended**	**Not Recommended**

* Future Do Nothing refers to an Alternative where all other planned transportation infrastructure improvements within the broader study are implemented, except a Teston Road connection.

** Cultural Heritage Resources were not impacted by these alternatives; therefore, it was removed from the evaluation criteria.

Due to the constraints in this section, the constrained cross-section will be caried forward to ensure impacts to the landfills and associated infrastructure are avoided. This infrastructure will be required long into the future to continually monitor and control the landfills.

Long term protection for a full-width cross-section is recommended as part of the IEA, however, the full-width cross-section would not be implemented until such time as the landfill monitoring and various leachate and gas controls are no longer required and have been decommissioned. There is currently no timeline for decommissioning.

A full evaluation table for Section 2, including factors and subfactors, is included in **Appendix U**.

8.4 Section 3: East Don River Valley Crossing

Section 3 includes the valley of the East Don River tributary from east of the landfills across to the Teston Road and Dufferin Street intersection. The surrounding area is forested and includes significant natural habitat. The valley also possesses significant elevation changes which results in design challenges.

Section 3 features four alternatives:

- Single span bridge
- Double span bridge
- Triple span bridge
- Future Do Nothing

8.4.1 Section 3, Alternative 1: Single Span Bridge

The single span bridge, as shown in **Figure 8-11**, features a structure at about 80m long and 14m high, at the tallest point. The remainder of the valley crossing includes embankments along the length. The existing tributary of the East Don River would pass under the structure and the structure would be wide enough to accommodate flooding from a regional storm, such as what happened with Hurricane Hazel.

The span is wide enough to permit wildlife passage as well as recreational opportunities such as trails, however, given it has the shortest span of the considered alternatives, the area for passage underneath is the smallest. There is also therefore limited space for vegetation to grow under the structure. While the embankments can be revegetated, this alternative has the largest footprint. It does, however, have the lowest construction cost.

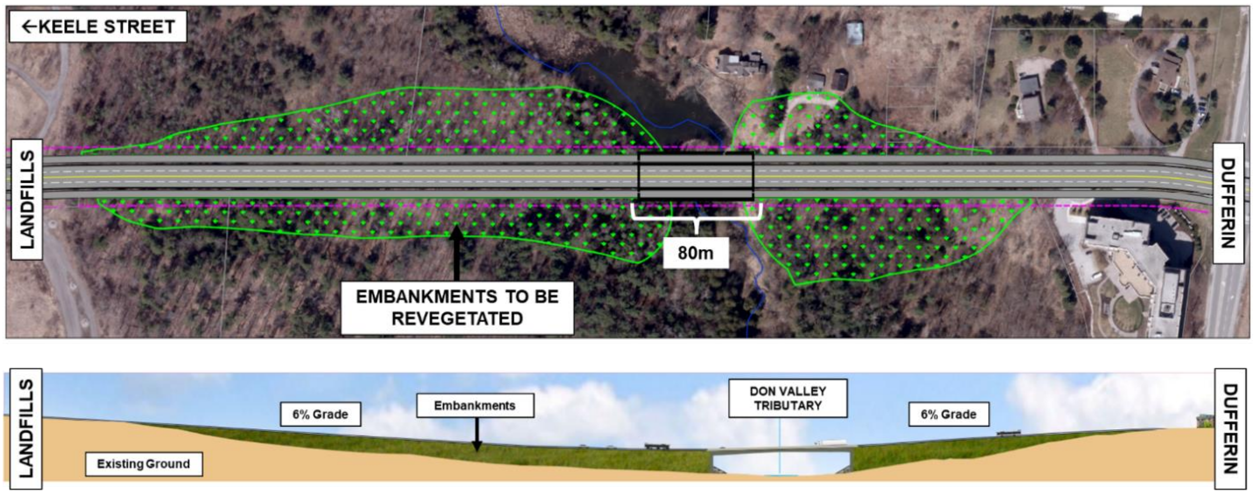

Figure 8-11: Section 3, Alternative 1: Single Span Bridge

8.4.2 Section 3, Alternative 2: Double Span Bridge

The double span bridge, as shown in **Figure 8-12**, features a structure that is about 160m in total length and 14m high, at its tallest point. This alternative would also have embankments along the remaining length of the valley. With double the span of Alternative 1, there are greater opportunities for wildlife passage and recreational opportunities and infrastructure. There is some potential for vegetation to continue to grow under the structure, however this may be limited due to shade from the structure. Embankments would also be revegetated in this alternative, though its overall construction footprint is lower than that of Alternative 1. The construction cost of this alternative is moderate, between Alternatives 1 and 3.

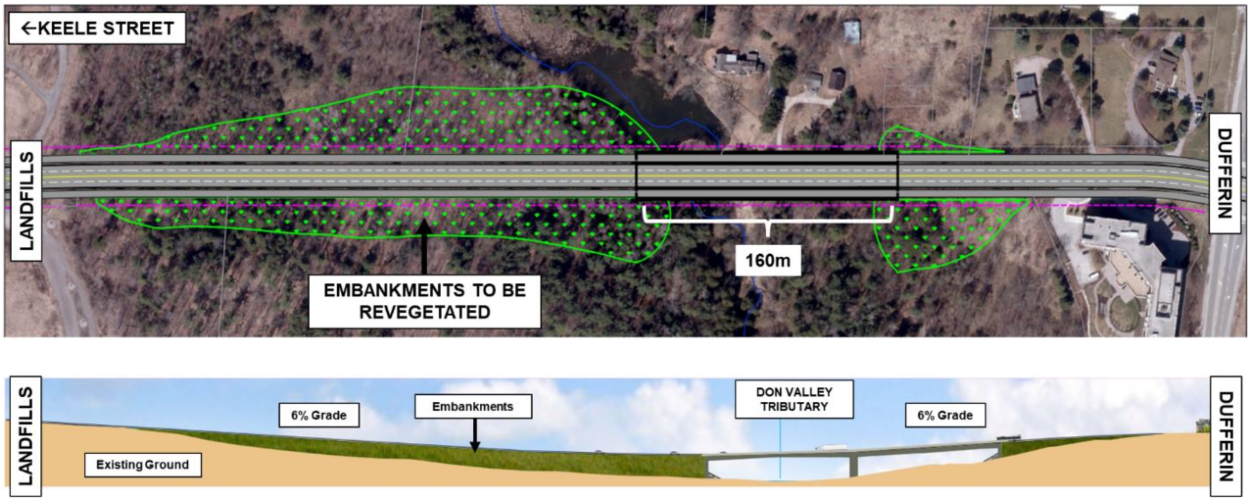

Figure 8-12: Section 3, Alternative 2: Double Span Bridge

8.4.3 Section 3, Alternative 3

The triple span bridge alternative, as shown in **Figure 8-13**, features a structure that is 240m in total length and 21m high at the tallest point. This alternative would also have embankments along the remaining length of the valley. With triple the span of Alternative 1, there are even greater opportunities for wildlife passage and recreational opportunities under the structure. Like Alternative 2, there is some potential for vegetation to grow under the structure. This alternative would have the highest construction cost.

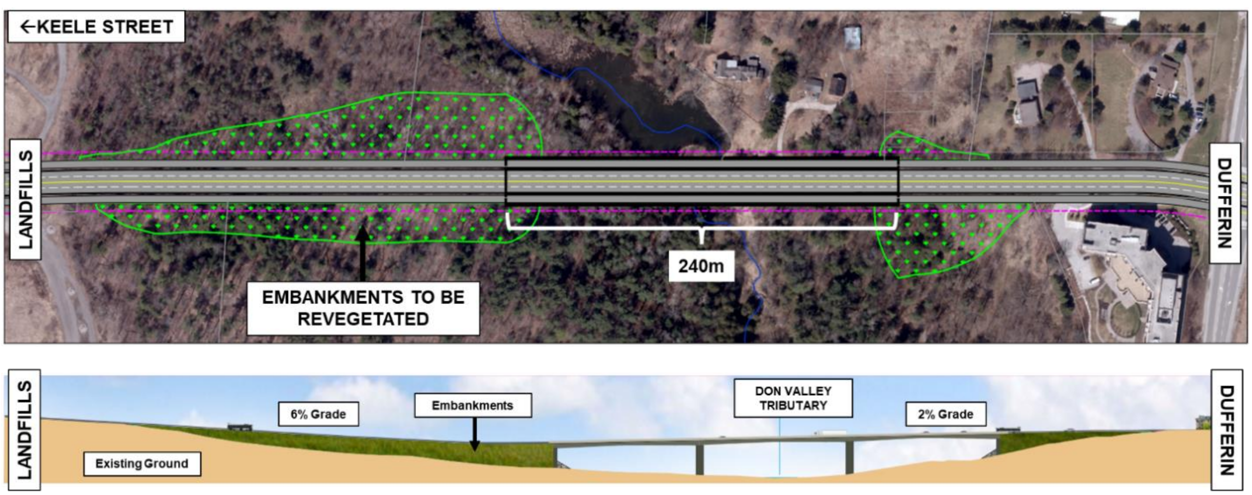

Figure 8-13: Section 3, Alternative 3: Triple Span Bridge

8.4.4 Evaluation

Table 8-3: Section 3 Evaluation Results

Factors*	1. Single-Span Bridge	2. Double-Span Bridge	3. Triple-Span Bridge	4. Future Do Nothing
Natural Environment	◔	◑	◕	●
Land Use/ Socio-Economic Environment	◕	◕	◕	◔
Transportation	●	◑	◔	○
Alternative Rank	◕	◑	◑	◔
Evaluation Results	**Carry Forward As Recommended**	**Not Recommended**	**Not Recommended**	**Not Recommended**

* Cultural Heritage Resources were not impacted by these alternatives; therefore, it was removed from the evaluation criteria.

Upon evaluation of the various bridge alternatives (**Table 8-3**) along with the Future Do Nothing alternative, the single span bridge is recommended be carried forwarded. While all alternatives will have impacts to the valley from both temporary construction impacts and permanent impacts, the longer structures are more complex to construct, more expensive, and do not offer many additional benefits to travelers or to land use and the socio-economic environment.

The design for this section of the project will include integration of public amenities such as existing or planned trails, parks, or natural areas, and will ensure a context-sensitive design solution. It will also include revegetation of the embankments and additional investigations will be undertaken to limit the extent of the embankments, where feasible.

A full evaluation table for Section 3, including factors and subfactors, is included in **Appendix U**.

8.5 Section 4: Dufferin Street to Bathurst Street

Section 4 comprises existing Teston Road from Dufferin Street to Bathurst Street and is dominated by residential development. This area already has an active two-lane road with a wide paved median and supporting infrastructure.

If this Individual Environmental Assessment is approved by the Ministry of Environment, Conservation, and Parks, and Teston Road is connected between Keele Street and Dufferin Street, Teston Road east of Dufferin Street would require additional lane capacity. The need for additional lane capacity due is detailed in Section 4 with a link and screenline analysis.

This IEA is also proposing the widening of Teston Road to four lanes between Dufferin Street and Bathurst Street. An aerial view of the existing conditions of this section are shown in **Figure 8-14**.

Figure 8-14: Section 4, Existing Conditions

4.1m of widening is required to expand the existing roadway. Widening alternatives include:

- Widen equally on each side of the existing road
- Widen on the south side only
- Widen on the north side only
- Future Do Nothing (keep road as two lanes)

All alternatives can be accommodated within the existing right-of-way. The need for traffic control signals will be assessed as part of the next steps of the project.

8.5.1 Section 4, Alternative 1

Widening equally on both sides of the existing road, as shown in **Figure 8-15**, would require the addition of approximately two metres on each side of the roadway. This minimizes grading impacts to the existing hydro poles on the south side of the road and avoids the need to extend an existing culvert located just west of Saul Court.

This alternative increases the complexity of construction staging to maintain traffic, given only a small amount of roadway needs to be added on each side of the existing road.

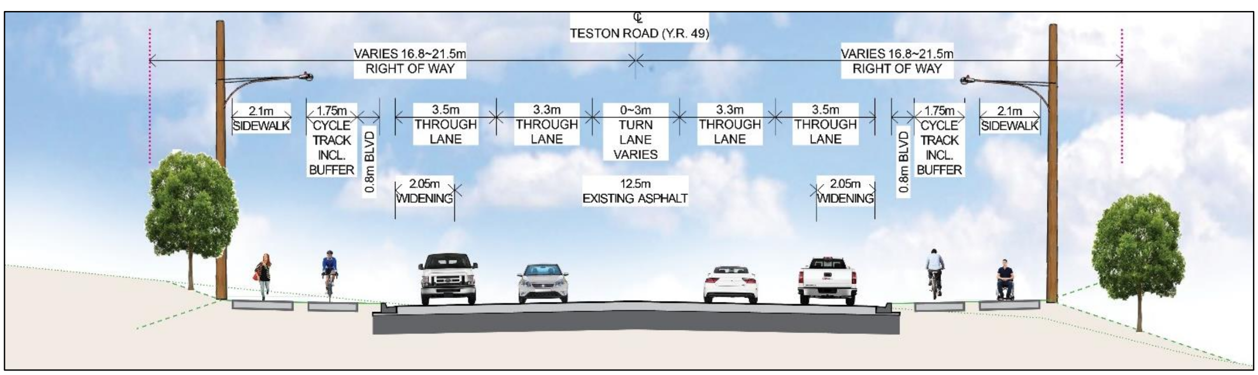

Figure 8-15: Section 4, Alternative 1

8.5.2 Section 4, Alternative 2

Widening on the south side of the existing road, as shown in **Figure 8-16**, would require the addition of four metres to the south. This would have minimal impacts to the north of Teston Road and is easier to construct, however, it may impact the existing hydro pole line, property, and grading all on the south side of Teston Road and would require lengthening of the existing culvert.

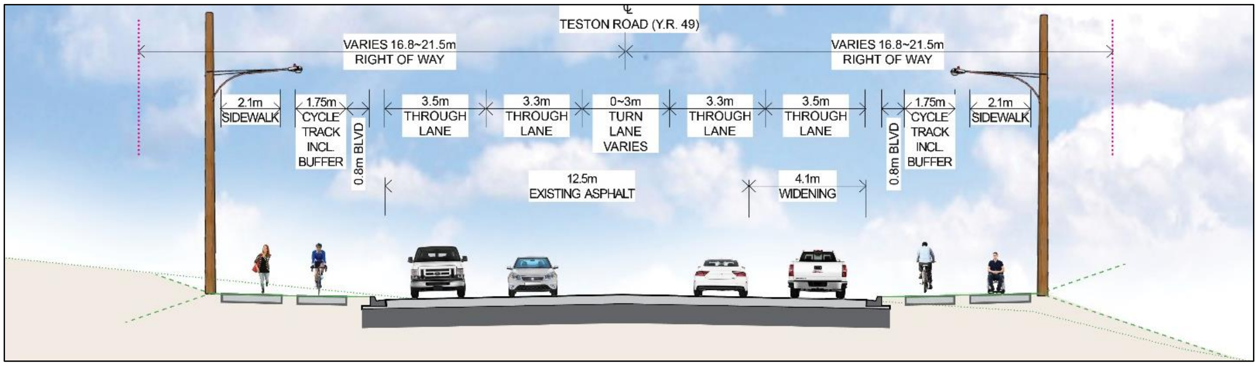

Figure 8-16: Section 4, Alternative 2

8.5.3 Section 4, Alternative 3

Widening on the north side of the existing road, as shown in **Figure 8-17**, would require the addition of four metres to the north. This would have minimal impacts to the south of Teston Road, is easier to construct than widening on both sides, and simpler construction staging to maintain existing traffic. It also avoids the hydro pole line on the south side.

North widening would also require lengthening of the existing culvert and may result in impact to the wetland in this area.

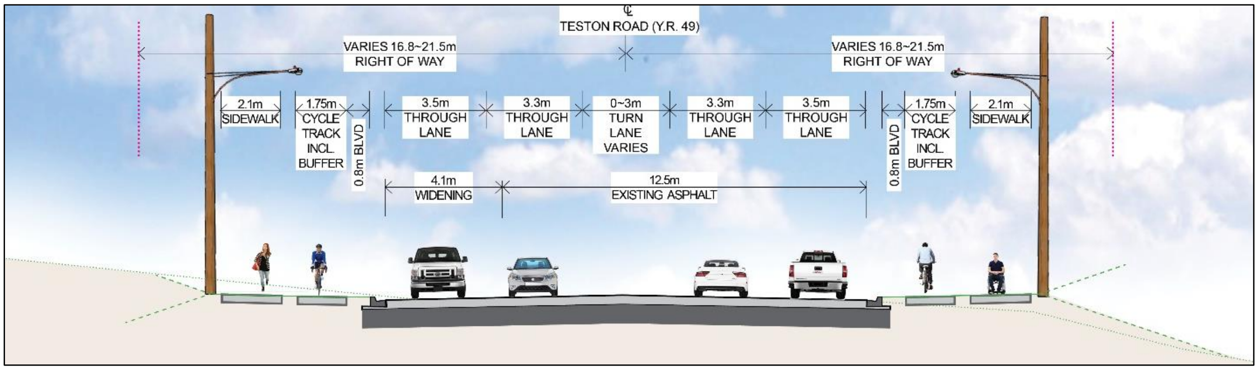

Figure 8-17: Section 4, Alternative 3

8.5.4 Evaluation

Table 8-4: Section 4, Evaluation Results

Factors*	1. Widen on Both Sides	2. Widen on the South	3. Widen on the North	4. Future Do Nothing
Natural Environment	◐	◔	◔	●
Land Use/ Socio-Economic Environment	●	◕	●	◔
Transportation	●	◔	◐	○
Alternative Rank	◕	◔	◐	◐
Evaluation Results	**Carry Forward As Recommended**	**Not Recommended**	**Not Recommended**	**Not Recommended**

* Cultural Heritage Resources were not impacted by these alternatives; therefore, it was removed from the evaluation criteria.

The results of the evaluation demonstrate that widening on both sides of the existing road is the most preferrable and therefore recommended alternative for Section 4. It has the least impact on the natural environment (aside from the Future Do Nothing scenario) and socio-economic environment while also performing the best from a transportation perspective. It is more complex to construct but this is largely a temporary condition and will require construction staging to be designed to reduce impacts to users.

A full evaluation table for Section 4, including factors and subfactors, is included in **Appendix U**.

8.6 Preliminary Preferred Design Alternatives

Based on the assessment and evaluation, the preliminary Preferred Design Alternative carried forward for public review at Open House 3 included:

- For Section 1: an at-grade GO rail crossing with an improved alignment of Teston Road (shift to north), and long-term property protection for grade separation.
- For Section 2: use of the constrained four-lane cross-section to avoid landfill infrastructure and use of the full width cross-section throughout the remaining sections (including property protection for future full width cross-section).
- For Section 3: a single span bridge structure of approximately 80m in length.
- For Section 4: equal widening on both sides of the existing Teston Road between Dufferin and Bathurst.

8.7 Consultation During Design Alternatives Process

8.7.1 Open House 3

Open House 3 (OH3) was held virtually due to the ongoing COVID-19 pandemic. The purpose of OH3 was to present a summary of the study background, process, and schedule, describe alignments carried forward for further analysis, and discuss the evaluation of design alternatives and the resulting recommendations, along with next steps for the project including opportunities for feedback.

Comments received were generally in support of the project, with some concerns around noise, traffic, and environmental impacts. Feedback received around OH3 included the following general themes:

- Concern surrounding the environmental impacts in the flood plain and with a single-span bridge specifically.
- Support for active transportation infrastructure.
- Noise concerns with the widening of Section 4 and suggestion for a noise study and noise barriers.
- Diverse general project comments ranging from overall disagreement with the study to support for the overall project and hopes for swift construction due to large population density.

Preference for each of the recommended sections of the design had the following support:

- 48% preferred a northerly shift of Teston Road/GO rail overpass in Section 1.
- 45% of respondents agreed with the proposed single-span bridge in Section 3.
- 84% of respondents preferred equal widening on each side of the existing road in Section 4.

Overall, 41% of respondents strongly agreed with the recommendation to proceed with each section alternative, and 21% somewhat agreed. Almost 19% of respondents strongly disagreed with the recommendation.

8.7.2 Stakeholder & Agency Meetings

Meetings with technical agencies were held to discuss and receive comment on the Alternative Methods. These included the Ministry of Environment, Conservation, and Parks (MECP), Metrolinx, The City of Toronto, The City of Vaughan, and the Toronto and Region Conservation Authority (TRCA).

Table 8-5: Stakeholder & Agency Meetings During Open House 3

Stakeholder/Agency	Meeting Date	Meeting Summary
City of Vaughan	February 11, 2022	The study team provided updates on progress to date, results from the second open house, the preferred alternative method, and the four sections of design alternatives. Discussions were held regarding the four sections of the study area. Some of the challenges discussed include the GO rail crossing, active transportation crossings, and topography challenges. The City requested the study team speak with the Block 27 Landowners Group about the land necessary for the eventual Teston Road realignment.
City of Toronto	February 15, 2022	The study team provided updates on progress to date, results from the second open house, the preferred Alternative Method, and the four sections of design alternatives. Some things that the City and their consultant noted include: ▪ There is a utility crossing from the Vaughan landfill that will traverse under the new road, this will require replacement. ▪ Requested that the design maintain existing landfill accesses. ▪ Road salt may cause issues during landfill leachate testing. ▪ The location of two maintenance holes south of the service road that access a methane gas pipe may cause odour to be a concern along active transportation facilities. ▪ Access to the purge well system is required every 2 weeks for pick-up trucks and large rigs.
Metrolinx	February 15, 2022	The study team provided updates on progress to date, results from the second open house and the alternative designs for the section of roadway near the Barrie GO railway. Metrolinx inquired about the status of the designs, the study team generated profiles, alignments, and grading limits at a high level, but more detail will be added further along.
Ministry of the Environment, Conservation & Parks	February 22, 2022	The study team provided updates on progress to date, results from the second open house, the preferred Alternative Method, and the four sections of design alternatives. Each discipline provided comments on the project, some things noted include: ▪ Air Group: visibility concerns when the gas flare facility is operating and producing flame plumes close to the roadway. ▪ York District: Contingency plans should be created for encountering impacted soils due to the age of the Vaughan landfill.

Stakeholder/Agency	Meeting Date	Meeting Summary
Toronto and Region Conservation Authority	February 18, 2022	The study team provided updates on progress to date, results from the second open house, the preferred Alternative Method, and the four sections of design alternatives. Some things that TRCA noted include: ▪ Leachate plumes in the landfill study area, any additions of infrastructure to the area could disrupt groundwater flow and the plumes. ▪ Expressed desire to minimize fill into the river. ▪ Removal of the upstream dam will cause the river shape to shift, a larger space between piers could facilitate movement and reduce bridge maintenance. ▪ A creek crossing in section four.

8.8 Further Refinement to the Preferred Design Alternatives

Following Open House #3, additional refinements were made to the Design Alternatives based on feedback from the public, agencies, and stakeholders and additional design studies.

8.8.1 Section 1: Keele Street to Rodinea Road (Figure 8-18 & Figure 8-19)

While the GO rail grade separation and full cross-section (with sidewalk and cycle track) is being recommended as the ultimate design for this section, the interim design will feature the at-grade GO rail crossing and active transportation in the form of a multiuse path on the north side of Teston Road. The use of a multiuse path versus sidewalk/cycle track was determined based on user experience and expectations and to better align with active transportation infrastructure in the area. Given that a multiuse path is recommended through Section 2 in the interim design, it is a better user experience to have a transition of facilities at a major intersection instead of mid-block. Additionally, there is no signalized intersection planned between Keele Street and Dufferin Street so keeping all active transportation facilities on the north side and having users cross at major intersections is safer and a better user experience.

8.8.2 Section 2: Rodinea Road to the East Don River Valley (Figure 8-20 & Figure 8-21)

Upon further analysis of the constraints posed by various landfill infrastructure in the area, it was determined that in the interim condition, active transportation facilities would only be constructed on the north side of Teston Road in the form of a multiuse path. This would provide active transportation access to the future expansion of the North Maple Regional Park.

8.8.3 Section 3: East Don River Valley Crossing (Figure 8-22 & Figure 8-23)

During refinements it was determined that a 40m span bridge, with 20m of retaining walls on each side (totaling 80m) would be more cost effective and result in similar impacts to an 80m single-span structure. This design would also feature a wildlife passage that would support additional capacity for wildlife movements through the area. At the request of the City of Vaughan, this design also included accommodation for trails underneath the structure. To provide continuity with Section 2 to the west, interim active transportation facilities would only be constructed on the north side of Teston Road in the form of a multiuse path.

8.8.4 Section 4: Dufferin Street to Bathurst Street (Figure 8-24, Figure 8-25 & Figure 8-26)

No further design refinements were made to Section 4.

Figure 8-18: Section 1 Preliminary Design

Figure 8-19: Section 1 Preliminary Design (cont.)

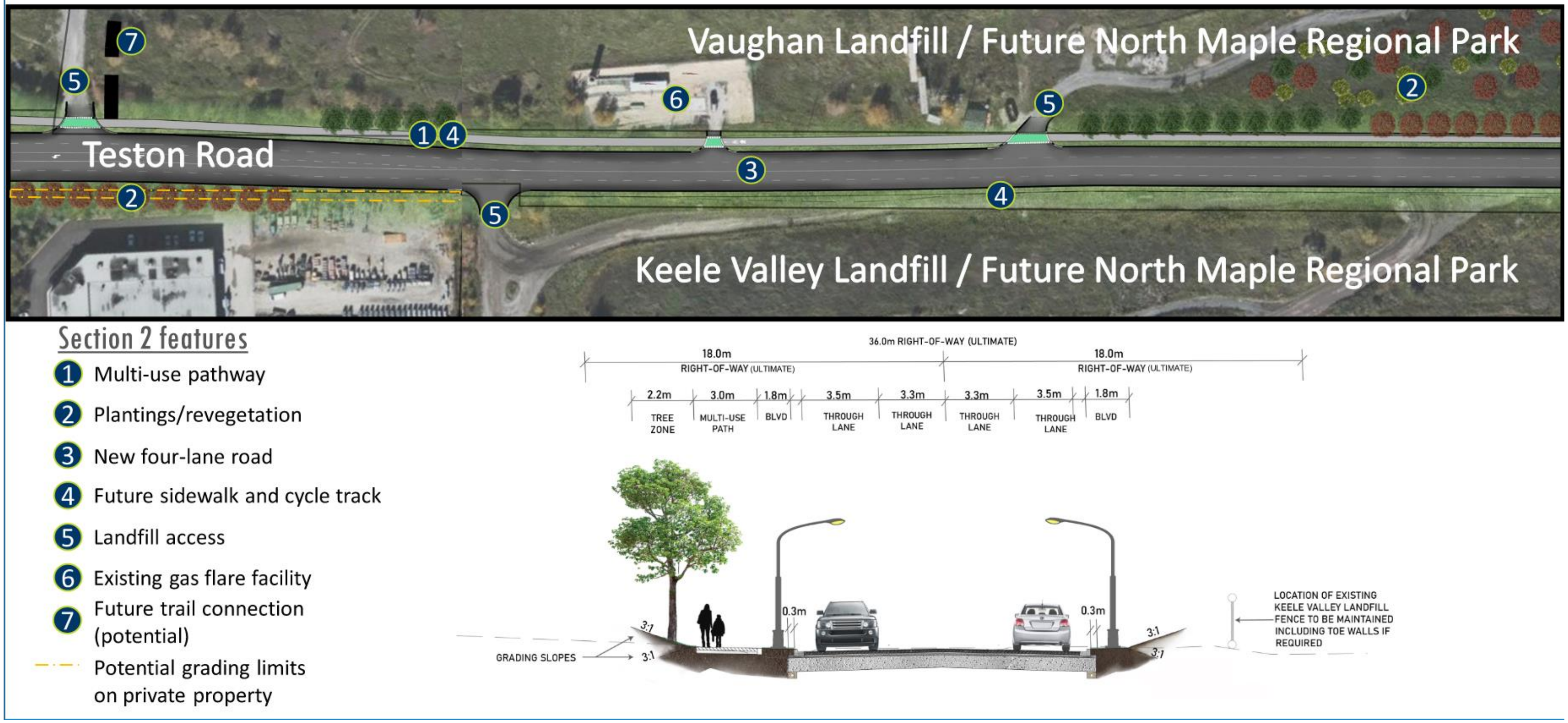

Figure 8-20: Section 2 Preliminary Design

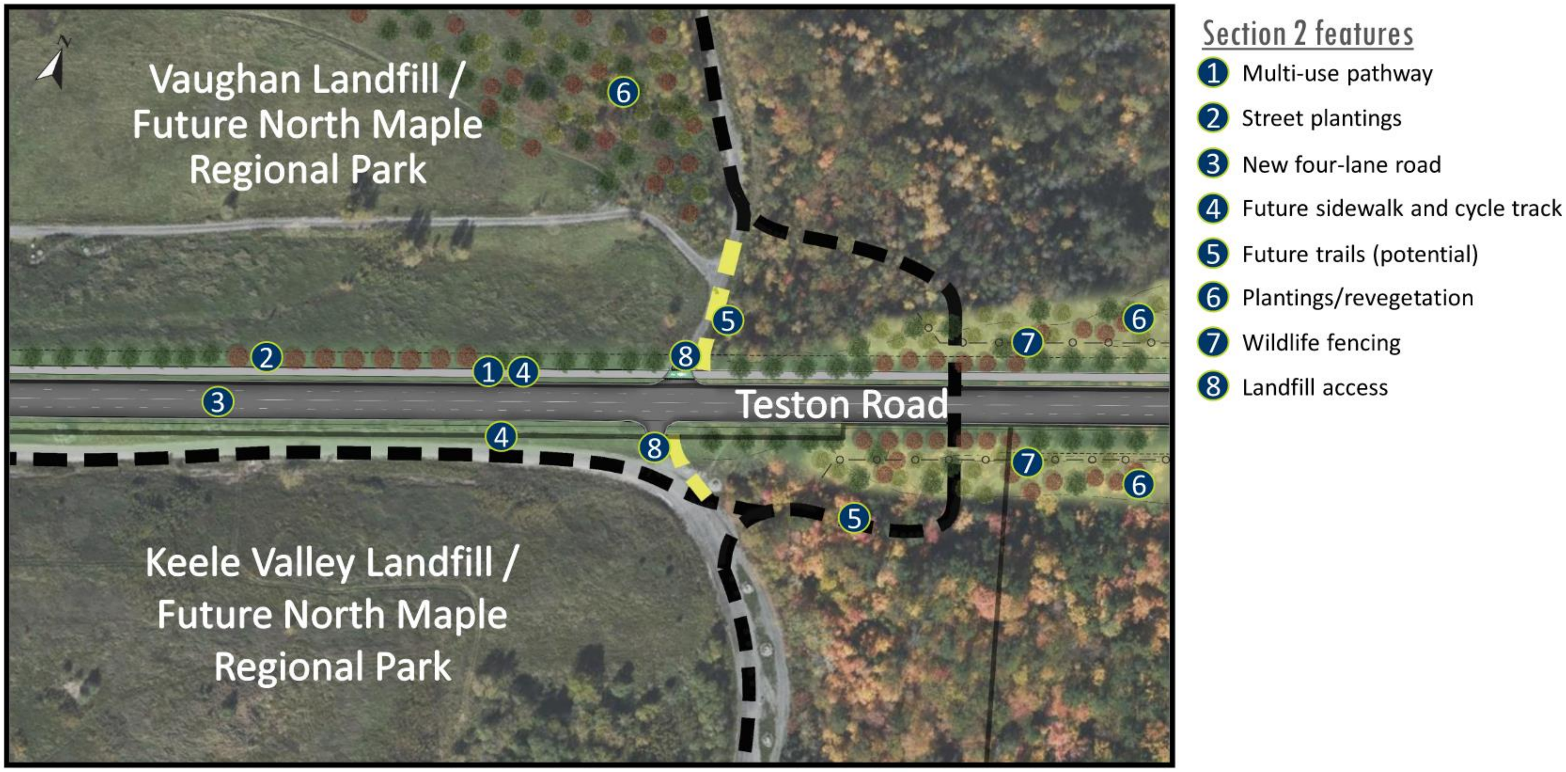

Figure 8-21: Section 2 Preliminary Design (cont.)

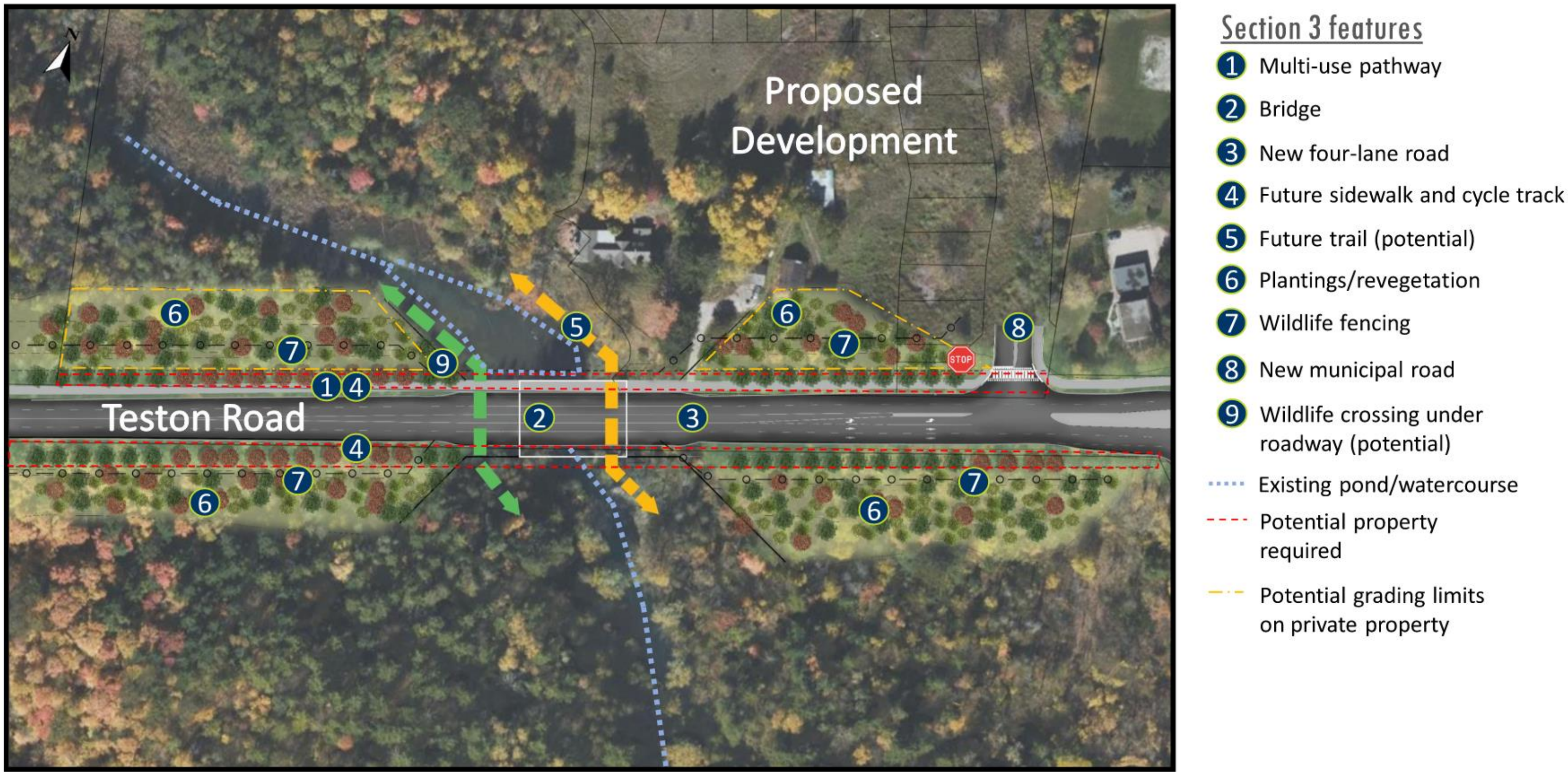

Figure 8-22: Section 3 Preliminary Design

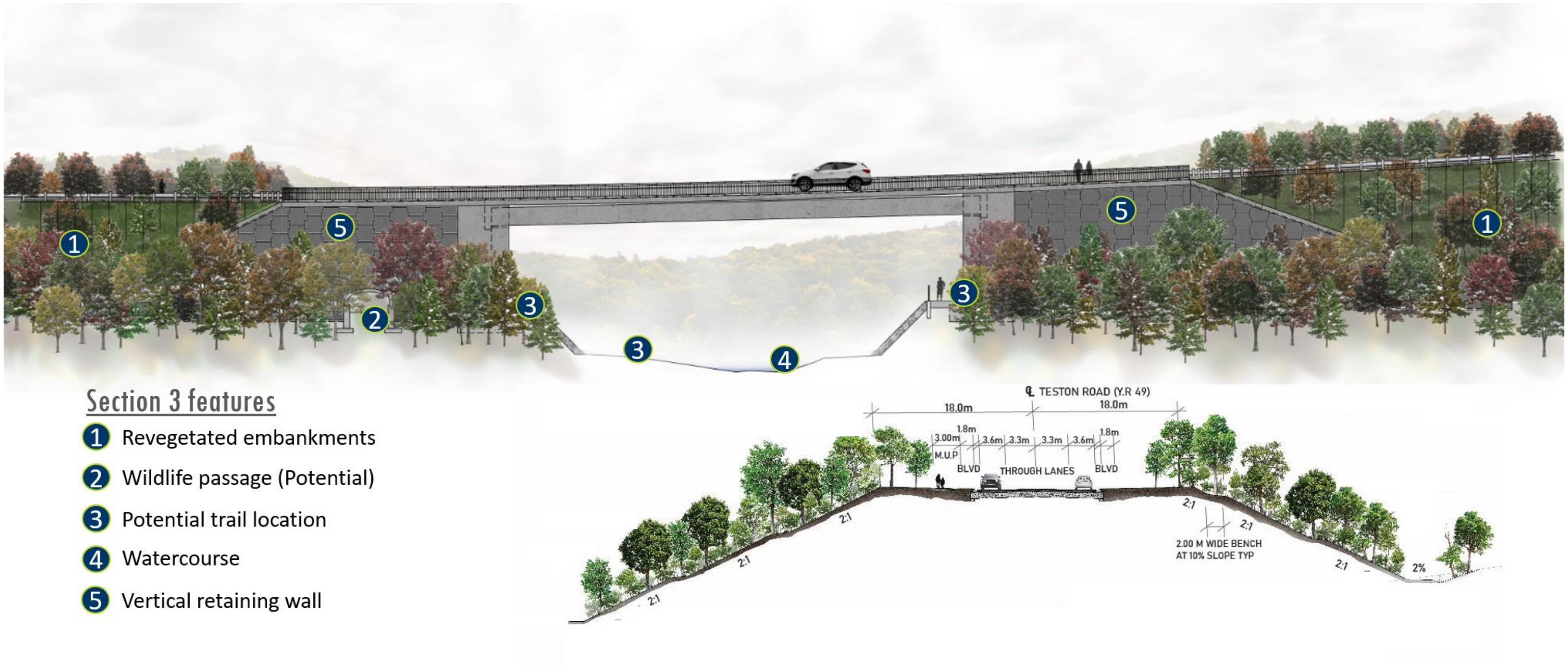

Figure 8-23: Don River Tributary Bridge and Embankment Preliminary Design

Figure 8-24: Section 4 Preliminary Design

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Figure 8-25: Section 4 Preliminary Design (cont.)

Figure 8-26: Section 4 Preliminary Design (cont.)

8.9 Consultation During Preliminary Design Process

8.9.1 Open House 4

Open House 4 (OH4) was held virtually due to the ongoing COVID-19 pandemic. The purpose of OH4 was to present the preliminary design, provide results of the impact assessments and proposed mitigation measures, and share next steps.

Comments received were generally in support of the project, with some concerns about noise, active transportation, and the GO rail. Feedback received around OH4 included the following general themes:

- Comments on area transportation issues such as traffic lights and turning lanes.
- Desire for the GO Rail overpass to alleviate future traffic.
- Increased active transportation facilities.
- Noise generated from the new road.
- Desire for an expedited timeline for the works.

Support for each of the recommended sections of the design had the following support:

- 59% strongly agreed with the preliminary design recommendations for Section 1.
- 70% strongly agreed with the preliminary design recommendations for Section 2.
- 72% strongly agreed with the preliminary design recommendations for Section 3.
- 75% strongly agreed with the preliminary design recommendations for Section 4.

Overall, the majority of respondents strongly agreed with the preliminary design recommendations.

Table 8-6: Stakeholder & Agency Meetings During Open House 4

Stakeholder/Agency	Meeting Date	Meeting Summary
City of Vaughan	October 30, 2023	The study team provided an overview of the content that would be presented at the fourth and final open house. The active transportation facilities and pedestrian crossings were discussed. The City also inquired about impacts to underground infrastructure.
City of Toronto	October 27, 2023	The study team provided a brief overview of progress to date, and the recommended plan for the section's concerning the landfill and valley bridge. The location of the City's gas collection wells and manholes were discussed, as well as the potential impacts of gas migration from the landfills.
Ministry of the Environment, Conservation & Parks	May 24, 2023	The study team provided updates on the project schedule, the recommended alternative design, and the preliminary impact assessment and proposed mitigation measures for each section of the project. MECP expressed interest in future meetings with members of their technical group.
Ministry of Natural Resources and Forestry	June 8, 2023	The study team provided updates on the project schedule, the recommended alternative design, and the preliminary impact assessment and proposed mitigation measures for each section of the project. Discussions were held regarding section three of the project area including the length of the bridge, type of bridge, additional wildlife passages, stormwater management and road salt. MNRF also made suggestions to acquire additional land east of the valley to revegetate the area. It was also noted that MNRF would prefer that the online pond in the area be removed.
Toronto and Region Conservation Authority	May 24, 2023	The study team provided updates on the project schedule, the recommended alternative design, and the preliminary impact assessment and proposed mitigation measures for each section of the project. TRCA made suggestions regarding section three of the project including potential opportunity for low impact development features, separate wildlife crossings, and edge management. TRCA also noted that the culvert west of Saul Ct in section four has high groundwater pressure and is highly sensitive.

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8.10 Confirmation of Preferred Design Alternatives

The results of the evaluation of the Design Alternatives were made available to the public, agencies, and other stakeholders to provide the opportunity to receive comments and feedback on the evaluation process and confirm the results (see **Section 3** for details). After receiving feedback on the evaluation, the Project Team confirmed the preferred Design Alternative as outlined above. This design was therefore carried forward to the next phase of the project.

9. Project Description

The extension and widening of Teston Road from west of Keele Street to Bathurst Street is the Preferred Alternative to the Undertaking to address the identified transportation needs in the study area. The recommended design was selected based on an assessment of Alternatives to the Undertaking, Alternative Methods, and Design Alternatives as described in **Sections 6**, **7**, and 8, respectively.

Ultimately, a 36-metre right-of-way with a full width urban (curbed) arterial road cross-section is planned for Teston Road from Keele Street to Bathurst Street. This includes four general purpose traffic lanes (one 3.5m and one 3.3m lane per direction), 2.1m sidewalks and 2.35m cycle tracks on both the north and south sides of Teston Road, boulevards, utility zones, and tree zones with landscaping where possible. The IEA will seek approval for this ultimate configuration so that it can be implemented when feasible in the future. Due to localized constraints a modified initial configuration is proposed along Teston Road from Keele Street to Dufferin Street which includes a 3.0m north side multi-use pathway instead of the sidewalks and cycle tracks on both sides planned for the ultimate configuration.

Property protection for an ultimate grade-separated GO Rail crossing on Teston Road east of Keele Street is also recommended with an initial at-grade rail crossing recommended until grade separation is warranted.

Initial and ultimate phases of the project are proposed to have a design speed of 70 km/hr and a posted speed of 60 km/hr.

The following report subsections describe the recommended design elements for the four different sections of the study corridor. The functional design plans and profiles for the recommended alternative are shown in **Appendix B.**

There are four sections of the Project, each with unique design challenges. These sections are illustrated in **Figure 9-1** and include:

- Section 1: Teston Road from west of Keele Street to Rodinea Road including the GO rail crossing and a private landfill.
- Section 2: Teston Road at Rodinea Road to the west edge of the Don River East Branch valley (the stretch of road that would pass between the Vaughan Township and Keele Valley landfills).
- Section 3: Teston Road from the west edge of the Don River East Branch valley to Dufferin Street.

- Section 4: Teston Road from Dufferin Street to Bathurst Street.

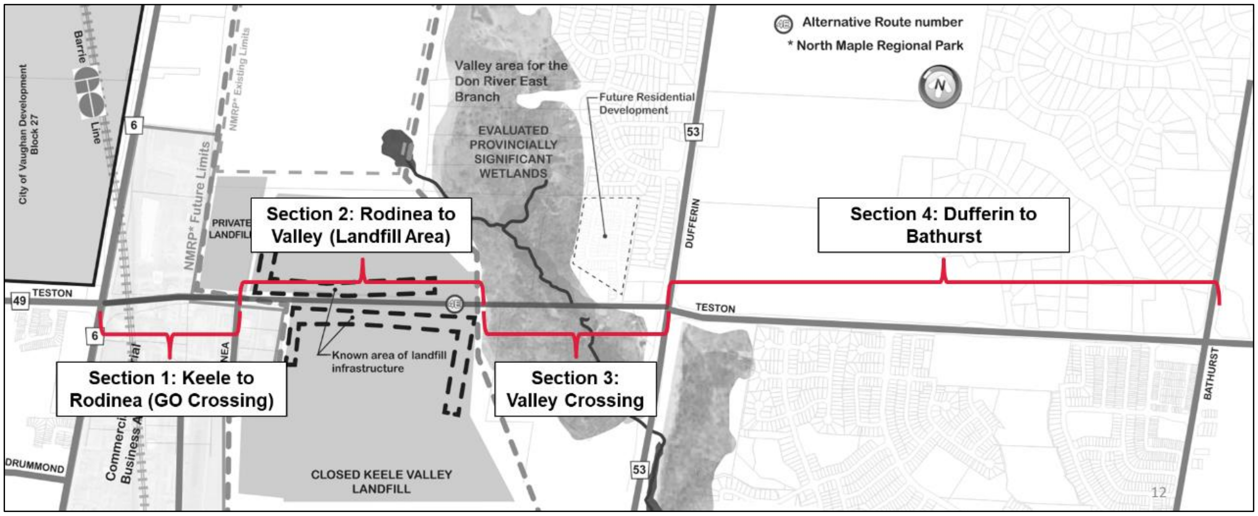

Figure 9-1: Recommended Design Project Sections

9.1 Description of the Recommended Design

9.1.1 Design Criteria

To develop the preliminary design plan for Teston Road, design criteria for the roadway geometrics were established based on direction from York Region staff, the York Region Road Design Guidelines 2023, and the Transportation Association of Canada (TAC) – Geometric Design Guide for Canadian Roads. TAC guidelines were used to select and assess the horizontal and vertical curve geometry for the recommended design. Design Criteria are provided in **Appendix V.**

9.1.2 Section 1: Teston Road from West of Keele Street to Rodinea Road

Section 1 includes the existing Teston Road corridor from approximately 250m west of Keele Street to Rodinea Road, a distance of approximately 700 m.

Design considerations included the GO rail crossing and its proximity to the Teston Road/Keele Street intersection, the planned Block 27 development north of Teston Road and west of Keele Street, the existing industrial facilities east of Keele Street, the natural areas and existing residential development south of Teston Road and west of Keele Street, and the private landfill on the north side of Teston Road at Rodinea Road.

Teston Road is a four-lane urban (curbed) roadway west of Keele Street with an existing south side multi-use pathway and a two-lane rural roadway with gravel shoulders, ditches and no existing off-road active transportation facilities for pedestrians or cyclists east of Keele Street.

The preliminary design for this section includes intersection improvements at Teston Road and Keele Street to accommodate a new urbanized (curbed) typically undivided four-lane Teston Road east of Keele Street, with an improved Teston Road alignment shifted slightly northerly from the existing Teston Road alignment which will eliminate the current S-curve. The roadway centreline profile generally follows the existing ground elevation and rises towards the east with gradients of up to 6.0%.

The design includes an at-grade crossing of Teston Road at the GO rail line with property protection for a future grade separated roadway overpass of the rail line (with Teston Road, the Teston Road/Keele Street intersection and adjacent sections of Keele Street all raised to accommodate the Teston Road/GO rail grade separation).

Due to the constraints within Section 2, which are discussed below, a 3.0m multi-use pathway will be implemented on the north side of Teston Road until such time that sidewalks (2.1m) and uni-directional cycle tracks (2.35 m) can be implemented throughout Sections 1 to 3.

A stormwater management area will be constructed in the southwest quadrant of Teston Road/ Keele Street to address stormwater runoff from the widened roadway. Existing private accesses will be maintained with minor adjustments to accommodate the widened roadway. Street plantings are proposed along both the north and south sides of Teston Road.

Section 1 has limited natural environmental impacts associated with the minor footprint increases of the roadway, multi-use pathway and a new stormwater retention facility in the southwest quadrant of Teston Road and Keele Street.

Property acquisition and grading requirements onto private property to accommodate the design have been identified for the initially recommended and future plans. While no property acquisition is proposed at the existing north side private landfill some minor embankment fill and grading may need to extend onto this property although this will be reviewed further at the detail design stage of the project.

If future grade separation of the Teston Road/GO rail line is needed, easements and property will be required to accommodate the grading. Some property accesses will be impacted by the grade separation but can be accommodated in alternative ways. This future grade separation may require additional noise attenuation measures for the residential properties in the southwest quadrant of Teston Road and Keele Street. Continued coordination with the Block 27 landowners will be required to ensure their land development plans can accommodate both the initial and future Teston Road designs.

9.1.3 Section 2: Teston Road from Rodinea Road to West Side of Don River Valley

Section 2 includes the proposed Teston Road corridor from Rodinea Road to the west side of the Don River East Branch valley, a distance of approximately 900 m.

Section 2 of the corridor is constrained by the private landfill and Vaughan Township landfill to the north and the Keele Valley landfill to the south. There is an existing east-west gated access road serving all three landfills that extends 275m east of Rodinea Road along the proposed Teston Road corridor before it shifts gradually to the north. The remaining section of the proposed alignment follows a grassed strip of land adjacent to the north edge of the Keele Valley Landfill and a downward sloping grassed area to the north. There is extensive landfill related infrastructure for monitoring and collecting leachate and landfill gas which is expected to remain in operation and in place for many years. There is an existing industrial property located east of Rodinea Road at the existing easterly limit of Teston Road which has its access off Rodinea Road.

Design considerations for Section 2 included: avoidance where possible of the landfills and associated monitoring infrastructure; how to provide connectivity for active transportation users including linkages to planned trails and potential crossings of Teston Road; how to maintain existing accesses to the landfills; and, providing a context sensitive design through and making provision for access to the future North Maple Regional Park.

The preliminary design for Section 2 of the Teston Road corridor includes a new four lane urban (curbed) undivided roadway that passes between the private landfill and Vaughan Township landfill to the north and the City of Toronto's Keele Valley landfill to the south. The constrained cross-section features a combination of two 3.5m and 3.3m lanes per direction and a 3.0m multi-use pathway on the north side. The boulevards and utility zones have been reduced or eliminated to bring the total width of the cross-section down. This will allow the roadway to fit between the landfills with minimum impacts to landfill infrastructure.

The roadway centreline profile generally follows the existing ground elevation and rises to a high point approximately 480m east of Rodinea Road before dropping down towards the Don River East Branch valley at a maximum gradient of 4.2%.

A westbound left turn lane will be provided on Teston Road at Rodinea Road. Existing access to the landfills and the existing gas flare facility will be maintained. A future intersection on Teston Road may also be implemented to provide access to the North Maple Regional Park once the park expands this far south.

In the future, sidewalks (2.1 m) and cycle tracks (2.35 m) may be implemented on both the north and south sides of the roadway, although this is subject to decommissioning of the landfill monitoring infrastructure.

North-south trail connections and an active transportation crossing are also being considered in this section, although details are unknown at this time and would be subject to coordination with the City of Vaughan's implementation of their local trail network.

Street plantings and revegetation are proposed primarily along the north side of Teston Road through Section 2.

There will be no direct property impacts in this section, as the design fits wholly within the existing York Region right-of-way. While no property acquisition is proposed within Section 2 some embankment fill and grading may need to extend onto the adjacent properties although this will be reviewed further at the detail design stage of the project. Short retaining walls may be needed to limit grading encroachment particularly along the elevated section between the Keele Valley and Vaughan Township landfills. Future protection for a standard 36-metre right-of-way will be included in the Individual Environmental Assessment.

The construction of a new road will result in some impacts to the natural environment. This includes removal of species at risk grassland bird habitat which currently exists in this section.

Stormwater will flow out of Section 2 to the proposed stormwater management facilities in Section 1 and Section 3. Future design considerations will be given to isolating impacts from road salt application to the existing groundwater plumes and monitoring wells.

Some impacts to existing landfill leachate and gas monitoring and collection infrastructure systems are expected although these will be kept to a minimum and will be subject to further site investigations and review at detail design.

9.1.4 Section 3: Teston Road from West Side of Don River Valley to Dufferin Street

Section 3 includes the proposed Teston Road corridor from the west side of the Don River West Branch valley to Dufferin Street, a distance of approximately 735 m.

The west side and the southeast quadrant of the valley crossing are in a relatively undisturbed natural condition. This area is an Environmentally Sensitive Area, Area of Natural and Scientific Interest, Natural Core Area within the Oak Ridges Moraine Conservation Plan and includes Evaluated Provincially Significant Wetlands and Significant Forests. The northeast quadrant of the valley crossing and the area of the proposed Teston Road right-of-way on the east side of the Don River Tributary are relatively disturbed and include an existing access lane from west of Dufferin Street to the bottom of the valley's east side slope.

The valley is quite deep (25m to 30m on the east and west sides, respectively) and wide (approximately 600m), meaning the study team had to consider how best to cross the existing Don River East Branch tributary and also keep roadway gradients within acceptable limits.

This section of corridor provides access to existing residential properties and future development on the north side of Teston Road west of Dufferin Street. There is an existing on-line human-made pond and dam retaining flows of the Don River East Branch immediately upstream of the crossing.

The preliminary design for Section 3 of the Teston Road corridor includes a new four lane urban (curbed) undivided roadway with a cross-section that includes a combination of two 3.5m and 3.3m lanes per direction and a 3.0m multi-use pathway on the north side. The roadway fill embankments through the valley of up to 14m in height will be built to their ultimate width with two-to-one side slopes with benching which will be planted with native species.

A new 40m bridge will be built over the Don River East Branch with vertical retaining and wing walls in all four quadrants to limit the encroachment into the valley. Approaching the bridge on both sides, the roadway will be elevated from the valley floor to ensure the roadway gradients are not too steep. The roadway profile across the valley will be built to maximum 6% gradients before connecting to the existing ground elevations approximately 115m west of Dufferin Street.

Several proposed or potential trail crossings of Teston Road have been identified within the valley limits which are subject to future City of Vaughan plans associated with the development of North Maple Regional Park and other active transportation plans for the area such as the proposed north-south ‘Super Trail’. A potential trail culvert crossing has been identified approximately 100m east of the west valley edge. Potential trails through the 40m bridge opening have been identified either on the floor of the valley or on platforms in front of the west and east bridge abutments above the river stone slope protection.

Wildlife fencing is to be installed to avoid wildlife crossing the roadway and directing them towards the bridge where they can safely pass underneath. A potential wildlife culvert (3.7m x 1.2m precast arch) has been identified beneath the roadway embankment west of the bridge.

An eastbound left-turn lane will be provided at a new unsignalized intersection at the entrance to a new residential development (Teston Sands) located 175m west of Dufferin Street. Eastbound left- and right-turn lanes will be provided on Teston Road at Dufferin Street. Some modifications will be made to the two existing residential accesses on the north side of Teston Road and at Richview Manor on the south side of Teston Road immediately west of Dufferin Street.

A short section of 3.0m wide multi-use pathway will be provided on the south side of Teston Road west of Dufferin Street.

In the future, sidewalks (2.1 m) and cycle tracks (2.35 m) may be implemented on both the north and south sides of the roadway, although this is subject to decommissioning of the landfill monitoring infrastructure to the west.

Stormwater management is proposed to be addressed by storage/treatment facilities under the roadway before outletting to the west and east sides of the Don River East Branch.

9.1.5 Section 4: Teston Road from Dufferin Street to Bathurst Street

Section 4 includes the existing Teston Road corridor from Dufferin Street to Bathurst Street, a distance of approximately 2,050 m.

Existing Teston Road through this section is mostly a three-lane undivided rural cross-section with paved shoulders and ditches on both sides. It currently has one through lane per direction and a centre two-way turn lane. An urban (curbed) cross-section exists along Teston Road between Torah Gate and Bathurst Street with an urban cross-section also at least partially in place at the intersections of Teston Road and Dufferin Street, Lady Fenyrose Avenue, Via Romano Boulevard, Saul Court, and Quail Run Boulevard. Traffic control signals are in place at Teston Road and Dufferin Street, Via Romano Boulevard and Bathurst Street.

Existing land use through this section is primarily residential with some agricultural, greenspace, institutional and commercial uses present as well, many of which have some form of existing direct property access from Teston Road.

Design considerations in this section included the desire to reduce impacts to property and avoid utility impacts, specifically relocation of existing hydro poles on the south side of Teston Road. Additionally, the study team reviewed traffic signal warrants at each intersection between Dufferin Street and Bathurst Street. The team also reviewed the ability to improve or use existing stormwater management infrastructure in this area, rather than build new facilities and to transition from cycle tracks to future active transportation infrastructure being planned on Teston Road east of Bathurst Street.

The preliminary design for Section 4 of the Teston Road corridor includes a widened four lane urban (curbed) undivided roadway with a cross-section that includes a combination of two 3.5m and 3.3m lanes per direction as well as sidewalks (2.1m), cycle tracks (2.35m), boulevards and utility zones on both side of the roadway within a (typically) 36.0m right-of-way. A total of 4.1m of road widening is required. Street plantings are proposed along both the north and south sides of Teston Road.

The intersection at Teston Road and Lady Fenyrose Avenue is proposed to have new traffic control signals and will include eastbound right-turn and westbound left-turn lanes and separate pedestrian and cyclist crossings on all three approaches. Via Romano Boulevard will remain signalized. Saul Court, Quail Run Boulevard and Torah Gate will remain as stop-controlled intersections at Teston Road. Bus stops will continue to be provided at the existing locations along Teston Road in Section 4. The active transportation facilities on the roadway will be transitioned to match the existing active transportation facilities east of Bathurst Street, in the City of Richmond Hill.

The centreline profile for Teston Road within Section 4 generally follows the existing ground elevation and initially rises east of Dufferin Street before dropping in elevation towards Bathurst Street with gradients of up to 6.0%.

Widening equally on both sides of the existing road would require the addition of approximately two metres on each side of the roadway. This minimizes grading impacts on both the north and south sides of Teston Road. It also avoids impacts to the existing hydro poles on the south side of the road and the need to extend the existing box culvert at McNair Creek located just west of Saul Court. The existing culvert is sufficiently long to support the full roadway platform with only minor modifications required to accommodate grading impacts such as headwall and wingwall installation.

Stormwater is proposed to be managed through new storm sewers upgrades to existing treatment facilities, however, additional coordination will be required with the City of Vaughan to integrate with existing infrastructure.

9.2 Traffic Control

Analysis of the Recommended Design (i.e., four lane Teston Road) under projected 2041 traffic conditions was undertaken to determine traffic control and lane requirements at the following key intersections within the study area:

- Teston Road and Keele Street: Currently signalized
- Teston Road and Rodinea Road: Currently unsignalized
- Teston Road and Future North Maple Regional Park: New intersection
- 1600 Teston Road Access Road: New intersection
- Teston Road and Dufferin Street: Currently signalized

- Teston Road and Lady Fenyrose Avenue: Currently unsignalized
- Teston Road and Via Romano Boulevard: Currently signalized
- Teston Road and Quail Run Boulevard: Currently unsignalized
- Teston Road and Torah Gate: Currently unsignalized
- Teston Road and Bathurst Street: Currently unsignalized

There are four signalized and six unsignalized intersections along Teston Road within the project limits Study Area. Roadway link and intersection traffic volumes were estimated using existing/historic traffic counts and the existing (2016) and the future (2041) EMME models. The York Region EMME models (comparing the 2016 model vs. the 2041 model) were used to estimate the growth rate between existing and future traffic conditions.

Signal warrant analysis was completed for five unsignalized intersections along Teston Road within the project limits. The signal warrant analysis showed that traffic control signals are not warranted at any of the unsignalized intersections by the year 2041.

The City of Vaughan has requested the installation of traffic control signals at the intersections of Teston Road and Rodinea Road, as well as at Teston Road and Lady Fenyrose Avenue, to improve pedestrian access to transit. The recommended design proposes to keep the side-street stop control at the Rodinea Road and Teston Road intersection but to signalize the Teston Road and Lady Fenyrose Avenue intersection. The decision regarding signalization of the Rodinea Road and Teston Road intersection (and/or a nearby future North Maple Regional Park access road) should be reviewed at detailed design.

A Synchro analysis and SimTraffic tools were used to evaluate the operational performance of intersections within the Preliminary Study Area. Synchro uses equations to determine the level of service (LOS), delay, and queue and does not consider spillback from insufficiently long turning bays. The results of Synchro analysis indicate that all signalized intersections are expected to operate at LOS E or better during the morning peak hour by the year 2041. Numerous failing (i.e., LOS F) turning movements were reported along with several locations reporting critical movements exceeding the v/c ratio thresholds.

In SimTraffic, the queues are determined by noting the maximum back of queue for every two-minute period. The SimTraffic analysis indicates delay/queuing issues at three out of four signalized intersections (Teston Road/Keele Street, Teston Road/Dufferin Street and Teston Road/Bathurst Street) during the morning peak hour. There is an existing at-grade rail crossing on Teston Road for the Barrie GO line just 80 metres east of the Keele Street and Teston Road intersection. The 95th percentile vehicle queues from the SimTraffic analysis indicate that queuing on the westbound approach is expected to spill back to and beyond the rail crossing. As such, the future grade separation at this location should be investigated further during detail design. If a grade separation is not built at the rail crossing at the time of the widening to four lanes, then careful consideration will need to be given to safety measures and controls at the at-grade crossing.

For the Teston Road and Dufferin Street, and Teston Road and Bathurst Street intersections, significant southbound traffic volumes result in relatively poor operations at these intersections: LOS E. Simulated average delays of up to 236 seconds and 95th percentile queues of up to

2.1km cause congestion on the approaches leading up to these intersections. It is worth noting that traffic operational issues at these intersections cause road congestion that extends beyond upstream intersections.

The increase in travel demand associated with future growth will continue to reduce the operating performance of the transportation network in the area unless additional transportation capacity and improved transportation network efficiency are provided, particularly in the north-south direction along Dufferin Street and Bathurst Street.

It should be noted that there are no (or limited) further opportunities to improve the signal timings at the Teston Road/Keele Street, Teston Road/Dufferin Street, and Teston Road/Bathurst Street intersections. The future volumes support the widening of Dufferin Street and Bathurst Street to six lanes; however, widening arterial roads that are currently four-lanes wide to six lanes could only be implemented when high occupancy vehicle (HOV) lanes are warranted in accordance with York Regional Council policy.

Further details are provided in **Appendix D**.

9.3 Pavement Design

Based on the pavement condition survey, the borehole information, laboratory testing, pavement structural capacity analysis and the projected traffic, the existing pavement structure within the study area is currently deficient and does not provide the required pavement structural number over the 15-year pavement design life. Therefore, pavement rehabilitation in conjunction with drainage and sub-drainage improvements will be required to accommodate the proposed road improvements. **Table 9-1** below provides preliminary pavement design recommendations. Further details regarding the pavement design recommendations are provided in Table 9-1**.**

Table 9-1: Recommended Pavement Design

Paving Limits	**Sections: 1, 2, 3 - Keele Street to Dufferin Street – Existing & Widening Areas**	**Section 4: Dufferin Street to Bathurst Street – Existing Areas**	**Section 4: Dufferin Street to Bathurst Street – Widening Areas**
Recommended Paving Strategy	**Full Depth Reconstruction/New Construction**	**Mill 100mm & Pave 150mm**	**New Construction**
Pavement Material	**Pavement Depth (mm)**		
SP12.5 FC1 Asphalt Surface Course	50	50	50
SP19.0 Asphalt Binder Course	50	50	50
SP19.0 Asphalt Binder Course	80	50	80
Granular ‘A’ Base	200	N/A	250

Paving Limits	Sections: 1, 2, 3 - Keele Street to Dufferin Street – Existing & Widening Areas	Section 4: Dufferin Street to Bathurst Street – Existing Areas	Section 4: Dufferin Street to Bathurst Street – Widening Areas
Recommended Paving Strategy	**Full Depth Reconstruction/New Construction**	**Mill 100mm & Pave 150mm**	**New Construction**
Pavement Material	**Pavement Depth (mm)**		
Granular 'B' Type I Subbase	600	N/A	550

9.4 Drainage & Stormwater Management

9.4.1 Proposed Drainage Conditions & Design Concept

In general, the existing drainage patterns will be maintained. The following drainage improvements are proposed to accommodate the roadway improvements:

- Construction of a new storm sewer system to accommodate the urban roadway cross-section.
- Extension and/or relocation of the existing culverts, where needed, to accommodate roadway widening and realignment.
- The proposed roadway improvements will increase impermeability within each catchment and increase flows at each drainage outlet. Therefore, a comprehensive stormwater management plan needs to be developed to mitigate the potential impacts.

The following sections discuss the preliminary design details and considerations related to each drainage element. Further details are provided in **Appendix K.**

9.4.2 Proposed Bridge & Culvert Crossings

9.4.2.1 Don River East Branch Bridge

A single-span bridge with a 40m and a height of approximately 14m at its tallest point was selected as the preferred configuration for the Don River East Branch bridge.

At the proposed bridge location, there is an existing inline concrete flow control structure in the Don River East Branch channel, which creates an artificial impoundment area and 1m vertical channel invert drop. The width of the regulated floodplain at the upstream side of the future bridge is approximately 74m, narrowing to 20m at the downstream side of the future bridge. The river valley does not run perpendicular to the proposed Teston Road alignment. An approximate skew angle of 30 degrees is expected from the direction of high flow to the roadway alignment. The meander belt width is 43.1 m.

It is anticipated that the soffit elevation of the future bridge will have a clearance of more than 11 m above the regulatory flood level. As a result, there are no concerns regarding the compliance of the new bridge crossing with hydraulic criteria in terms of freeboard and clearance.

9.4.2.2 McNair Creek Culvert

The McNair Creek Culvert is located on Teston Road approximately 1,230m east of Dufferin Street. The existing culvert has sufficient capacity to convey 100-year and Regional storms without overtopping the road. The culvert also meets hydraulic criteria in terms of freeboard, clearance, and ratio of headwater depth to rise of culvert (HW/D). Under the proposed conditions, it is recommended to install headwalls/retaining walls at both upstream and downstream ends. The headwalls/retaining walls are to accommodate the roadway widening and prevent the need for culvert extensions, as well as preventing embankment encroachment into the wetland area.

It is expected that the culvert will maintain its existing hydraulic functionality under the proposed modifications. Furthermore, there are no anticipated adverse effects on the Regulatory Floodplain as a result of these changes.

9.4.2.3 Roadway Culverts

The existing Teston Road culvert east of Keele Street (WD07) and the culvert under the railway north of Teston Road will be replaced and relocated due to the shifting of the future Teston Road alignment. The new culvert locations were selected with consideration of a potential future grade separation of Teston Road with the rail corridor. The proposed culvert WD07 has the capability of being extended once the new overpass structure is in place. Alternatively, in the future, a ditch along the roadway corridor could be constructed within the new overpass structure to accommodate surface drainage flow path, eliminating the need for culvert WD07.

The culvert under the GO Rail north of Teston Road should be designed to meet hydraulic criteria listed in the American Railway Engineering and Maintance-of-way Association (AREMA) and loading criteria as per Metrolinx standards. As the railway base information is not available, the culvert size, material and construction strategy should be further confirmed during the detailed design stage.

The existing Teston Road concrete pipe culverts located to the east of Dufferin Street (ED02 and ED03) will be retained and lengthened to accommodate the widened roadway. The existing concrete pipe culvert west of Bathurst Street (ED05) has sufficient length to accommodate the widened corridor with a minor modification of the upstream retaining wall.

A hydrological and hydraulic analysis has been conducted for the proposed conditions using the same approach as the one for the existing conditions to size the new culverts (WD07 and Railway North). Under the proposed conditions, the roadway drainage will be conveyed by the new storm sewer system and directed to the proposed stormwater management pond (SWMF1). The catchment to the new culvert is only from external area (19.32 ha).

9.4.3 Roadway Drainage System

To accommodate the proposed road widening, urbanization, localized realignment, and new road connection, a storm sewer dominated surface drainage system is proposed. The following design aspects were taken into consideration:

- Four existing storm sewer networks will be retained with appropriate adjustment of manholes and relocation of catchbasins. Eleven (11) new storm sewer networks need to be constructed to accommodate the urban cross-section.
- A preliminary storm sewer sizing was completed using the Rational Method. The new storm sewer system was sized to convey a 10-year storm without surcharging. At the location without a proper overland flow route, the pipe segments were sized to convey a 100-year storm. The IDF Curves in the York Region standard were used for this preliminary sizing exercise.
- The new storm sewer systems generally maintain the same discharge points as for the existing conditions. Four new storm sewer outfalls are proposed to be introduced at both sides of the Don River East Branch and the McNair Creek valley. It is recommended that headwalls, plunge pools and/or enhanced swales be constructed at the sewer outfalls upstream of the watercourses to minimize erosion impacts.

Currently there are several external areas draining towards the ditches along Teston Road. Drainage from these external areas needs to be captured and directed to a suitable outlet location under the proposed conditions. Where possible, it is advisable to separate all external drainage from the roadway drainage to avoid the need for large storm sewer systems and stormwater management facilities.

Generally, a drainage ditch will be graded outside of the boulevard to intercept the flow and convey it to the adjacent crossing. For the area at the northeast quadrant of the intersection of Teston Road and Keele Street where the ditch cannot be graded due to limited space within the right-of-way (ROW), a parallel storm sewer is proposed.

9.4.4 Stormwater Management

A preliminary stormwater management (SWM) plan was developed to meet the stormwater management objectives in terms of water quantity, water quality, erosion and water balance. A hydrologic analysis was undertaken to quantify the required retention and detention volumes for each proposed drainage outlet. The required storage was subsequently used to select feasible SWM features and determine property requirements at a preliminary design level.

Several stormwater management practices (SWMPs) were screened for this study along with the “do nothing” alternative against general advantages and disadvantages, such as effectiveness, experience from similar conditions, and site-specific constraints or opportunities. Based on an initial screening of SWMPs, it was concluded that:

- Based on feedback received from City of Vaughan, it is understood that certain existing SWM facilities were designed with additional capacity to accommodate a future widening of Teston Road. The utilization of these existing facilities will have to be confirmed to ensure they can treat the calculated stormwater volumes.

- The implementation of surface storage stormwater management practices (such as wet ponds, dry ponds, and constructed wetlands) can be effective in providing combined quality and quantity control, especially when there are sufficient drainage areas and available space. However, the use of surface storage SWMPs for the linear infrastructure project within an urban setting is limited due to space constraints. In such cases, underground storage tanks and pipes become the main measures for water quantity control.
- SWMPs based on infiltration can be effective in treating stormwater runoff and recharging groundwater, but their effectiveness is limited with respect to flood control. The implementation of infiltration facilities is typically constrained by a high groundwater table and the infiltration rate of the sub-surface soil. It should also be noted that infiltration facilities cannot be applied to landfill areas due to the potential impact on groundwater patterns and concerns regarding cross-contamination.
- Vegetative SWMPs such as grassed swales, bioretention cells and filter strips provide water quality treatment primarily by filtering out fine sediments and promoting infiltration. Due to the urban corridor, vegetative buffers, filter strips and enhanced swale along the corridor are not practical. An alternative solution could be incorporating enhanced swales at the storm sewer outlets. In addition, bioretention cells can be integrated into boulevards where the space is available.
- Oil/grit separators are popular and practical measures that can be incorporated into a storm sewer system. They can be used in conjunction with other SWMPs as part of a treatment train.

In general, the feasibility of implementing a particular SWMP is dependent on the size of the contributing area, available grade separation (i.e., top of road profile versus ditch profile), local topographical constraints and land availability. The criteria used in the selection of the preferred stormwater management alternative(s) also include the potentials for upstream or downstream impacts, the environmental and hydraulic sensitivity of the downstream receiver and maintenance.

9.5 Bridge Structures

9.5.1 Don River East Branch Crossings

The proposed Don River East Branch crossing is located along the proposed Teston Road alignment in a greenfield location approximately 300m west of Dufferin Street. The preferred alternative includes connecting Teston Road on either side of the valley by constructing a new roadway through the valley, including a 40m bridge structure over the tributary. The proposed posted speed on Teston Road will be 60 km/h. For structural design purposes, an AADT of 30,000 for the new structure has been assumed.

WSP/Golder was retained by MH to perform geotechnical investigation and provide recommendations for new bridge structure foundations. (See **Appendix R** for details). The available physiographic mapping indicates that the site is within the region of the Oak Ridges Moraine, bordering on the South Slope physiographic region, which is mapped as a kame moraine. The subsurface generally consists of glaciofluvial sands and gravels, with shale and limestone bedrock 60 to 100m below the valley floor. Spread footings were recommended as the preferred bridge foundation type.

The proposed horizontal alignment is straight, with no bridge skew. The roadway design features a sag curve in the valley to minimize the height of the required new embankments. The proposed bridge structure is located to the east of the low point. The structure accommodates 2 traffic lanes in each direction (3.3m and 3.5m wide) with 1.5m side clearance (or shoulders) on each side, a 3m flush-painted median, and a 4m multi-use pathway on each side (although the south side may not be used for some time). The overall deck width is 28.7 m. Long-term plans include a sidewalk and a cycle track on each side which would replace the multi-use pathways.

The proposed design features 10-1800mm deep prestressed concrete NU girders supporting a 225mm (minimum) cast-in-place (CIP) concrete deck. The girders are sloped down to the west to follow the grade of the roadway, with variable-depth haunches in the concrete deck to achieve the required vertical profile. Bridge articulation is proposed as expansion-expansion with laminated elastomeric bearings and semi-integral abutments. This type of articulation avoids transverse expansion joints at the abutments, which are typically high-maintenance items. With semi-integral abutments, the 250mm approach slabs are connected to the deck and the foundations behave rigidly with minimal movement, which is consistent with spread footing foundations. The proposed substructures are CIP concrete abutment caps/bearing seats with CIP concrete circular columns down to CIP concrete spread footings. The use of mechanically stabilized earth (MSE) false abutments tied-back into the soil is recommended, with precast concrete facing in front of the abutments.

The proposed traffic barriers are 825mm high (from top of asphalt) concrete parapet walls without railings, and the proposed railings along the edges of the deck are 1370mm bicycle railings. The proposed new embankments in the valley are approximately 10m to 14m high, so retaining systems are required at the bridge location. Vertical MSE (or reinforced soil slope (RSS)) walls with precast concrete facing units are proposed, with structural separations from the bridge structure. The MSE systems would form both the bridge wing walls parallel to the roadway in all 4 quadrants and flared and tapered retaining walls in all four quadrants.

The new bridge would be designed for a minimum 75-year service life (or design life) as required by the Canadian Highway Bridge Design Code (CHBDC). The Region would need to acquire property and easements to construct the bridge and roadway embankments. The proposed bridge is considered to be readily constructible using standard construction methods for Ontario roadway bridges.

To maintain connectivity for wildlife passage within the valley, a wildlife crossing is proposed to be incorporated into the design. A precast concrete arch structure on CIP inverted T-shaped footings, with natural ground surface, has been assumed under the west approach embankment. A 3658mm x 1200mm rise arch has been assumed for costing purposes. With the height of the footing walls, the vertical clearance would be about 2 m. During subsequent design stages the size of this culvert should be reviewed in more detail in terms of wildlife needs, including the openness ratio. It should also be noted that a culvert or tunnel of this type could become a liability to the Region in terms of human security and safety, being a protected but hidden location in a public area.

A cost estimate was prepared for the proposed bridge structure to Class 'C' level. The estimate for construction in 2024 Canadian dollars is $12.8M, including 25% contingency. The estimate for the project including design and contract administration fees is $14.8M. These estimates do not include the roadway embankments and associated elements or taxes, they are structure only but including the MSE walls. The estimate does include the wildlife culvert under the west approach.

The estimate construction duration for the bridge structure alone is one construction season, approximately 40 weeks. Environmental work timing restrictions for fish spawning, breeding birds and possibly SAR bats would apply.

Further details are provided in **Appendix R.**

9.6 Streetscaping

The proposed widening of Teston Road provides an opportunity to improve both the aesthetics and ecological conditions of the corridor. The Recommended Design includes a preliminary Landscape Concept Plan which gives an indication of the locations and types of planting that are proposed to be included as part of the project. The landscaping plan will be developed further at the detail design stage of the project. See **Appendix B.**

9.7 Illumination

There is currently no existing roadway illumination along Teston Road between Keele Street and Dufferin Street, while there is existing illumination along Teston Road from Keele Street westerly and between Dufferin Street and Bathurst Street. As part of the widening and extension of Teston Road, illumination is proposed as part of the preliminary design. The need and type of illumination along the Teston Road corridor is to be confirmed at the detail design stage.

9.8 Utilities

There are a number of existing underground and overhead utilities within the roadway corridor that are affected by or pose physical constraints on the project. These were identified and assessed based on reviews of available mapping and design or as-built plans. Utility relocations identified at this time include:

- Some existing gas collection and monitoring infrastructure at the existing landfills will need to be relocated.
- Some existing leachate monitoring wells may need to be relocated.
- Hydro poles within Section 1 and 2 may need to be relocated.
- Existing streetlighting will mostly be replaced as part of the new streetlighting design for the overall corridor.

Efforts will be made to limit the relocation of existing gas mains, sanitary sewers, watermains and telecommunication cables located within the limits of the project.

Given that Teston Road will be undergoing a full depth pavement reconstruction with profile improvements, further investigations (Quality Level A, if necessary) will be required during the detailed design to verify the depth and location of underground infrastructure to ensure there are no conflicts with the proposed pavement or storm sewers.

Formal definition of utility impacts and relocation strategy will be determined during the detailed design. All utility information should be updated prior to construction to ensure that the data is accurate and to finalize relocation requirements as necessary.

9.9 Property Requirements

Property will be required to along Teston Road to facilitate the widening and grading of the proposed design. The approximate property requirements both permanent and temporary by impacted properties are shown in the table below.

The locations where property requirements have been identified for this project are shown on the plan and profile drawings (**Appendix B).** The property requirements are preliminary only and subject to further review and confirmation during the detailed design.

Table 9-2: Anticipated Property Requirements

Property Identification Number (PIN)	Municipal Address (If Available)	Permanent Property Acquisition (m^2)	Temporary Construction Easements (m^2)
033440217	2400 Teston Road	225	
033440261	2270 Teston Road	320	
033432964	2190 Teston Road	350	515
033431066		540	500
033430350		9400	6950
033433310	1600 Teston Road	3500	10750
033433212	2101 Teston Road		70
033430831	21 Rodinea Road		85
033430024	7 Eaglet Court	1315	980
033431882	1500 Teston Road	3780	15900
033430329	10790 Dufferin Street	80	330
033430345	1136 Teston Road	35	200
033420387	1010 Teston Road	930	3600
033420256	3 Quail Run Boulevard		110
033420103	6 Quail Run Boulevard		30
033420065	900 Teston Road		30
033432915	10401 Dufferin Street	190	325
700180062		205	400

Property Identification Number (PIN)	Municipal Address (If Available)	Permanent Property Acquisition (m^2)	Temporary Construction Easements (m^2)
033410690	8 Little Marco Court		15
033411067	28 Countrywide Court		55
033416505	24 Countrywide Court	220	310
033413751			770
033415937		115	125
033413534			230
033410795			50
033417029		5	485

9.10 Preliminary Cost Estimate

Project costs were developed in accordance with the Region's cost estimating process for implementing capital projects. The cost for design, construction, environmental mitigation measures, property acquisition and contingencies in 2024 dollars is estimated at $120.4M.

While the construction of a four-lane Teston Road from Keele Street to Dufferin Street is identified in the Region's 10-year capital plan, the widening of Teston Road to four lanes from Dufferin Street to Bathurst Street is currently beyond the horizon of the Region's 10-year capital plan. The separated project costs for the major project components are:

- Teston Road from Keele Street to Dufferin Street – $79.9M.
- Teston Road from Dufferin Street to Bathurst Street – $40.5M.

9.11 Construction Staging & Scheduling

Construction staging for the project may be influenced by factors such as:

- Opportunity to combine the road widening with other planned capital works (e.g. underground servicing replacement, pavement rehabilitation, intersection improvements) and in co-ordination with private utility relocation.
- Potential conflicts with planned adjacent capital works that may diminish availability of alternatives/detours for commuters.
- Physical contract separation requirements.
- Unique attributes of the different sections of the corridor (existing traveled corridors vs. greenfield construction).
- Environmental timing window restrictions.
- Complexity and duration of the proposed road works, and/or
- Budget availability.

Construction staging for the project will be determined at the detail design stage of the project.

9.12 Construction Phasing

A preliminary project phasing (or implementation sequence) has been developed for the project. It takes into consideration factors such as: interdependencies with other infrastructure improvements; growth policies; degree of need; development triggers; affordability, etc. Details are provided in **Table 9-3**. Note that phasing could be revised in future OP/TMP updates and will be subject to funding availability.

Table 9-3: Preliminary Project Phasing Recommendations

Phase	Recommendations
Early Works	Construction/establishment of environmental mitigation measures prior to roadway construction to reduce lag time between the environmental impacts associated with construction and achieving the intended environmental mitigation results.
Phase 1	Widen Teston Road to four lanes from west of Keele Street to Rodinea Road. Extend new four lane Teston Road from Rodinea Road to Dufferin Street. Both to be done within current York Region 10-year Capital Plan (by 2034).
Phase 2	Widen Teston Road to four lanes from Dufferin Street to Bathurst Street. Work to be done beyond current York Region 10-year Capital Plan (after 2034)
Potential Future Phase	Construct grade separated Teston Road/GO Rail crossing.
Potential Future Phase	Replace north side multi-use pathway on Teston Road between Keele Street and Dufferin Street with sidewalks and cycle tracks on both side of road. This is expected to be quite a long-term undertaking after the landfill monitoring infrastructure is no longer needed although some active transportation upgrades may be undertaken sooner on Teston Road between Keele Street and Dufferin Street – potentially the addition of a south side multi-use pathway.

10. Environmental Effects, Mitigation Measures & Commitments to Future Work

10.1 Assessment Methodology

Effects on the environment (Natural, Socio-Economic, Cultural, and Transportation) were comprehensively evaluated as part of the IEA study in accordance with the requirements of the Terms of Reference (**Appendix A**). Although environmental effects were avoided as part of the Recommended Design where possible, measures will need to be taken to either minimize or offset unavoidable environmental effects. These environmental effects relate to construction, operations/maintenance, or both.

The assessment and evaluation of effects was based primarily on comparing the existing environment with the anticipated future environment, during and after construction. The prediction of effects considered:

- The interaction between the project and the environmental values.
- The effects of the project activities on the environmental values.
- The combined effects of multiple activities and/or multiple effects.

Professional judgement and experience formed the basis for identifying environmental effects and mitigation measures. Consideration was given to:

- The magnitude, spatial extent, and duration of the effect.
- Percentage of population (either people or wildlife) that are affected.
- Direct or indirect effects.
- The degree to which the effect responds to mitigation.
- Level of uncertainty of the effect.

10.2 Identification of Potential Environmental Effects, Mitigation Measures & Future Works

Table 10-1 provides an overview of the potential environmental effects that may result from the construction and operation of the Teston Road Area Transportation Improvements project, as well as their significance, the recommended mitigation measures, and the commitment to future works. **Sections 10.3** to **10.6** provide a more detailed summary of some of the potentially significant environmental effects and the mitigation measures being introduced to minimize their impact.

Potential environmental effects were categorized to determine the significance of the effect. They were categorized as follows:

a. **Significant (S)** means an effect that may exhibit one or more of the following characteristics:
    - Widespread

- Permanent transcendence or contravention of legislation, standards or environmental guidelines or objectives.
- Permanent reduction of species diversity or population of species.
- Permanent loss of critical/productive habitat.
- Permanent alteration to community characteristics or services, land use or established patterns which is severe and undesirable to the community as a whole.
- Permanent alteration to groundwater flow direction or available groundwater quality and quantity.
- Permanent loss of archaeological/heritage resources.

b. **Insignificant (I)** means an effect that may exhibit one or more of the following characteristics:
   - Not widespread.
   - Temporary or short-term duration.
   - Recurring effect lasting for short periods of time during or after project implementation.
   - Not permanent.
   - Once the stimulus is removed, the integrity of the social/environmental components is resumed.

c. **Negligible/Moderate (N)** means an effect that may exhibit one or more of the following characteristics:
   - Reversible
   - Small/localized/limited to the construction phase of the project
   - A nearly zero or hardly discernable effect
   - Impacting a population at a localized area.

d. **Positive (P)** indicates that the effect can result in a beneficial outcome.

Table 10-1: Potential Effects, Significance, Mitigation Measures & Commitments

Project Phase	Valued Ecosystem Components	Potential Environmental Effect(s)	Potential Significance	Recommended Mitigation Measures	Level of Significance Following Mitigation	Commitment to Future Works
Construction	Fisheries and Aquatic Resources	▪ Fish habitat will be permanently altered by the creation of the new road ▪ Bridge footprint will permanently impact the high-water mark	S	▪ Work carried out within the in-water timing window between **June 15 –September 15** when water levels are depressed and to avoid harming fish during critical life stages. ▪ Minimize vegetation removal on the waterbody banks where possible to maintain shading and bank stability. ▪ Reinstate and stabilize banks disturbed during construction to pre-construction or better condition. ▪ Operation of equipment in waterbodies or on waterbody banks shall be carried out according to guidelines.	I	▪ A Request for Review should be submitted to Fisheries and Oceans Canada (DFO) during detail design to determine the need for a Fisheries Act Authorization.
	Terrestrial Environment	▪ Permanent footprint impacts ▪ Removal of vegetation and habitat	S	▪ Minimize vegetation disturbance wherever possible by reducing temporary working easements, limiting equipment storage areas and vehicle turning points to open areas dominated by exotic species, and reducing ROW footprints ▪ Areas not part of a re-planting plan shall be seeded with a native seed mix consisting of species appropriate for the study area and site conditions. ▪ Any damaged trees not being removed shall be pruned or treated. ▪ In areas requiring only temporary disturbance and where feasible, grubbing will not be completed to promote more rapid regrowth of vegetation.	I	▪ Limits of construction shall be clearly delineated to avoid intrusion into adjacent areas.
	Designated Natural Areas	▪ Proposed works will occur within the limits of several Designated Natural Areas	S	▪ Temporary impact areas be restored to conditions similar to pre-construction conditions. ▪ Restoration plantings to offset permanent impacts to designated areas should be focused on areas connected to remaining intact habitats, or on creating additional connections to adjacent habitats, to maximize ecological function in the area.	I	▪ The limits of Designated Natural Areas [Provincially Significant Wetlands (PSW) and Areas of Natural and Scientific Interest (ANSIs)] will be shown on the contract drawings as Environmentally Sensitive Areas, and equipment, construction, etc. will not extend beyond the work limits, into these areas.
	Wildlife and Wildlife Habitat	▪ Impacts to wildlife habitat through vegetation clearing and habitat loss ▪ Habitat fragmentation	S	▪ All vegetation and tree removal and/or clearing operations must be completed after August 31 and before April 1 of any year, outside of the breeding bird active nesting season. ▪ **No tree removals or vegetation clearing can occur in potential bat habitat areas** until it is first confirmed through acoustic monitoring whether SAR bats are present, and whether a permit under the ESA is required for impacts to SAR bats and their habitat. Removals of trees that are potential bat maternity roost trees will not be permitted during the active bat season, from April 1 to September 30 of any year.	I	▪ Acoustic surveys to be completed targeting potential roost locations, to determine whether SAR are present. ▪ Review size and length of culverts and crossings at detail design.

Project Phase	Valued Ecosystem Components	Potential Environmental Effect(s)	Potential Significance	Recommended Mitigation Measures	Level of Significance Following Mitigation	Commitment to Future Works
Construction	Vegetation and Flora	▪ Removal of trees ▪ Increased potential for introduction of invasive species in areas alongside the roadway	S	▪ Recommended that a certified arborist be retained during tree removal to ensure standard arboricultural techniques are employed ▪ Implementation of best management practices to prevent the introduction/spread of invasive plants will be required, including proper soil management and equipment clearing protocols.	N	▪ Detailed tree inventory to be completed during detail design to confirm number of trees impacted. ▪ Parcel fabric data requested from York Region during detail design to confirm tree ownership to calculate removal compensation plantings.
	Erosion and Sediment Control	▪ Erosion and loss of fine soil particles around the culverts and bridge	I	▪ Riprap treatment for the inlet/outlet of the culvert and toe of bridge ▪ Follow all Ontario regulations concerning the import and export of excess soils	N	▪ Design of erosion protection measures for inlet/outlet of culvert and toe of bridge embankment slopes assessed by the hydraulics engineer. ▪ Additional soil quality sampling and analysis should be carried out in conjunction with geotechnical investigations. ▪ An overall Soil (or Earth) Management Plan should be developed.

	Drainage	▪ Increase in impervious pavement area, and the associated potential increase in pollutant loading to the receiving watercourses would result in negative effects such as reduced stream water quality, degraded aquatic habitat, and/or flooding.
		▪ The minimum target for the erosion control and water balance is retention of 5mm from increased impervious area. Due to the site being located within High Volume Groundwater Recharge Areas, maintaining pre-development groundwater recharge rates is required by TRCA.
			I	▪ Mitigation is accounted for in the design of the stormwater management systems and includes the following and is further discussed in **Section 9** and below:
				  ▪ In general, the existing drainage patterns will be maintained
				  ▪ Construction of a new storm sewer system to accommodate the urban roadway cross-section.
				  ▪ Extension and/or relocation of the existing culverts (as needed) to accommodate roadway widening and realignment.
				  ▪ Construction of a single span bridge structure with span length of approximately 40 meters over the East Don River valley.
				▪ Any recharge facilities to be situated more than 250m from landfill sites.
					N	▪ Conduct water balance analysis during detail design and further evaluate the feasibility of enhanced recharging measures.
						▪ A comprehensive stormwater management plan needs to be developed to mitigate the potential impact.

	Source Water Protection / Hydrogeology	▪ Changes in plume chemistry ▪ Lowering of groundwater level ▪ Conflicts with gas monitoring probes at landfill sites	I	▪ Protection of purge well leachate main during construction activities ▪ All storm drains designed to minimize leakage ▪ Enhanced monitoring of the eastern edge of the chlorine plume to be put in place at all outfalls to prevent contamination ▪ Follow all Ontario regulations concerning the taking and discharge of water ▪ Develop and implement spill management plan (SMP) for all construction activities	N	▪ Perform detailed assessment of landfill conflicts in later design stages. ▪ Perform desktop and field survey to further identify in-use water wells within 500m of the proposed alignment. ▪ Amendments to the ECA if any changes are made to the landfill infrastructure.

Project Phase	Valued Ecosystem Components	Potential Environmental Effect(s)	Potential Significance	Recommended Mitigation Measures	Level of Significance Following Mitigation	Commitment to Future Works
Construction	Fluvial Geomorphology	▪ Erosion hazard for the Don River East Branch. 100-year fluvial erosion rates are estimated at 8m (with an estimated meander belt width of 43.1m).	I	▪ The structure was designed to span as much of the meander belt as is practical (40m bridge and 25 m opening between toes of foreslopes vs. 43.1 meander belt).	N	▪ N/A
	Noise	▪ Anticipated noise impacts above some of the noise impact criteria in the York Region Policy in the developer's community west of Dufferin Street and north of Teston Road.	I	▪ Where possible construction should be carried out during The City of Vaughan's normally allowed hours specified in the City of Vaughan by-law which restricts the operation of any construction Vehicle or equipment between the hours of 7pm-7am.	N	▪ Additional noise impact study to be undertaken prior to construction for potential noise barrier for the community west of Dufferin Street, north of Teston Road. ▪ Methods to minimize construction noise impacts should be included into the contract documentation. ▪ Additional noise assessment will be required for the potential future Teston Road/GO rail grade separation to analyze sensitive receptors west of Keele Street.
	Air Quality	▪ Increased dust ▪ NOx and VOC may be emitted from equipment during construction activities	I	▪ Use of material wetting or use of non-chloride dust suppressants to reduce dust, use of wind barriers, limiting exposed areas which may be a source of dust, and equipment washing. ▪ Ensure Best Management practices are followed during construction	N	▪ N/A
	Climate Change	▪ Extreme heat impacts to roadway, bridges, culverts, transit facilities, landscaping, public health ▪ Freezing rain impacts to above ground utilities, roadways, bridges, transit and active transit facilities, landscaping ▪ Riverine flooding impacts on bridges, culverts, roadways, ground-level facilities ▪ Extreme wind impacts to bridges, landscaping, above-ground utilities, and user safety ▪ Increased GHG emissions associated with project construction, maintenance, and operation.	S	▪ Implement asset specific adaptation measures to improve resilience and policy related adaptation measures. ▪ Selecting design alternatives that reduce the amounts of materials that contribute the most to the project's emissions (e.g. earth fill, concrete). ▪ Selecting materials with lower GHG emissions associated with their production. ▪ Sourcing materials and/or equipment more locally to reduce transportation emissions. ▪ Selecting durable materials ▪ Reducing fuel consumption of construction equipment	I	▪ Conduct further assessment of project's GHG emissions and potential vulnerability to climate change through detail design.
	Archaeology	▪ Study Area includes lands within the established ossuary monitoring buffer with the Late Woodland period McNair and McGaw village sites.	I	▪ Archaeological monitoring of any proposed construction activities or topsoil removals by a licensed archaeologist is recommended within both 1000 metres of the McNair (AlGu8) and McGaw (AlGu-88) village sites and 300 metres of water.	I	▪ Detailed monitoring strategies should be formulated at the time construction is proposed. ▪ Undisturbed Keele Valley landfill lands require Stage 2 test pit survey at five metre intervals prior to any soil disturbing activities.

Project Phase	Valued Ecosystem Components	Potential Environmental Effect(s)	Potential Significance	Recommended Mitigation Measures	Level of Significance Following Mitigation	Commitment to Future Works
Construction	Heritage	▪ One Built Heritage Resource (BHR) and five Cultural Heritage Landscapes (CHLs) are within or adjacent to the proposed Teston Road extension alignment. ▪ Direct impacts to CHL 26 including property acquisition, encroachment, grading, and construction of a curb and gutter along south of property. ▪ Direct impacts to CHL 27 including re-alignment of Teston Road to the north	S	▪ Implementation of avoidance measures (e.g., temporary fencing, establishing buffer zones, issuing instructions to construction crews to avoid identified BHRs and CHLs, etc.). ▪ Post construction rehabilitation	I	▪ A baseline vibration assessment should be undertaken during detailed design for CHL 17, 18 and 27. ▪ Extent and depth of grading should be revised or reduced. ▪ If grading is infeasible, a Heritage Impact Assessment (HIA) should be conducted for CHL 17 and 18.
	Traffic and Transportation	▪ Potential traffic delays during construction, creating potential idling, increased noise, and vehicular accidents.	I	▪ Traffic staging and detours will be determined prior to construction to ensure disruption is minimized to traffic flow. ▪ Contractor to establish an acceptable accident management plan prior to construction.	I	▪ A construction staging plan is to be prepared ▪ An accident/incident management plan is to be prepared
	Property Requirements	▪ Approximately 43,000m^2 of public and private property will need to be acquired by York Region to construct the project. ▪ No full buyouts are required. ▪ Approximately 22,000m^2 of temporary easements required to construct the project.	I	▪ Property/easement requirements have been reduced to the greatest extent possible for this level of design.	I	▪ Review designs and grading requirements to reduce acquisition and easements to the greatest extent possible.
	Access	▪ Closure or consolidation of property accesses may be required for the ultimate design of the GO rail grade separation.	S	▪ Avoidance of access closure, where feasible.	I	▪ During detail design of the grade separation, avoid or relocate property accesses. ▪ Consult with property owners to discuss impacts and mitigation measures if accesses are to be closed/relocated.
	Provision for Pedestrians and Cyclists	▪ There is currently no provision for pedestrians or cyclists on Teston Road between Keele Street and Dufferin Street. ▪ From Dufferin Street to Bathurst Street, there are paved shoulders for cyclists but on limited sections of sidewalk. ▪ Construction may have impacts to the above facilities.	I	▪ Impacts to sidewalks/paved shoulders during construction should be limited in duration to the extent possible.	N	▪ During detail design, work should be staged to prevent long term impacts to sidewalks.
	Streetscape and Landscape	▪ Existing streetscaping/landscaping may be removed to construct the project.	N	▪ Streetscaping/landscaping will be designed in accordance with York Region's standards. ▪ Streetscaping has been incorporated into the design where it doesn't currently exist.	P	▪ Ensure streetscaping/landscaping is designed according to current standards at the time and ensure replacement of any removed/damaged streetscaping.

Project Phase	Valued Ecosystem Components	Potential Environmental Effect(s)	Potential Significance	Recommended Mitigation Measures	Level of Significance Following Mitigation	Commitment to Future Works
Construction	Contamination	▪ Seven areas of potential environmental concern (APEC) due to previous: importation of fill of unknown quality, diesel fuel spill, waste disposal sites, and historical fuel spills/leaks. ▪ Metal exceedances at MH-BH1 ▪ Potential for spills during construction ▪ Presence of landfill waste and/or gas in sub-surface within proposed right-of-way or construction limits.	S	▪ All disturbed soils will be properly contained to prevent silt and sediment from entering watercourses, ditches, and adjoining properties. ▪ Further mitigation measures include additional soil quality sampling and analysis, the development of a Soil Management Plan, and a mitigation plan should be developed against the possibility of encountering landfill related waste during excavation activities. ▪ The Contractor must ensure that machinery arrives on site in a clean condition and is maintained free of excess or leaking fuel, lubricants, coolant, or any other contaminants for the duration of construction. ▪ A Spill Response Plan must be prepared that outlines the measures that will be implemented, such as spill kits, and drip pans under all non-mobile machinery, and must be kept on site at all times.	I	▪ A Phase Two ESA for Properties 1, 2, 4, 5, and 8 is required. ▪ Further investigation of presence of landfill waste and gas ▪ Develop mitigation plan should any landfill related waste and gases be found during excavation activities.

Operations & Maintenance	Fisheries and Aquatic Resources	▪ Increase in impervious pavement area, and the associated potential increase in pollutant loading to the receiving watercourses would result in negative effects such as reduced stream water quality, degraded aquatic habitat, and/or flooding.	I	▪ Mitigation is accounted for in the design of the stormwater management systems and includes the following and is further discussed in **Section 9** and below:
				  ▪ In general, the existing drainage patterns will be maintained
				  ▪ Construction of a new storm sewer system to accommodate the urban roadway cross-section.
				  ▪ Extension and/or relocation of the existing culverts (as needed) to accommodate roadway widening and realignment.
				  ▪ Construction of a single span bridge structure with span length of approximately 40 meters over the East Don River valley.
					I	▪ A Request for Review should be submitted to Fisheries and Oceans Canada (DFO) during detail design to determine the need for a Fisheries Act Authorization.

	Terrestrial Environment	▪ N/A		▪ N/A		▪ N/A
	Wildlife and Wildlife Habitat	▪ Animals crossing the road create unsafe conditions for drivers and themselves ▪ Road mortality ▪ Disturbance to animals due to introduced roadway noise, frequent human presence, artificial lighting in the area. ▪ Potential for the introduction of invasive species	I	▪ Install fencing along the ROW within the valley lands to direct wildlife to cross under the bridge structure or through the wildlife culvert.	N	▪ Review size and length of culverts and crossings at detail design.
	Vegetation and Flora	▪ Damage from winter maintenance (i.e., road salting)	I	▪ Winter maintenance will be carried out in accordance with the York Region's maintenance standards.	N	▪ N/A
	Erosion and Sediment Control	▪ Erosion of embankment side slopes from surface water runoff	I	▪ Maintenance of topsoil and seeding	N	▪ N/A

Project Phase	Valued Ecosystem Components	Potential Environmental Effect(s)	Potential Significance	Recommended Mitigation Measures	Level of Significance Following Mitigation	Commitment to Future Works
Operations & Maintenance	Drainage	▪ Increase runoff due to widened roadway	I	▪ Preliminary designs include stormwater quantity and quality control measures to address the increase in runoff.	N	▪ N/A
	Source Water Protection / Hydrogeology	▪ Road salt contributions to chloride plume	I	▪ Winter maintenance will be carried out in accordance with York Region's maintenance standards.	I	▪ Measures to ensure road salt doesn't contribute to landfill chloride plumes are to be incorporated into the design.
	Noise	▪ Increases in sound levels due to vehicles on the road in noise sensitive areas.	I	▪ Proposed developer-constructed noise barriers to reduce the noise levels below 60dBA in new development areas west of Dufferin Street, north of Teston Road.	N	▪ Existing residential areas south of Teston Road and west of Keele Street may require noise attenuation if Teston Road profile is raised as part of a future GO Rail grade separation. Warrants for noise barriers will be reviewed/confirmed using the current policies and site conditions at the time of detailed design.
	Air Quality	▪ Increase in airborne particulates from vehicle use of road	I	▪ Planting vegetation should be considered to minimize particulate impacts at nearby sensitive receptors.	N	▪ N/A
	Climate Change	▪ Extreme heat impacts to roadway, bridges, culverts, transit facilities, landscaping, public health ▪ Freezing rain impacts to above ground utilities, roadways, bridges, transit and active transit facilities, landscaping ▪ Riverine flooding impacts on bridges, culverts, roadways, ground-level facilities ▪ Extreme wind impacts to bridges, landscaping, above-ground utilities, and safety. ▪ Air quality/indirect wildfire impacts to bridges and public health	S	▪ Engineering and technological solutions, as well as policy, planning, management, and maintenance approaches. ▪ Asset specific adaptation measures to improve resilience include clearing combustible materials, enhancing scour and erosion protection for bridge foundations, resilient species planting, additional storage capacity in stormwater management facilities, among others. ▪ Policy-related adaptation measures to increase resilience include ongoing inspection, maintenance and rehabilitation of roadway and pedestrian facilities and culverts, hardening of flood susceptible roadway portion, an Invasive Species Monitoring Program, a Health & Safety Management Plan, and a Utility Power (Off-Site Services) Outage Management Plan.	I	▪ N/A
	Traffic Operations	▪ Traffic conditions (within the project limits) will potentially have a deteriorating Level of Service (without the project).	S	▪ Completing the missing link, roadway widening, intersection modifications, improved access management will improve level of service.	N	▪ Monitor post-project operating conditions for potential future modifications
		▪ Traffic conditions will potentially have a deteriorating Level of Service (delay/queuing issues at signalized intersections during the morning peak hour).	S	▪ Detailed intersection design to be developed during detailed design	N	▪ Monitor post-project operating conditions for potential future modifications.
	Property Requirements	▪ N/A		▪ N/A		▪ N/A

Project Phase	Valued Ecosystem Components	Potential Environmental Effect(s)	Potential Significance	Recommended Mitigation Measures	Level of Significance Following Mitigation	Commitment to Future Works
Operations & Maintenance	Access	▪ The project will not impede the operations of the Keele Valley landfill, its monitoring programs, or access to its infrastructure (including underground infrastructure).	I	▪ Detailed Design, construction staging, and operational requirements will account for operations of the landfill.	N	▪ Consult with the City of Toronto's Keele Valley Landfill staff to ensure operations are not affected by the project.
	Provision for Pedestrians and Cyclists	▪ Pedestrian and cyclist provisions will be made throughout the project's length, improving existing conditions.	P	▪ N/A	P	▪ N/A
	Streetscape and Landscape	▪ N/A		▪ N/A		▪ N/A

10.3 Natural Environment

10.3.1 Fisheries & Aquatic Resources

As the impacts have been assessed based on preliminary design information, impacts will need to be reassessed when detailed designs become available. Given that the project is not anticipated to commence for several years, there is potential that classifications of species under SARO and regulations under the ESA may change. Further, habitat conditions on site are subject to change. As such, species' statuses, and protections, as well as on-site conditions should be re-examined during subsequent phases of this project.

Site 1: Don River East Branch Located West of Dufferin Street

Impacts to the headwaters of the East Don River within the Teston Road extension between Keele Street and Dufferin Street are expected, as direct fish habitat will be permanently altered by the creation of the new road and the resulting bridge crossing the watercourse. As per the Federal Fisheries Act, the DFO Self-Screening process has been completed for the new Teston Road extension and as these works do not meet the criteria for the Clear Span Bridges DFO Code of Practice, they have been assessed using the Pathway of Effects (PoE) model.

The planned construction of the Teston Road bridge over the Don River East Branch will result in both land and water-based impacts to the natural environment. Activities including vegetation clearing, grading, excavation, use of industrial equipment, riparian planting, temporary change in flows, and temporary fish passage alterations, will likely result from the proposed works. Through the placement of the retaining walls and wingwalls, the bridge footprint will permanently impact 90 m^2 below the 2-year high water mark. The specific details of the placement of materials will be confirmed at a later design stage. The bridge deck will cover 225 m^2 of area over the 2-year high water mark, however it is expected that the natural channel form will be maintained throughout the width of the bridge, and acceptable light levels will be present. There is an opportunity to take the existing pond off-line by rerouting the existing watercourse around the pond, improving habitat quality within the watercourse for fish, while still ensuring maintenance of wetland habitat within the pond for amphibians and other wildlife. This pond is located on private property therefore this recommendation will need to be addressed in conjunction with the adjacent property owner and developer. See **Section 10.3.2.1** for additional information.

Site 2: Tributary of Don River East Branch, Culvert Crossing Teston Road West of Saul Court

Aquatic impacts between Dufferin Street and Bathurst Street are expected to be limited, however the future design of this culvert is likely to include the installation of wing walls at the culvert inlet and/or outlet. In-water work is likely to be needed for the installation of the wing walls. Although too early in the design process to assess impacts from this work, it will be the goal that all construction activities can be properly mitigated with no residual effects persisting following completion of the roadway expansion and wingwall construction. Redside Dace which are present within the watercourse downstream of Teston Road will be considered as a part of the wingwall design process and development of mitigation measures during the detailed design phase.

Site 3: Tributary of East Don River, Culvert Crossing Teston Road at Bathurst Street

Aquatic impacts at the culvert crossing of Teston Road west of Bathurst Street are expected to be limited as the roadway widening will not require widening or extension of the culvert at Site 3. No in-water work is expected, and all construction activities can be properly mitigated with no residual effects persisting following completion of the roadway expansion.

10.3.1.1 Mitigation Measures

Due to the level of impact associated with the new crossing of the Don River East Branch located west of Dufferin Street, and the potential for the work to result in Harmful Alteration, Disruption or Destruction (HADD) of fish and fish habitat, a Request for Review should be submitted to Fisheries and Oceans Canada (DFO) during the detailed design phase of the project. While impacts were assessed based on the available information, impacts will need to be reassessed when new design information becomes available.

In addition to the above, to protect fish and fish habitat and ensure that the construction works will not result in serious harm to fish or fish habitat, the mitigation measures (measures to avoid causing harm to fish and fish habitat) as summarized below should be followed:

- In water work at Site 1 will be carried out within the in-water timing window between **June 15 –September 15** when water levels are depressed and to avoid harming fish during critical life stages. In water work at Site 2 will be carried out within the in-water timing window of **July 1st to September 15th**, to protect Redside Dace and their habitat downstream of Teston Road.
- Bridge and future culvert works will be carried out in the dry, within the confines of cofferdams.
- Work area dewatering will be directed to a flat vegetated area at least 30m from the receiving watercourse or ditchline or outlet into a filter bag (also 30m from surface water features) to allow sediments to settle out before re-entering the watercourse.
- Minimize vegetation removal on the waterbody banks where possible in order to maintain shading and bank stability.
- Stabilize disturbed banks with native seed mixture and/or cover exposed areas with erosion control measures until seeding or planting can occur.
- Reinstate and stabilize banks disturbed during construction to pre-construction or better condition.
- Use of effective erosion and sediment control measures including topsoil and seed, sediment fence barriers, and erosion control blankets.
- Operation of equipment in waterbodies or on waterbody banks will require the following
  - Have spill kits onsite and drip pans under all non-mobile machinery.
  - Refueling, maintenance and necessary repairs shall be carried out on a site designated for this purpose located 30m way from any waterbody.

- Heavy machinery access and staging will be limited to areas within the new ROW and along the banks of the watercourse.

10.3.2 Terrestrial Environment

Based on the preliminary designs, it is anticipated that the proposed project could result in a total permanent loss (before mitigation measures) of approximately 59,565 m^2 (5.96 ha.) from within existing vegetation communities. An additional negative impact within existing vegetation communities of 25,405 m^2 (2.54 ha.) would be associated with construction. An additional 1,437 m^2 (0.14 ha) of vegetation will be within an area of harmful alteration, and thus habitat will be impaired. Negative impacts within vegetation communities are potentially somewhat more temporary in nature, as these are areas where removal of vegetation and habitat will occur, but, following construction, vegetation can be replaced and re-establish.

In addition to physical removal of vegetation both permanently and temporarily, post-construction impacts to vegetated areas along the new and widened Teston Road may also include increases in run-off, soil erosion, sedimentation, and pollution such as excess salts. Increased edge impacts may also occur, such as an increased potential for introduction of invasive species into areas alongside the roadway. Although many of these impacts can be reduced through considerations within the design plans and/or mitigation and avoidance measures, they cannot be entirely prevented from increasing from current conditions (i.e., with no roadway present within the river valley and no widening along the existing sections of Teston Road).

The proposed work will occur within several Designated Natural Areas associated with the Don River East Branch valley lands and the Oak Ridges Moraine. The severance and discontinuity of these Designated Natural Areas caused by introducing a roadway into them may affect the overall functions of these areas, particularly by constricting and restricting wildlife movement in the vicinity or the proposed Teston Road extension through the valley.

Wherever possible, it is recommended that negative impact areas be restored to conditions similar to pre-construction conditions. Compensation plantings and habitat creation to offset permanent impacts to Designated Natural Areas should be focused on areas connected to remaining intact habitats, or on creating additional connections to adjacent habitats, to maximize ecological function in the area. See **Section 10.3.5** for additional mitigation measures related to tree removals and protection. Mitigation and avoidance measures required for vegetation and soils (above) will also reduce temporary impacts within designated natural areas, during construction.

Additional discussion on these Designated Natural Areas can be found in **Appendix E.** Generally speaking, impacts to the following areas should be avoided, however, mitigation measures have been proposed to reduce or compensate for the impacts to the greatest extent possible. The Designated Natural Areas include:

- Oak Ridges Moraine Conservation Plan Protected Areas (particularly areas designated as Natural Core Areas and Natural Linkage Areas)
- York Region’s Natural Heritage System and Significant Forest Areas

- Maple Uplands and Kettle Wetlands Candidate Life Science Area of Natural and Scientific Interest
- McGill Area Environmental Significant Area (ESA #73)
- Provincially Significant East Don River Headwater Wetland Complex

10.3.2.1 Restoration Recommendations & Commitments

To restore the areas impacted by the project, provide offsetting compensation, and enhance the effects of the proposed mitigation measures, the following recommendations have been made.

Recommendation 1: Species at Risk

Species at Risk habitat compensation will be addressed as part of detailed design based on up-to-date site conditions and legislative requirements. Based on information gathered within the Technically Preferred Alternative limits, confirmed SAR habitat requiring compensation includes habitat for Bobolink and Eastern Meadowlark, and potential SAR habitat requiring compensation includes habitat for SAR bats.

Recommendation 2: Wildlife Crossing

As wildlife movement corridors will be impaired by the project, including for White-tailed Deer, leading to increased susceptibility to road mortality and motorist collisions with wildlife, wildlife passages should be implemented in suitable locations, should be of sufficient size, and should be designed with features that facilitate wildlife movement across the roadway. A Wildlife Crossing Plan should be developed as part of detailed design. Wildlife crossing for deer, small mammals, turtles, and amphibians will be considered and incorporated into the detailed design. This will include wildlife fencing alongside the road within and adjacent to habitat for these species to tie in with wildlife crossings and encourage use by wildlife. There may be additional opportunities for wildlife crossing associated with a proposed trail connection.

Recommendation 3: Significant Wetlands and Significant Wildlife Habitat

A Wetland and Significant Wildlife Habitat Restoration Plan should be developed to accurately characterize these areas, identify opportunities to minimize impacts, and to develop appropriate mitigation and restoration measures for any impacts in consultation with the MNRF. Impacts to Significant Wetlands and Significant Wildlife Habitat will be assessed as part of detailed design based on up-to-date site conditions. Field investigations to confirm conditions in and boundaries of significant wetland features, as well as locations and limits of SWH will be completed as part of detailed design. Key considerations at detailed design, based on the results of these surveys, will be ensuring maintenance of wetland connectivity and appropriate restoration or compensation of wetlands. Enhancement measures implemented as part of the restoration plan should consider and complement confirmed SWH within the project limits, and may include turtle nesting areas, turtle basking areas, reptile hibernacula, bat houses, duck nesting structures, and more.

Recommendation 4: Invasive Species Removal & Management

An Invasive Species Management Plan should be developed to document up-to-date conditions and removal and management plans. Invasive species such as Common Reed (restricted), Japanese Knotweed (restricted), and Goutweed have been recorded within and adjacent to the project limits. Field investigations to confirm locations and limits of invasive species will be completed as part of detailed design to inform appropriate removal and management measures. Legislation is periodically updated and will need to be consulted during the detailed design stage to identify any changes to restricted species or best management practices for their removal and disposal.

Recommendation 5: Vegetation Restoration

A Vegetation Restoration Plan will be developed to reinstate lost vegetation within negative impact and harmful alteration areas within the project footprint. Development of a Vegetation Restoration Plan will include recommendations within TRCA's Seed Mix Guideline (2022) and be completed in consultation with the TRCA. Key measures will include planting of native species providing similar or superior benefit to wildlife than those being impacted. Where possible, restoration techniques on site should be in accordance with TRCA's Post-Construction Restoration Guidelines (2004).

Recommendation 6: Storm Water Management

A Stormwater Management Plan was developed to meet stormwater management objectives in terms of water quantity, water quality, erosion, and water balance. The proposed stormwater management plan for the ROW improvements will include the use of new and existing underground and surface facilities for quantity control and water balance (via infiltration in selected areas) and oil and grit separator (OGS) units placed upstream of outlets for quality control.

Recommendation 7: Riparian Planting

Restoration and planting plans within and adjacent to wetlands and along the tributary should focus on improving riparian conditions and functions to improve habitat quality and water quality at the bridge as well as downstream. The section of the Don River tributary which falls within the project area is a clear, cold, headwater stream and would benefit from additional woody material and leaf litter contributions and riparian shading.

Recommendation 8: Take Private Pond Off-Line

There is an opportunity to take the existing pond [Duckweed Floating-leaved Shallow Aquatic (SAF1-3) community] off-line by rerouting the existing watercourse around the pond, improving habitat quality within the watercourse for fish, while still ensuring maintenance of wetland habitat within the pond for amphibians and other wildlife. This pond is located on private property therefore this recommendation will need to be addressed in conjunction with the adjacent property owner and developer. DFO should be consulted (i.e., through submission of a Request for Review) on any changes made to existing fish habitat, as a Fisheries Act Authorization may be required to complete this work. To maintain wetland functions, it is important to preserve water quality, quantity, and duration of seasonal inundation or water holding of wetlands.

Alterations to water regimes could have negative impacts on wetland communities and their resident species (GEM Services Inc., 2019). If this recommendation is implemented, the detailed design plans will need to ensure that water quality, quantity, and seasonal inundation or water holding in the existing pond is maintained, to reduce the risk of permanent alterations to water regimes resulting in long-lasting and far-reaching impacts to wetland communities and associated wildlife.

10.3.2.2 Ecosystem Compensation Recommendations

Ecosystem compensation recommendations are quantified for permanent loss areas, in accordance with the TRCA's *Guideline for Determining Ecosystem Compensation* (2023). This approach to ecosystem compensation uses the basal area per ELC community impacted to determine the ratio of replacement required for that community, which can be used to calculate areas of compensation required relative to the area of each community impacted. Since it takes much longer to re-establish treed ecosystems as a result of their long development times and the impracticality of planting large, full-grown trees, this approach attempts to address the issue of lag-time in ecosystem establishment by recommending that that the loss of a mature forest (i.e., a community with a higher basal area) requires replacement with a larger forest (i.e., replacement at a higher ratio) than a non-treed community. **Table 10-2** shows the ecosystem compensation ratios and results that are recommended to replace permanent loss areas resulting from the project, per ELC community, for all vegetated, non-cultural/non-constructed communities.

Table 10-2: Areas of Ecosystem Compensation Recommended per ELC Community - Vegetation Communities

ELC Classification	ELC Code	Basal Area (m^2/ha)	Replacement Ratio	Area of Permanent Loss (m^2)	Ecosystem Compensation Area Required (m^2)
Treed Hedgerow	CUH1-A	N/A	2:1	315	630
Native Forb Meadow	CUM1-A	5	1:1	33,808	33,808
Exotic Cool Season Grass	CUM1-B	5	1:1	1,620	1,620
Exotic Forb Old Field Meadow	CUM1-C	5	1:1	4,733	4,733
Hybrid Poplar Deciduous Plantation	CUP1-4	N/A	2:1	5	10
White Pine Coniferous Plantation	CUP3-2	N/A	2:1	72	144
Mixed Conifer Coniferous Plantation	CUP3-H	N/A	2:1	73	146
Native Cultural Woodland	CUW1-A	8	2:1	3,711	7,422
Native Deciduous Cultural Woodland	CUW1-A3	22	5:1	253	1,265
Exotic Cultural Woodland	CUW1-B	22	5:1	0	0

ELC Classification	ELC Code	Basal Area (m^2/ha)	Replacement Ratio	Area of Permanent Loss (m^2)	Ecosystem Compensation Area Required (m^2)
Fresh-Moist Hemlock Coniferous Forest	FOC3-1	32	5:1	544	2,720
Fresh-Moist Hemlock – White Pine Coniferous Forest	FOC3-A	50	5:1	0	0
Fresh-Moist Poplar Deciduous Forest	FOD8-1	32	5:1	2,410	12,050
Dry-Fresh Poplar Deciduous Forest	FOD3-1	32	5:1	5,476	27,380
Dry-Fresh Hardwood – Hemlock Mixed Forest	FOM3-1	38	5:1	5,030	25,150
Fresh-Moist White Pine – Sugar Maple Mixed Forest	FOMA-A	38	5:1	102	510
Jewelweed Mineral Meadow Marsh	MAM2-9	18	4:1	1,065	4,260
Narrow-leaved Cattail Mineral Shallow Marsh	MAS2-1B	18	4:1	149	596
Duckweed Floating-leaved Shallow Aquatic	SAF1-3	12	3:1	23	69
White Cedar – Conifer Mineral Coniferous Swamp	SWC1-2	40	5:1	176	880
			Total Area (m^2)	**59,565**	**123,393**
			Total Area (ha)	**6.00**	**12.34**

* N/A indicates that a basal area was not available for that ELC community from the MH Arborist Assessment, and a 2:1 replacement ratio was presumed given the cultural conditions associated with the site. A shaded basal area indicates that a basal area was not available for that ELC community, and a basal area from the most similar ELC community was assumed (e.g., basal area for MAS2-1B was presumed similar to MAM2-9, FOMA-A was presumed similar to FOM3-1, etc.). For all CUM communities, a basal area of 5 was applied per the *Guideline for Determining Ecosystem Compensation* (TRCA, 2023) which states that a vegetation community with few or no trees will have a basal area of 5 or less and can therefore be replaced at a 1:1 ratio.

As the foremost project impact will be fragmentation of intact forest and wetland habitats, including to the north and south of the project, and within Designated Natural Areas, priority for compensation should be given to replacing ecosystems adjacent to the project limits. However, given that there are numerous constraints directly at the project location making compensation in the immediate area impractical, including conflicts with new and ongoing developments, conflicts with existing developed areas or with current land uses (e.g., golf courses, cemeteries, and park spaces), and the need to maintain identified grassland habitat for SAR birds – Bobolink and Eastern Meadowlark, coupled with the large total area recommended to accommodate all required compensation areas (minimum of ~ 123,393 m² or 12.34 ha total) as shown in **Table 10-2**, one (1) or more off-site locations, as proximal as possible to the project, will need to be considered for implementation of ecosystem compensation measures at a largescale to account for permanent habitat losses. Thus, the focus on selecting suitable sites for ecosystem compensation should be on creating new, nearby continuous habitat tracts in locations lacking vegetation, that are located within designated natural areas.

Based on a review of aerial imagery in the surrounding area, potential compensation locations are shown in **Appendix E**. The compensation location(s) and detailed ecosystem compensation plans to offset permanent losses from the project will be determined at the detailed design stage. The offsite compensation should incorporate some enhancement and/or wetland compensation components included under Restoration Recommendation 3 – Significant Wetlands and Significant Wildlife Habitat (**Section 10.3.2.1**) as well if required or desired.

10.3.2.3 Mitigation Measures During Construction

Vegetation clearing is required as part of the proposed Teston Road project. Therefore, mitigation and restoration measures are required. It is recommended that the following measures be implemented for vegetation removals:

- Trees and treed areas to be protected will be protected as per the *York Region Street Tree and Forest Preservation Guidelines*.
- A Certified Arborist will be present during tree removal operations to ensure that standardized arboricultural techniques are employed, prior to and during the proposed work activities, and to confirm the need to remove or protect additional trees.
- A Certified Arborist will return at the conclusion of construction to assess the health of trees that were protected during construction and identify opportunities for mitigation should any trees display signs of stress
- In areas requiring only temporary disturbance and where feasible, grubbing will not be completed to promote more rapid regrowth of vegetation.
- Any damaged trees not being removed shall be pruned or treated as follows:
  - Branches 25mm or greater in diameter that are broken shall be cut back cleanly on the tree side of the break or to within 10mm of their base if a substantial portion of the branch is damaged.
  - Roots 25mm or larger in diameter that are exposed shall be cut back cleanly to the soil surface.
  - Bark that is damaged shall be neatly trimmed back to uninjured bark without causing further injury to the tree.
- Minimize vegetation disturbance wherever possible by reducing temporary working easements, limiting equipment storage areas and vehicle turning points to open areas dominated by exotic species, and reducing ROW footprints as per TRCA's *Forest Edge Management Plan Guidelines* (2004). Limits of construction shall be clearly delineated to avoid intrusion into adjacent areas.
- Areas of vegetation disturbed and requiring cover shall be planted with native species appropriate for the area and site conditions, in accordance with the *Vegetation Restoration Plan*.

- To maintain soil conditions appropriate for restoring vegetation, soil should be managed as per TRCA's *Preserving and Restoring Healthy Soil: Best Practices for Urban Construction* (2012).
- The Contractor must ensure that machinery arrives on site in a clean condition and is maintained free of excess or leaking fuel, lubricants, coolant, or any other contaminants for the duration of construction,
- The limits of Designated Natural Areas (PSW and ANSIs) will be shown on the contract drawings as Environmentally Sensitive Areas, and equipment, construction, etc. will not extend beyond the work limits, into these areas.
- Stockpiling of materials shall be limited to clearly identified locations within the project footprint*.*
- All disturbed soils will be properly contained to prevent silt and sediment from entering watercourses, ditches, and adjoining properties and lands. Erosion and sediment controls shall be frequently monitored maintained, adapted, and repaired as required to remain effective at all times.
- Vegetation should be maintained for as long as possible prior to disturbance. Excavations and removals shall be performed in such a manner and with such equipment as to leave undisturbed and undamaged any portion of an area not designated for removal/excavation or salvage. All damaged or disturbed areas shall be corrected expeditiously.
- A Spill Response Plan must be prepared that outlines the measures that will be implemented, such as spill kits, and drip pans under all non-mobile machinery, and must be kept on site at all times. Details pertaining to spill prevention and response for operation of machinery and storage of deleterious substances (i.e., fuel, oil etc.) shall be included in this plan to ensure adequate mitigation measures are implemented to prevent release of such substances into the adjacent waterbody or soils. All spills shall be reported to the Ministry of Environment (MOE) Spills Action Centre (1-800-268-6060) as well as to DFO and MNRF Aurora District if there is potential for significant impacts to fish or fish habitat and/or wildlife resources.
- Areas within the work limits contain two (2) invasive plant species (Common Reed and Japanese Knotweed) which are restricted species under Invasive Species Act Regulations (O. Reg. 354/16). Regulations for restricted invasive species include ensuring these species are not spread/deposited elsewhere into new locations. Therefore, the spread of invasive and noxious vegetation species to, from and within the work limits must be prevented.
  - Implementation of best management practices to prevent the introduction/spread of invasive plants will be required, including proper soil management and equipment clearing protocols. Guidelines outlined in the *Invasive Phragmites – Best Management Practices in Ontario*, (OIPC, 2011) and *Invasive Japanese Knotweed – Best Management Practices in Ontario*, (OIPC, 2012), shall be followed.
  - Debris including earth clods or invasive and noxious vegetation material attached to the outside surfaces of equipment is prohibited from entering the work limits. Equipment coming on site shall be inspected as close to the site entrance as

possible for debris, and if present, debris shall be completely removed and collected for disposal, prior to the equipment proceeding to the work area

- Surveys within the disturbance limits to delineate invasive species are required closer to commencement of the project. Where invasive species have been identified within the limits of disturbance associated with the work, these areas will be clearly marked on the contract drawings. The Contractor shall clean all vehicles and equipment exposed to invasive plants prior to leaving the site.
- Best Management Practices set forth in the Clean Equipment Protocol for Industry (Halloran et. Al, 2013), prepared by the Peterborough Stewardship Council and the Ontario Invasive Plant Council for the Canada-Ontario Invasive Species Centre and the MNRF, shall be followed at all times.
- Soils from areas impacted by invasive vegetation shall not be stockpiled for reuse.
- No invasive species shall be present in fill or topsoil brought on to the site to complete the work.
- A disposal plan will be required to dispose of invasive species and soils containing invasive species. Soils containing invasive species are difficult to accommodate at some landfill facilities, as these soils are not clearly defined, and most landfills deem it a contaminated soil. Though considered a non-hazardous material, many landfill locations do not accept invasive species containing soils.

Operation of Machinery

The following mitigation measures are recommended to minimize potential for disruption to wildlife, during construction:

- All equipment shall be maintained in an operating condition that prevents unnecessary noise, including but not limited to non-defective muffler systems, properly secured components, unnecessary idling/running, and the lubrication of moving parts.
- All work will conform with York Region Noise bylaws unless an exemption is obtained.
- Night work should not occur in proximity to potential bat maternity roost trees. If night work must occur, lighting must be directed away from bat habitat areas and toward the work zone, to the greatest degree possible.
- Steps shall be taken as necessary to control dust resulting from operations such that it does not enter surface waters or escape beyond the working area to cause a nuisance to wildlife. Dust suppressants shall be applied in a manner that avoids ponding, runoff, drifting, and tracking of the material beyond the area of application. Dust suppressant application shall not proceed during periods of rain when the surface is in a saturated condition or on areas of ponded water. Dust suppressants, other than water, shall not be applied when weather forecasts indicate a high probability of rainfall to minimize loss of the material from the intended area of application. Areas receiving rainfall within 6 hours after application may require reapplication of the material.

10.3.3 Wildlife & Wildlife Habitat

10.3.3.1 Significant Wildlife Habitat (SWH)

Based on the proposed project plans, it is anticipated that the majority of candidate and confirmed SWH identified will persist upon completion of the project, as most habitat types will remain available in the area in abundance and will remain accessible to wildlife. However, there are several exceptions where SWH may be permanently impacted, as described below.

Seasonal Concentration Areas of Animals: Reptile Hibernaculum (Candidate)

Two (2) Eastern Garter Snakes were previously observed basking together along a pathway running east to west within the Dry-Fresh Hardwood – Hemlock Mixed Forest (FOM3-1) community located directly east of the Vaughan and City of Toronto landfills, east of Keele Street. Given the time of year that these snakes were observed and the suitability of the surrounding habitat features, it is likely that a potential hibernaculum for snakes was located in the vicinity of this observation, though the threshold required to meet the criteria of SWH was not reached. As the proposed alignment for the Teston Road extension will run directly through the location of this observation, if a hibernacula is present in the vicinity, it may be directly and permanently impacted by construction of the roadway, or may no longer be accessible to snakes as a result of the road.

Specialized Habitat for Wildlife: Woodland Raptor Nesting Habitat (Candidate)

Raptors require large tracts of forest with interior forest habitat (i.e., forest habitat > 200m from a forest edge). As the proposed Teston Road project will fragment the forest habitat along the East Don River, resulting in a loss of interior forest habitat, the forest may no longer be suitable for Woodland Raptor Nesting.

Specialized Habitat for Wildlife: Seeps & Springs (Candidate)

Seeps have been recorded in headwater areas within the project limits, although the scale and extent of these features are unknown and so the criteria for this SWH could not be confirmed. As the proposed alignment for the Teston Road extension will run directly through the headwaters of the East Don River, if seeps are present in the vicinity they may be directly and permanently impacted by construction of the roadway.

Specialized Habitat for Wildlife: Woodland Area Sensitive Bird Breeding Habitat (Candidate)

Woodland Area Sensitive Birds require large tracts of forest with interior forest habitat (i.e., forest habitat > 200m from a forest edge). As the proposed Teston Road project will fragment the forest habitat along the East Don River, resulting in a loss of interior forest habitat, the forest may no longer be suitable for Woodland Area Sensitive Bird Breeding.

Habitats for Species of Conservation Concern: Open Country Bird Breeding Habitat (Confirmed)

Open Country Breeding Birds require large, undisturbed tracts of grasslands or meadows. As the proposed Teston Road project will fragment the meadow habitat east of the East Don River, resulting in a loss of interior meadow habitat, the meadows may no longer be suitable for Open Country Bird Breeding.

Habitats for Species of Conservation Concern: Amphibian Movement Corridors (Candidate)

Given that amphibians are known to travel long distances over land to move between breeding wetlands and hibernation sites seasonally, construction of a roadway through a continuous tract of wetlands and adjacent upland habitats will result in creation of a barrier to Amphibian Movement Corridors and introduce the threat of road mortality to amphibian populations.

10.3.3.2 Species of Conservation Concern

The majority of wildlife observed are considered species of Conservation Concern by the TRCA, and numerous SAR were determined to be present.

Both negative and permanent impacts to wildlife habitat will occur through vegetation clearing and habitat loss resulting from the project.

In terms of SAR, 17 were detected or were determined to have potential habitat in proximity to the project. The provincial ESA, 2007, prohibits willful harm or harassment of Extirpated, Threatened, or Endangered species that are listed in regulations under the Act. The ESA also prohibits willful damage to, or destruction of their habitats.

A discussion on impacts anticipated for each SAR follows. Additional species that are listed as Special Concern under the ESA are discussed in **Appendix E**. Generally, these species are not afforded protection under the ESA, as such no mitigation measures are required.

Bank Swallow

Bank Swallow is listed as Threatened under the ESA. Neither Bank Swallows nor their habitat have been identified to date. However, there is the potential for this species to arrive on site following commencement of construction activities, as they are attracted to nesting in loose soils on exposed vertical faces, such as those resulting from construction of embankments, excavations, or stockpiles of soils. This species will not be impacted by the project, but creation of suitable habitat should be prevented during construction.

Bobolink & Eastern Meadowlark

Bobolink and Eastern Meadowlark are listed as Threatened under the ESA. Bobolink and Eastern Meadowlark have been confirmed present and breeding within the native forb meadow (CUM1-A) communities within the landfills. While there are existing gravel roads and footpaths through the landfills, access is limited and the level of disturbance to nesting Bobolinks and Eastern Meadowlarks is currently low. This will no longer be the case after introduction of a major roadway into the area, and increased noise during and after construction may further reduce useable habitat for these species, by reducing the distance at which breeding calls can be heard (thereby reducing breeding success), and/or by increasing agitation of these birds during breeding. In addition, the creation of a multi-lane road through the middle of this habitat could potentially result in introduction of invasive species and/or non-grassland species during or following construction, resulting in a further loss of habitat for Bobolinks and Meadowlarks. Currently, despite a small permanent loss in area available for breeding, this loss of habitat is not anticipated to affect nesting Bobolinks or Eastern Meadowlark provided that large enough tracts of native forb meadow (CUM1-A) communities remain. However, under current legislation, actions for Bobolink and Eastern Meadowlark are required under the ESA due to the proposed impacts to habitat for these species. Based on the preliminary designs, it is anticipated that the area of SAR grassland bird habitat (Native Forb Meadow – CUM1-A) impacted by the Technically Preferred Alternative will be 34,671m^2 (3.47 ha), of which 32,383m^2 (3.24 ha) will be permanent.

Bobolink and Eastern Meadowlark are both listed as Threatened species and receive habitat and species protection under the ESA, Ontario Regulation (O. Reg.) 830/21. Clearing of this habitat must be avoided between April 1 and August 31 to avoid direct impacts to these species. Based on current regulations, an authorization under the ESA will be required to address the loss of habitat for these species and their habitat.

Butternut

Butternut is listed as Endangered under the ESA. To date, three (3) Butternuts have been documented in the vicinity of the project during field investigations. Of these, one (1) has been removed as a result of tree clearing for another project along the proposed alignment of Teston Road, west of Dufferin Street. The remaining two (2) are located within 120m of the proposed site plan. However, both of these Butternuts are located greater than 50 metres away from the proposed work, therefore no impacts to Butternuts or their habitat are anticipated as a result of the proposed project.

Given the locations of known Butternuts currently, no specific actions are anticipated. However, there is potential for new trees to establish at different locations before commencement of the project. If this species is identified within the project limits at a later time, appropriate actions will need to be undertaken and authorization under the ESA will need to be obtained for this species.

Black Ash

Black Ash has been previously recorded in the area, within the white cedar – conifer mineral coniferous swamp (SWC1-2) community (near BBS 13). As of January 26, 2022, Black Ash was listed as Endangered under the ESA, though protections under the ESA are currently suspended for this species (until 2024). No Black Ash trees are currently present within the proposed work limits, therefore no impacts to this species are anticipated as a result of the proposed project.

Given the locations of known Black Ash trees, no specific actions are anticipated, as these trees are located well beyond the proposed project limits. However, there is potential for new trees to establish at different locations before commencement of the project. If this species is identified within the project limits at a later time, appropriate actions will need to be undertaken and authorization under the ESA will need to be obtained for this species.

Bat Species at Risk

Eastern Small-footed Myotis, Little Brown Myotis, Northern Myotis, and Tri-colored Bat are listed as Endangered under the ESA. As 86 potential maternity roost trees for bats have been documented within numerous treed and forest communities, as per Phase II: Identification of Suitable Maternity Roost Trees of The Protocol, there is potential suitable habitat for these species. Phase III: Acoustic Surveys of The Protocol have not been undertaken and so presence/absence of these species has not yet been assessed. However, based on the quality of the habitat identified, it is likely that one (1) species or more of SAR bats are present. Based on the current design, permanent impacts to SAR bats, if present, and their habitat will include clearing of trees and forest habitat resulting in a loss of roosting locations, fragmentation of what is currently a continuous tract of habitat and loss of interior habitat, potential introduction of invasive and/or non-forest species due to imposed edge impacts, and an increase in noise and disturbance, both during and after construction, which may further reduce useable habitat for bats if they are unable to forage or roost effectively in areas with increased noise and disturbance. If SAR bats are determined to be present, under current legislation, actions for these species would be required under the ESA due to the proposed impacts to their habitat.

Surveys for potential bat maternity roost trees have indicated that potential SAR bat habitat is present. Therefore, acoustic surveys as per Phase III: Acoustic Surveys of The Protocol need to be completed targeting potential roost locations, to determine whether SAR are present and if actions for SAR bats and authorization under the ESA are required before the project can proceed.

Blanding's Turtle

Blanding's Turtles are listed as Threatened under the ESA. Although this species has not been confirmed, as they are not highly detectable and are highly mobile, there is potential for Blanding's Turtle to be present since suitable habitat is available along the East Don River, within wetlands, swamps, and adjacent upland areas for nesting and migration between seasonal habitat types. As this species is known to travel long distances over land to move between over wintering, summer, and nesting sites, construction of a roadway through a continuous tract of undisturbed habitat may create a barrier to Blanding's Turtle movement and introduce the threat of road mortality. If Blanding's Turtles are determined to be present, under current legislation, actions for this species would be required under the ESA due to the proposed impacts to habitat for this species.

No Blanding's Turtles have been observed to date, though suitable habitat is available within the project limits. Therefore, it is recommended that targeted surveys be carried out to determine the presence or absence of this species. In the event that presence is confirmed, an overall benefit permit or other authorization under the ESA may be required.

Mitigation Measures During Construction

The Migratory Birds Convention Act (MBCA) provides legal protection to migratory birds in Canada, and prevents harm, harassment, or destruction of their young, nests, and eggs. Modernized Migratory Birds Regulations under the MBCA came into force on July 30, 2022. The new regulations, provide protection to most migratory bird nests only when they are considered to have a higher conservation value for migratory birds (i.e., when they are active or in use). However, 18 migratory bird species are listed under Schedule 1 of the Migratory Birds Regulations, and nests of these species receive protection year-round unless they have been shown to be abandoned for a specified period of time. Two (2) Schedule 1 species, Pileated Woodpecker and Great Blue Heron, have been observed within or adjacent to the project limits, and one (1), Green Heron, has potential to be present as well. Therefore, further studies to determine nest locations for these species are recommended.

Under the Fish and Wildlife Conservation Act (FWCA) 1997, a person shall not destroy, take, or possess fish or the nest or eggs of a bird that belongs to a species that is wild by nature; this Act generally applies only to birds not covered under the MBCA. The FWCA also regulates the conditions under which numerous species of fish, mammals, reptiles, amphibians, and birds can be caught or hunted, which is defined under the Act to include pursuing, chasing, capturing, harassing, injuring, or killing. The following avoidance and mitigation measures are recommended to avoid impacts to MBCA and/or FWCA protected birds due to the Project activities:

- Individuals, nests, eggs, or young of MBCA or FWCA protected birds shall not be disturbed or destroyed at any time.
- All vegetation and tree removal and/or clearing operations must be completed after August 31 and before April 1 of any year, outside of the breeding bird active nesting season.
    - In the event a tree removal must occur between April 1 and August 31, the Contractor must retain a Qualified Avian Specialist to conduct a survey to confirm that no nests are present, prior to clearing. Nest search surveys are only suitable on isolated trees or in sparsely vegetated areas; they are not to be relied on as an alternative to abiding by the timing window for breeding birds.
- If a bird showing behaviour indicative of nesting (e.g., carrying nesting material, alarm calling, acting agitated, etc.) and/or nests or young birds are encountered in the work limits at any time, consultation with an Avian Specialist shall be completed, and works will not continue in the location of the observation until after August 31 (or until the area is determined by the Avian Specialist to no longer be in use by breeding birds). Species specific buffers (or setback distances) in which no work can occur may be established by the Avian Specialist surrounding nests or other observations, using guidance provided by ECCC.

To prevent impacts to other wildlife during construction, the following shall be implemented:

- A daily pre-construction search of all machinery and the work area shall be implemented to identify presence of wildlife, as animals may be found hiding or basking around equipment, rocks, debris piles etc., especially if they are displaced during construction.
- Before filling any holes or trenches, they shall be inspected for wildlife, and any trapped wildlife shall be removed and released nearby.
- Any wildlife encountered in the work area will not be knowingly harmed and shall be allowed to move away from the work area on their own. In the event that any wildlife encountered does not move away from the area or is injured, the Contract Administrator shall be notified immediately, and a Qualified Biologist should be contacted for recommendations to prevent harassment and/or harm to applicable wildlife.
- A worker awareness program shall be provided to all on-site personnel for all wildlife likely to be encountered on site, which includes species identification, habitat characteristics, and species-specific guidance with respect to appropriate actions to be taken if these species are encountered.
- The Contractor should be advised that any brush piles or soil stockpiles should be tarped or covered to ensure they do not provide nesting, denning, or hiding opportunities for wildlife, unless the intent of such brush piles or soil stockpiles is to provide intentional temporary cover for wildlife during construction.
- Wherever work in or adjacent to water (e.g., in-filling, work adjacent to wetlands or around bridge abutments, etc.) will occur, heavy duty silt fencing and turbidity curtains shall be installed within and adjacent to all turtle habitat areas, to prevent or minimize the risk of harm to turtles by physically preventing turtles from entering the work areas at any time prior to or during construction. Where work in water must occur during the peak activity period for turtles (i.e., April 1 to October 31), heavy duty silt fence and turbidity curtains shall be installed around the work limits, prior to the peak activity period (before April 1), and shall be frequently monitored and maintained for the duration of construction.
- There is potential for turtle nesting in gardens, in lawns areas, along trail systems and roadways, and on sun exposed slopes, or they can be created during construction if there are exposed soils from excavation or soil stockpiles present during the nesting season. If a nesting turtle is observed at any time (i.e., digging or sitting on a nest), the MNRF shall be notified immediately, a five (5) metre buffer zone shall be flagged around the nest site, and the area shall be protected from harm during the nesting season, unless otherwise managed (i.e., relocation or offsite incubation) with MNRF's approval.
- If a turtle is sighted during construction, work will immediately stop near the turtle, and it should be allowed to move out of the work area on its own. The Contractor should immediately notify the Contract Administrator, and the Contract Administrator will be responsible for notifying the MNRF for further direction.

As a result of identified potential roosting habitat (i.e., maternity roost trees) for SAR and non-SAR bats, the following mitigation and avoidance measures to avoid impacts to these species, which are protected under the FWCA and/or ESA, shall be implemented:

- No tree removals or vegetation clearing can occur in potential bat habitat areas (i.e., where potential maternity roost trees were identified) until it is first confirmed through acoustic monitoring whether SAR bats are present, and whether a permit (or other authorization) under the ESA is required for impacts to SAR bats and their habitat.
- If SAR bats are present, additional mitigation measures have been proposed in **Appendix E** but will be finalized during Detail Design.

10.3.4 Tree Inventory & Assessment

10.3.4.1 Environmental Effects & Impact Assessment

Two approaches were undertaken to complete the tree inventory and assessment for this project within the Preliminary Design, including individual assessments of Regionally owned trees within the ROW and private trees 10m from the Preliminary Design, and prism sweeps conducted within the woodland feature situated along Teston Road between Keele Street and Dufferin Street to provide a general understanding of forest density within the Preliminary Design.

Based on the results of the tree impact analysis, using the Preliminary Design, a total of 396 individual trees are currently anticipated for removal, including 329 trees located within the Preliminary Design Impact Area, 4 trees located within the 10m Buffer Area, and 63 trees in poor or dead condition that should be considered for removal within and outside of the Tree Inventory Study Area. **Table 10-3** summarizes the number of trees anticipated for removal, injury and protection, and retention within and outside of the Tree Inventory Study Area.

Table 10-3: Summary of Individual Tree Recommendations

Ownership	Trees Recommended for Removal	Trees Recommended for Protection/Injury	Trees Recommended for Retention – No Injury	Total
York Region (ROW Trees)	286	50	87	**423**
Private Property	98	30	176	**304**
Shared (York Region & Private Property)	12	3	4	**19**
Total	**396**	**83**	**267**	**746**

A total of 746 individually assessed trees were inventoried within and outside the Tree Inventory Study Area, including 360 trees recommended for removal as they currently exist within the Preliminary Design. A total of 524 trees were tallied between 38 survey stations within the woodland feature using the prism sweep method. A total of 3.91 ha of the woodland feature is recommended for removal as that portion currently exists within the Preliminary Design. These woodlands range in stand basal area from 8m^2 to 50m^2 across 10 different ELC communities.

It is highly recommended that a detailed tree inventory be completed within the project extents and woodland feature between Keele Street and Dufferin Street during the Detail Design phase of this project to confirm the number of trees to be impacted by construction works to determine tree removal compensation requirements and ensure tree protection fencing is established for trees recommended for protection and retention.

10.3.4.2 Mitigation Recommendations

The following recommendations represent general arborist best practices for tree removal operations and should be reassessed during the Detail Design phase of this project, as construction methods, grading limits and staging areas should be confirmed by that time and tree protection fencing can be reviewed for each tree recommended for protection. Additionally, parcel fabric data should be requested from York Region at Detail Design to confirm tree ownership to calculate the appropriate tree removal compensation plantings or monetary value owed, as described per the Street Tree and Forest Preservation Guidelines.

Tree Removal

It is recommended that a Certified Arborist be retained during tree removal operations to ensure that standardized arboricultural techniques are employed, prior to and during the proposed work activities, and to confirm the need to remove or protect additional trees in proximity to the Tree Inventory Study Area. Additionally, it is recommended that a Certified Arborist return at the conclusion of construction to assess the health of trees that were protected during construction and identify opportunities for mitigation should any trees display signs of stress (i.e., falling limbs, declining health, etc.).

Tree Preservation

It is recommended that a Certified Arborist be retained to regularly monitor the Project’s construction activities to ensure that all trees that are recommended for protection and retention are being maintained adequately, in relation to standard arboricultural practices. Additionally, no grading, excavation or restoration related activities are to occur within the TPZ of any protected or retained trees, if it cannot be avoided, without the supervision of a Certified Arborist. Should the limits of the proposed excavation areas change, a Certified Arborist will be retained to review trees with TPZs intersecting new excavation area limits to determine whether trees shall be recommended for removal, injury and protection or retention.

As per the Region’s Street Tree and Forest Preservation Guidelines, all trees measuring 24cm DBH and less require a TPZ distance of 2.4m. For trees measuring 25cm and above, 10cm of trunk protection must be provided for every centimeter of trunk diameter.

Tree Protection Fencing

Tree protection fencing should be installed around trees recommended for protection and retention during the Detail Design, where retained trees are near the Impact Area prior to the any work activities taking place within the Tree Inventory Study Area. The tree protection fencing shall be installed in accordance with the Region’s Street Tree and Forest Preservation Guidelines and follow the Region’s typical detail drawing NHF-400.

Vegetation Clearing and Management

Vegetation removal, including tree removal will be limited to the specified activity areas and shall not commence until required permits and approvals are obtained.

Clearing of vegetation outside of the breeding bird season is recommended to reduce potential impacts to migratory birds and avoid contravention of the Migratory Birds Convention Act. Searching for nests by a qualified biologist are not recommended within complex habitats, as the ability to detect nests is low while the risk of disturbance to active nests is high. This disturbance increases the risk of nest predation or abandonment by adults. Nests searches may be completed during the nesting period (April 1 to August 31) by a qualified biologist within 'simple habitats' (ECCC 2018) which refer to habitats that contain few likely nesting spots or a small community of migratory birds. Clearing in simple habitats during the nesting season can only occur if a qualified biologist has confirmed it would not affect the nest or young of a protected species.

Where works are proposed within a TPZ of a tree proposed for preservation, clearing of vegetation shall be performed manually to reduce soil compaction and mechanical damage to the tree. These recommendations are critical along the large proposed retaining wall on site.

Branch Pruning

Where branches are likely to be damaged during construction, they shall be pruned accordingly, prior to construction activities, to avoid unnecessary damage to the tree.

Roots

Root damage shall be minimized by restricting equipment in the vicinity of the existing Critical Root Zone (CRZ) and limiting equipment within the construction limits. This will help minimize damage if there is any excavation in the areas of a preserved tree. It is critical to avoid damage to the structural root plate to prevent affecting tree stability and thus creating a hazard tree.

10.3.5 Rare Vegetation & Flora

Butternut is listed as Endangered under the ESA. To date, three (3) Butternuts have been documented in the vicinity of the project during field investigations. Of these, one (1) has been removed due of tree clearing for another project along the proposed alignment of Teston Road, west of Dufferin Street. The remaining two (2) are located within 120m of the proposed site plan. However, both Butternuts are located greater than 50 metres away from the proposed work, therefore no impacts to Butternuts or their habitat are anticipated due to the proposed project.

Given the locations of known Butternuts currently, no specific actions are anticipated, as these trees are greater than 50m from the proposed project limits. However, there is potential for new trees to establish at different locations before commencement of the project. If this species is identified within the project limits at a later time, appropriate actions will need to be undertaken and authorization under the ESA will need to be obtained for this species.

10.4 Socio-Economic Environment

10.4.1 Property Requirements

To facilitate construction of the project approximately 4.3 hectares of public and private property will need to be acquired by York Region to construct the project and approximately 2.2 hectares of temporary easements are required for the construction of the project. No full buyouts are required to construct the project.

During detailed design, reductions to property and easement requirements will be examined.

10.4.2 Noise

The roadway noise prediction model used is the ORNAMENT road noise prediction algorithm produced by the MECP. The MECP "STAMSON" highway noise prediction model is a computerized version of this method. Both methods are simplified versions of the United States Federal Highway Administration Method. A Cadna/A implementation of the STAMSON/ ORNAMENT model was used for the noise analysis because of its ability of handle complex ground elevations, multiple barriers, and receptors. The Cadna/A software also considers screening from buildings that are located between the roadways and the Noise Sensitive Areas (NSAs).

10.4.2.1 Noise Mitigation

There are anticipated noise impacts for this project that are above some of the noise impact criteria in the York Region Policy. Noise barriers for receivers with over 5 dB of increase from "no-build" to "build" conditions were quantitatively assessed and deemed infeasible due to location, cost, and providing less than 6 dB of attenuation. These locations may be candidates for a potential noise barrier and will be reviewed/confirmed using the current policies and site conditions at the time of detailed design in the future.

As a result, it is recommended that an additional noise impact study be undertaken prior to construction as site conditions, the road design and traffic volumes will likely be different than those assumed in this study.

10.4.2.2 Mitigation Recommendations

The potential environmental noise impacts of the proposed undertaking have been assessed. Both operational and construction noise impacts have been considered. The conclusions and recommendations are as follows:

- The results show that changes in sound levels resulting from the proposed project (without the potential future GO Rail grade separation) are expected to be very minor for the homes west of Keele Street and for the homes located between Dufferin Street and Bathurst Street.
- Noise impacts of the proposed future conditions at existing south side residential properties both with and without the potential grade raise west of Keele Street (associated with a potential future GO Rail grade separation) were quantitatively

assessed. It is very likely that noise mitigation would be required in the vicinity of the Teston Road grade raise if this is undertaken in future.

- The noise sensitive areas shown as Receptors 4, 6 to 9, 18 and 19 would experience significant increases in sound levels. See **Appendix G** for location of sensitive receptors.
- No mitigation is possible for Receptor 4, 6, and 26 due to the presence of driveways that need to be maintained.
- Receptors 7 to 9, 18 and 19 will experience a significant change in noise levels once the new Teston Road bridge over the Don River East Branch is constructed and in operation. There are anticipated noise impacts for this project that are above some of the noise impact criteria in the York Region Policy for analyzing mitigation. However, sound levels are still predicted to be below 60 dBA and therefore mitigation should be deferred until levels are above 60 dBA.
- Proposed developer-constructed noise barriers for the development at Receptors 7-20 were included in the assessment based on plans provided in the Detailed Environmental Noise Report conducted by Jade Acoustics Inc., for the 1600 Teston Road development. The proposed barriers reduce the future noise levels to below 60 dBA which falls within the guideline limits of MECP Guideline NPC-300 for outdoor living areas with the inclusion of appropriate warning clauses and York Region's Policy.
- Receptors 7-20 may be candidates for a potential noise barrier and will be reviewed/confirmed using the current policies and site conditions at the time of detailed design in the future. It is highly recommended that an additional noise impact study be undertaken closer to the anticipated date of construction as emission levels from vehicles may change.
- Construction noise impacts are temporary in nature but may be noticeable at times in nearby residential NSAs. Methods to minimize construction noise impacts should be included in the contract documentation.
- Where possible construction should be carried out during The City of Vaughan's normally allowed hours specified in the City of Vaughan by-law which restricts the operation of any construction Vehicle or equipment between the hours of 7pm-7am.

10.4.3 Air Quality Assessment

The objective of the Air Quality Assessment study was to assess the local air quality impacts due to the proposed road widening and extension. The two following scenarios were considered:

- 2018 No Build (NB): Assess the existing air quality conditions at representative receptors. Predicted contaminant concentrations from the existing traffic levels were combined with hourly measured ambient concentrations to determine combined impacts.
- 2041 Future Build (FB): Assess the future air quality conditions with the proposed project in place. Predicted contaminant concentrations associated with traffic levels for the preferred alternatives were combined with hourly measured ambient concentrations to determine combined impacts.

The emission modelling was based on the USA's Motor Vehicle Emission Simulator (MOVES). The modelling considered vehicle emissions from Teston Road, and its major intersecting roadways: Keele Street, Dufferin Street, and Bathurst Street.

The maximum combined concentrations for the Future Build were below their respective MECP guidelines or Canadian Ambient Air Quality Standards (CAAQS), except for the 1-hr and annual NO2 CAAQ, 24-hr PM10, 24-hr TSP, 24-hr benzene and annual benzene. Note that background concentrations exceeded the guideline for all these contaminant averaging periods as well. The overall contribution from the roadway emissions to the combined concentrations was small.

Mitigation measures are not warranted, due to the small number of days which are expected to exceed the guideline.

10.4.3.1 Air Quality Impacts During Construction

During construction of the roadway, dust is the primary contaminant of concern. Other contaminants including NOx and VOC's may be emitted from equipment used during construction activities. Due to the temporary nature of construction activities, there are no air quality criteria specific to construction activities. However, the Environment and Climate Change Canada's "Best Practices for the Reduction of Air Emissions from Construction and Demolition Activities" document provides several mitigation measures for reducing emissions during construction activities. Mitigation techniques discussed in the document include material wetting or use of non-chloride dust suppressants to reduce dust, use of wind barriers, and limiting exposed areas which may be a source of dust and equipment washing. Furthermore, as annual PM2.5, 24-hr PM10, and 24-hr TSP levels will exceed their corresponding guidelines in the future build scenario, additional mitigation measures such as planting vegetation (for example coniferous species and shrubs) should be considered to minimize particulate impacts at nearby sensitive receptors. It is recommended that these best management practices be followed during construction of the roadway to reduce any air quality impacts that may occur.

10.4.4 Climate Change

The MECP (formerly the Ministry of the Environment and Climate Change) released a guide in 2017 titled "Considering Climate Change in the Environmental Assessment Process" (the 2017 Guide) which outlines how Proponents (York Region) can incorporate consideration of climate change impacts into the EA process. York Region's Climate Change Action Plan, adopted in 2022, outlines the region's priorities for greenhouse gas emission reduction, transitioning to a low-carbon way of living and building resilient communities.

This IEA considered the project's potential impact on GHG emissions; assessed the resiliency or vulnerability of the project to changing climate conditions; and, identified potential climate change adaptations and future monitoring requirements based on regional climate and severe weather projections to 2050 and beyond.

Greenhouse Gas Emissions: Construction & Rehabilitation

The effects of the project on climate change were determined by completing a GHG assessment for embodied emissions associated with the construction of the project. The overall approach is quantitative.

GHG emissions are divided into three categories, known as Scope 1, 2 and 3. Scope 1 refer to direct sources owned or controlled by the proponent. Indirect emissions are divided into Scope 2 and Scope 3 emissions. Scope 2 refers to indirect emissions from the consumption of electricity, natural gas, steam, and/or heating and cooling. Scope 3 refers to all other indirect emissions both upstream and downstream (Government of Canada, 2024). The GHG assessment considered scopes 1 and 3 for GHG emissions associated with the following phases: earthworks and mass hauling, construction materials, and use. Results were reported as a mass of CO_{2e} in tonnes. The calculations were performed on OneClick LCA.

The total GHG emissions for the development of the Project is estimated to result in a whole life cycle net release of 10,920 T CO_2e.This includes construction and major rehabilitation/refurbishment (repaving) of the roadway.

The effects of climate change on the project were determined by conducting a climate vulnerability risk assessment (CVRA) following the PIEVC High Level Screening Guide (HLSG). Under the RCP8.5 high emissions scenario, some of the potential hazards identified for this project include extreme heat impacts to roadway, bridges, culverts, transit facilities, landscaping, public health; freezing rain impacts to above ground utilities, roadway, bridges, transit and active transit facilities, landscaping; riverine flooding impacts on bridges, culverts, roadways, ground-level facilities; extreme wind impacts to bridges, landscaping, above ground utilities, and user safety; and air quality/indirect wildfire impacts to roadway infrastructure, bridges and public health.

Greenhouse Gas Emissions: Operations

In addition to the contaminants of interest assessed in the local air quality assessment (See above and **Appendix H**), greenhouse gas (GHG) emissions were predicted for the project considering traffic/vehicular operational emissions. Potential impacts were assessed by calculating the relative change in total emissions between the 2018 Existing and 2041 Future Build scenarios as well as comparing the total emissions to the 2030 provincial and Canada-wide GHG targets. Total GHG emissions from the roadway operations were determined based on the length of the roadway, traffic volumes, and predicted emission rates.

From a GHG perspective, the contaminants of concern from motor vehicle emissions are carbon dioxide (CO2), methane (CH4), and nitrous oxide (N2O). These GHGs can be further classified according to their Global Warming Potential. The Global Warming Potential is a multiplier developed for each GHG, which allows comparison of the ability of each GHG to trap heat in the atmosphere, relative to carbon dioxide. Using these multipliers, total GHG emissions can be classified as CO2 equivalent emissions.

For this assessment, the MOVES model was used to determine total CO2 equivalent emission rates for the traffic levels, posted speed and heavy-duty vehicle percentage on Teston Road Extension.

The results show that the average daily GHG emissions along Teston Road within the project limits are predicted to increase from 3.6 kg of CO2 equivalent per vehicle mile (kg/VMT) travelled in 2018 to 7.8 kg/VMT in 2041 – an increase of 116%.

10.4.4.1 Mitigation Measures

Greenhouse Gas Emissions

To reduce GHG emissions for the construction phase of the project, consideration should be given to:

- Selecting design alternatives that reduce the amounts of materials that contribute the most to the project's GHG emissions (e.g., earth fill, concrete).
- Selecting materials with lower GHG emissions associated with their production.
- Sourcing materials and/or equipment from closer to the project site to reduce emissions associated with their transportation.
- It is crucial to keep durability and practicality of design in mind when evaluating potential GHG reduction measures. Materials with low up-front GHG emissions but reduced longevity or frequent maintenance needs could have higher overall emissions when considering their entire lifecycle. In addition to the embodied emissions resulting from earlier repairs to or replacements of less durable system components, repairs that require traffic queues will add to GHG emissions.
- Another contributor to GHG emissions related to the construction of the project is the fuel consumption required for the construction equipment. Implementing GHG emissions reduction work practices where suitable, such as the use of 'low-carbon' fuels in vehicles and equipment, using of fuel-efficient or electric equipment, as well as regular maintenance and inspection of equipment will help further optimize fuel efficiency and reduce construction-related GHG emissions. Furthermore, shifting the use of energy-efficient vehicles to higher intensity tasks and less efficient vehicles to lower intensity tasks can reduce the GHG emissions associated with the construction equipment.

Climate Change Adaptation

To mitigate the impacts of climate hazards, adaptation options for the project may include engineering and technological solutions, as well as policy, planning, management, and maintenance approaches.

Asset specific adaptation measures to improve resilience include:

- Clear combustible materials away from roadway infrastructure and bridge structures to reduce the risk of indirect wildfire impacts.

- Allow clearance for extreme heat movements in expansion joints to reduce maintenance issues and prolong durability through increased expansion/contraction of elements under extreme heat conditions.
- Provide enhanced erosion and scour protection measures for bridge foundations to build resilience in the case of flooding events and washouts.
- Avoid use of slender elements susceptible to wind or debris impact for increased resilience in extreme wind conditions.
- Planted species selection that are tolerant to harsh climate conditions.
- Additional storage capacity in stormwater management facilities.
- Additional conveyance capacity in culverts/storm sewers to accommodate increased peak flows.

Policy related adaptation measures to increase resilience include:

- Ongoing inspection, maintenance and rehabilitation of roadway and pedestrian facilities, primarily due to adverse impacts from freeze thaw cycles and extreme heat.
- Harden flood susceptible roadway sections and reduce runoff velocities where possible to increase resilience to overland and riverine flooding impacts.
- Ongoing inspection, maintenance and rehabilitation of culverts that may be impacted by flooding events.
- Invasive Species Monitoring Program including increasing monitoring of landscaping and neighbouring areas, and planting species that are resilient to invasive species.
- Health and Safety Management Plan including increased monitoring of road/sidewalk conditions, monitoring of temperatures and air quality in transit facilities, and increased snow clearing and salting to address multiple hazards.
- Utility Power (Off-Site Services) Outage Management Plan including monitoring and/or upgrades to current emergency power distribution and implementing of additional emergency lighting to address extreme heat risks, freezing rain, extreme wind, and snowfall.

10.5 Cultural Environment

10.5.1 Archaeology

A Stage 1 Archaeological Assessment for the Teston Road IEA was previously completed during the Terms of Reference phase (New Directions Archaeology Ltd., 2018). Background research and a property inspection determined that portions of the Study Area retained archaeological potential and Stage 2 test pit survey was recommended. In addition, the study concluded that the study corridor had potential for containing an ossuary and ossuary construction monitoring was recommended following York Region's Official Plan. The full Archaeological Assessment can be found in **Appendix I.**

The Stage 2 property survey was conducted from December 13-14, 2022, and a Stage 1 property inspection was conducted on April 13, 2023. The remainder of the Stage 2 test pit survey took place from May 23-26, 2023. Approximately 83.5 percent of the Study Area did not exhibit archaeological potential on account of previous assessment, previous disturbance within the Teston Road right-of-way, and permanently low and wet and sloping conditions associated with a tributary of the Don River. Approximately 0.8 percent of the Study Area (0.14ha) was inaccessible at the time of survey due to a lack of permission to access. This area demonstrates archaeological potential and requires Stage 2 test pit survey at five metre intervals prior to any soil disturbing activities. The remaining 15.7 percent of the Study Area (2.77 hectares), comprising woodlots and manicured lawns, was subject to test pit survey at five metre intervals and judgmental test pit survey at 10 and 20 metre intervals to confirm previous disturbance or permanently low and wet gleyed soils. Gleysolic soils result from prolonged water saturation of the soil profile.

As a result of this assessment, the late nineteenth to early twentieth century historical Euro-Canadian Oliver site was identified within the Teston Road study area, located within the valley lands west of Dufferin Street. The Oliver site was evaluated with reference to S & G Section 3.4.2, Standard 1.a, which stipulates that a domestic site contains cultural heritage value or interest if the majority (80 percent) of the time span of occupation pre-dates 1870. As more than 80 percent of the Oliver site artifact assemblage does not pre-date 1870, it does not meet the requirements for Stage 3 assessment following S & G Section 3.4.2, Standard 1, and therefore does not require further work. There are presently two Late Woodland Indigenous sites within one kilometre of the current Study Area where associated ossuaries have not been identified: the McNair site (AlGu-8) and the McGaw site (AlGu-88). Following the policies laid out in the 2022 York Region Official Plan (York Region, 2023) and York Region Archaeological Management Plan (York Region, 2014), it has been determined that portions of the Study Area demonstrate ossuary potential and will require burial avoidance strategies should those lands be proposed for development.

10.5.1.1 Ossuary Potential

The 2022 York Region Official Plan (York Region, 2023) sets out directions and policies that guide economic, environmental and community planning decisions for the Region, including endorsement of the York Region Archaeological Management Plan, entitled Planning for the Conservation of Archaeological Resources in York Region (York Region, 2014). In addition to outlining existing archaeological resources and areas of archaeological potential, the management plan also sets out guidelines for the identification and treatment of ossuaries.

Ossuaries are features in which the remains of numerous individuals, who were formerly interred within ancestral Wendat villages, were disinterred, and re-deposited into one or two mass graves. Ossuaries range in size from those that contain the disarticulated and/or bundled remains of approximately ten individuals, to those that contain the remains of 500 people or more. Their usual depth of over one metre renders them invisible in the modern landscape and impossible to identify through standard methods used in Stage 2 archaeological assessments. These features are most often discovered by chance during site alteration or construction activities that require large scale earth moving. In York Region, this most recently occurred at the site of the widening of Teston Road in the City of Vaughan when the side of a small knoll was removed. Its associated village is located within 200 metres of the ossuary.

Because there are only a small number of ossuaries that have been systematically studied and precisely mapped and therefore linked with their villages, there are limited data on which to construct a model to predict their locations. The information that is available indicates that most ossuaries will be located within 1000 metres of their associated village and also within 300 metres of a current or former water source. Each Late Woodland village for which an ossuary has not yet been located has therefore been buffered by 1000 metres on those lands that are also within 300 metres of water. These lands will be subject to special monitoring measures to minimize impacts to incidental discoveries of ossuaries. This model will be modified to add the buffers around any newly discovered village sites within York Region, and as more data are collected with regard to geographical or cultural attributes that may relate to ossuary locations.

There are presently two Late Woodland Indigenous sites within one kilometre of the current Study Area where associated ossuaries have not been identified: the McNair site, located south of Teston road on Vanda Drive, north of Sir Angelo Way, and the McGaw site, located in Twickenham Park north of Canyon Hill Avenue. ASI has applied the above potential model to the current Study Area and has determined that portions of the Study Area meet these requirements and will require burial avoidance strategies should those lands be proposed for development.

Considering the Stage 2 results the following recommendations are made:

- The Oliver site is a late nineteenth to early twentieth century Euro-Canadian site attributed to the occupation of the property by Thomas Oliver circa 1903-1937. As more than 80 percent of the Oliver site artifact assemblage does not pre-date 1870, it does not meet the requirements for Stage 3 assessment following S & G Section 3.4.2, Standard 1, and therefore does not require further assessment.
- Some of the Keele Valley landfill lands (7 Eaglet Court) that overlap with the Study Area exhibit archaeological potential and require Stage 2 test pit survey at five metre intervals for the undisturbed areas, prior to any soil disturbing activities.
- The Teston Road IEA Study Area includes lands within the established ossuary monitoring buffer associated with the Late Woodland period McNair sand McGaw village sites. Detailed monitoring strategies should be formulated at the time construction is proposed.
  - To minimize the risk of impacting an ossuary within the project limits, archaeological monitoring of any proposed construction activities by a licensed archaeologist is recommended within both 1000 metres of the McNair and McGaw village sites and 300 metres of water. This should include a monitoring program specifically tailored to project impacts and may include systematic testing of fill soils and mechanical trenching to determine if there are any extant topsoil deposits.
- Should the proposed work extend beyond the current Study Area or should changes to the project design or temporary workspace requirements result in the inclusion of previously un-surveyed lands, these lands should be subject to a Stage 2 archaeological assessment.

10.5.2 Built Heritage

The results of background historical research and a review of secondary source material, including historical mapping, indicate a study area with a rural land use history dating back to the early nineteenth century. A review of federal, provincial, and municipal registers, inventories, and databases revealed that there are 18 previously identified features of cultural heritage value within the Teston Road – Highway 400 to Bathurst Street study area. An additional 37 potential heritage properties were identified during desktop review and fieldwork. Of these 18 known and 37 potential Built Heritage Resources (BHRs) and Cultural Heritage Landscapes (CHLs) were identified within the overall study area, one BHR and five CHLs are within or adjacent to the proposed Teston Road extension alignment. The location of the BHRs and CHLs can be found in **Appendix J.**

Based on the results of the assessment, the following recommendations were developed:

- Construction activities and staging should be suitably planned and undertaken to avoid unintended negative impacts to identified BHRs and CHLs. Avoidance measures may include, but are not limited to erecting temporary fencing, establishing buffer zones, issuing instructions to construction crews to avoid identified BHRs and CHLs, etc. Where the proposed alignment cannot be revised to avoid impacts, the depth and extent of grading should be limited to reduce impacts to identified BHRs and CHLs. In this respect, grading limits should be revised to reduce or eliminate potential impacts to 981 Teston Road (CHL 17) and 1600 Teston Road (CHL 18) to the extent practicable. Where there is tree or vegetation removal anticipated, the removal of mature trees and vegetation adjacent to Teston Road should be limited to the extent feasible. Where tree removals are required, post construction rehabilitation with sympathetic plantings should be implemented.
- If revising the proposed grading limits is determined to be infeasible, direct adverse impacts would be anticipated to 981 Teston Road (CHL 17). Given the potential cultural heritage value of this property, a resource specific HIA should be conducted to evaluate alternatives, assess potential impacts to the resource, and recommend appropriate mitigation measures if suitable avoidance measures cannot be implemented.
  - The HIA should be completed by a qualified heritage professional with recent and relevant experience as early in detailed design as possible.
- Direct impacts to CHL 26 (Northeast corner of Teston Road and Dufferin Street) are anticipated to include property acquisition, encroachment onto the property, grading, and the construction of a curb and gutter along the southern portion of the property. While the property will be directly impacted, encroachment and construction activities are not anticipated to have direct or indirect adverse impacts to the potential cultural heritage value or interest of the property or identified potential heritage attributes. The proposed property acquisition and encroachment should be minimized, where technically feasible, to limit the impacts to the property. Suitable mitigation measures should include post construction rehabilitation with sympathetic plantings where vegetation removals are anticipated. Suitable mitigation measures may also include establishing no-go zones with fencing and issuing instructions to construction crews to avoid the CHL.

- Direct impacts to CHL 27 (Barrie GO Rail Corridor) are anticipated to include the re-alignment of Teston Road to the north of its current intersection with the Barrie GO Rail Corridor. While the rail corridor will be directly impacted, the net effects of the re-alignment are not anticipated to have direct or indirect adverse impacts to the potential cultural heritage value or interest of the rail corridor or identified potential heritage attributes. As such, the proposed design and construction activities related to this project are not anticipated to result in permanent adverse impacts to identified potential heritage attributes if suitable postconstruction mitigation is employed. Post-construction rehabilitation should be completed to return the active rail corridor to its pre-construction conditions and to reduce impacts on rail operations where feasible.
- Vibrations during construction activities may impact CHL 16 and CHL 17 due to their location in close proximity to the proposed alignment. To ensure potential heritage attributes are not adversely impacted during construction, a baseline vibration assessment should be undertaken during detailed design for the properties at:
  - 814 Teston Road (CHL 16), and
  - 981 Teston Road (CHL 17).
- Should this advance assessment conclude that the any structures or potential heritage attributes will be subject to vibrations, a vibration monitoring plan should be prepared and implemented as part of the detailed design phase of the project to lessen vibration impacts related to construction.
- Should future work require an expansion of the study area then a qualified heritage consultant should be contacted to confirm the impacts of the proposed work on potential heritage resources.

Within the Cultural Heritage Assessment Report (**Appendix J**) it is noted that the buildings on the 1600 Teston Road property would require a resource specific HIA to be completed if suitable avoidance measures cannot be implemented. Subsequent to completing the Cultural Heritage Assessment Report, the owner of the property has completed their own Cultural Heritage Screening (LHC Heritage Planning & Archaeology Inc., 2024). This screening has determined that the property does not meet the criteria under the Ontario Heritage Act and that no HIA is required. Acceptance of this recommendation should be confirmed with the City of Vaughan during detail design.

10.6 Built Environment

10.6.1 Sediment & Erosion Control

10.6.1.1 Erosion Protection

To reduce erosion of the embankment side slopes (bridge and culvert) due to surface water runoff, placement of topsoil and seeding or pegged sod should be carried out on the embankment slopes as soon as practicable after construction of the embankments. In the short term, if placement of cover material cannot be carried out soon after the construction of the embankments, erosion control blankets should be installed to minimize erosion of the embankment slopes and to prevent surface runoff water from infiltrating into the backfill. The erosion protection should be in accordance with OPSS.MUNI 804 (Seed and Cover). Maintenance may be required over the first several years until the vegetative mat is fully established. Further details can be found in **Appendix R**.

10.6.1.2 Scour Protection

Provision should be made for scour and erosion protection (suitable non-woven geotextiles and/or rip rap, and/or river stone slope protection) at the culvert inlet/outlet locations and at the toe of the bridge embankment slopes adjacent to the East Don River tributary.

To prevent surface water from flowing beneath or around the proposed culvert located west of Saul Court, creating seepage through the embankment fill, and potentially causing erosion and loss of fine soil particles, a barrier such as a clay seal or concrete cut off headwall should be provided at the upstream and downstream end of the culvert. If a clay seal is adopted, the clay material should meet the requirements of OPSS.MUNI 1205 (Clay Seal), and the seal should be a minimum thickness of 1.0 m. The clay seal should extend from a depth of 1.0m below the scour level to a minimum vertical height equivalent to the high-water level. The seal should also extend from the open footing to a minimum horizontal distance of 2.0m on either side of the culvert inlet opening. Alternatively, a 0.6m thick clay blanket may be constructed (assuming a headwall is not constructed), extending upstream three times the structure height and along the adjacent slopes to a height of two times the structure height or the high-water level, whichever is greater.

The requirements for and design of erosion protection measures (i.e., size, thickness, and extents) for the inlet and outlet of the culvert and at the toe of the bridge embankment slopes should be assessed by the hydraulics design engineer. As a minimum, rip rap treatment for the inlet/outlet of the culverts be consistent with the standard Treatment Type A presented in OPSD 810.010 (Rip Rap Treatment).

10.6.1.3 Excavations

All excavations for the proposed Teston Road embankments, bridge and culvert including for stripping or footing construction should be carried out in accordance with O.Reg. 213 Ontario Occupational Health and Safety Act for Construction Projects (as amended).

10.6.1.4 Import/Export of Excess Soil

All importation or exportation of excess soil for the Project shall be done in accordance with O. Reg. 406/19 – On-site and Excess Soil Management and MECP’s Rules For Soil Management And Excess Soil Quality Standards (the Soil Rules).

The quality of the soil for importation at different sections of the Project Area shall be determined using the guidelines outlined in the Soil Rules. The quality of soil to be imported in the Keele Valley region shall meet MECP’s Table 1 Full Depth Background Site Condition Standards (Table 1 SCS). The quality of soil to be imported in all other areas shall meet MECP’s Table 2.1 Full Depth Excess Soil Quality Standards in a Potable Ground Water Condition (Table 2.1 ESQS) or Table 3.1 Full Depth Excess Soil Quality Standards in a Non-Potable Ground Water Condition (Table 3.1 ESQS), depending on the presence or absence of potable groundwater wells within the Study Area. The property use within the Study Area shall be determined by a Qualified Person (QP), as defined under O. Reg. 153/04, during the final design or pre-construction stage to select the right MECP standards, corresponding to agricultural or other, residential/parkland/institutional, or industrial/commercial/community property use.

The Project Leader or their Qualified Person (QP) shall complete all required assessments and studies to meet the requirements of O. Reg. 406/19.

10.6.1.5 Soil Management

A total of eighteen (18) boreholes locations were selected to collect soil samples which were submitted for the laboratory analyses of metals, inorganics, PHC, BTEX, VOC, PAH, OCP, PCB, phenols, dioxins and/or furans. The results of the chemical analyses indicated that all the soil samples met the applicable site condition standards for all the parameters tested, except for select metal exceedances of the Table 3 site condition standards in soil sample MH-BH1 which is located immediately east of the railway tracks.

Pockets of waste may be present within the road right-of-way, though, if present they are likely to be small and shallow. Landfill gas will likely be present in the sub-surface within the road right-of-way, and measures should be included in the design to prevent its migration into new infrastructure (particularly storm sewers).

The following are recommendations for assessing and managing soil for the later phases of design and construction:

- Additional soil quality sampling and analysis should be carried out in conjunction with geotechnical investigations, to continue to delineate areas of poor-quality soil identified in this study (area of MH-BH1) and to build a data set for the appropriate management of excess materials.
- An overall Soil (or Earth) Management Plan should be developed, outlining areas and volumes of potential cut and fill, strategies for on- and off-site management of soil, environmental quality of soil, strategies for excess soil management in accordance with O.Reg. 406/19, approaches for waste management.
- The presence of landfill waste within the road ROW should be further investigated during the geotechnical investigation that will be undertaken at later design stages.
- The presence of landfill gas beneath the road ROW should be further investigated in conjunction with the geotechnical investigation that will be undertaken at later design stages.
- A mitigation plan should be developed against the possibility of encountering any landfill related waste and gases during excavation activities. In such an event, the landfill operator should be immediately notified, and control measures should be taken to minimize the exposure of harmful chemicals and gases to construction workers.

10.6.2 Drainage and Stormwater Management

10.6.2.1 Drainage

The proposed Teston Road improvements would result in an increase in pavement areas. The total increase in pavement area is approximately 20 ha, approximately 25% of the overall existing pavement area which will result in higher potential pollutant loading and peak flow.

The potential impact to each outlet in term of imperviousness is summarized **Table 10-4** below.

Table 10-4: Summary of Potential Impacts on an Outlet Basis

Outlet ID	Catchment ID	ROW Area (ha)	Impervious Area				Existing Condition	Proposed Work
			Existing (ha)	Existing Impervious (%)	Proposed (ha)	Proposed Impervious (%)		
Outlet #1	101/201	0.41	0.22	54%	0.22	54%	Urban	Transition
Outlet #2	102/202	0.80	0.35	44%	0.40	50%	Urban	Transition/Realignment
Outlet #3	103/203	4.48	1.43	32%	3.20	71%	Local Road	Widening/Realignment/ New Road
Outlet #4.1	141/241	3.10	0.00	0%	2.06	66%	No Road	New Road
Outlet #4.2	142/242	0.72	0.04	5%	0.50	70%	No road	New Road
Outlet #5	105/205	0.41	0.23	56%	0.30	73%	Urban	Widening
Outlet #6	106/206	1.64	0.74	45%	1.20	73%	Rural	Additional Cycle and Sidewalk
Outlet #7	171/271	2.67	1.16	43%	1.49	56%	Rural	Addition Cycle and Sidewalk
Outlet #8.1	181/281	0.97	0.36	37%	0.64	66%	Rural	Addition Cycle and Sidewalk
Outlet #8.2	182/282	1.33	0.63	47%	0.96	72%	Rural	Addition Cycle and Sidewalk
Outlet #9	109/209	1.23	0.60	49%	0.90	73%	Rural	Addition Cycle and Sidewalk
Outlet #10	110/210	0.90	0.53	59%	0.62	69%	Urban/Rural	Addition Cycle and Sidewalk

Water Quantity Requirements

As per TRCA SWM criteria, unit flow rates should be used for all the sites located north of Steeles Ave that are greater than 5 ha. Linear infrastructure projects often have limited space available within the right-of-way and multiple outlets with small catchment areas for each outlet. Therefore, it may be difficult to meet unit flow targets for linear infrastructure project. Based on consultations with TRCA, TRCA had indicated that it would be acceptable to apply a best effort approach with post-to-pre control as a minimum.

Erosion and Water Balance Requirements

The minimum target for the erosion control and water balance is retention of 5mm from increased imperious area. Due to the site being located within High Volume Groundwater Recharge Areas, maintaining pre-development groundwater recharge rates is required by TRCA. It is recommended to conduct water balance analysis and further evaluate the feasibility of enhanced recharging measures during the detailed design stage. It is recommended that any recharging facilities be situated at more than 250 meters from the boundary of landfill sites.

A Stormwater Management plan was developed to meet the stormwater management objectives in terms of water quantity, quality, erosion, and balance. Further details regarding this can be found in **Appendix L.**

10.6.3 Fluvial Geomorphology

The details of the geomorphological assessments are included in the Teston Road Extension IEA Fluvial Erosion Hazard Study Report, which can be found in **Appendix P.**

The results of the study show that the meander belt (commonly used to define erosion hazard setbacks, and a regulatory limit that establishes the setback for new developments) width is 43.1m. 100-year fluvial erosion rates are estimated at 8m.

10.6.4 Source Water Protection

The closest Wellhead Protection Area is located more than a kilometre away from the study area, so no impacts are anticipated from the project.

The aquifer beneath the Study Area is “vulnerable” to contamination by road salt specifically because of the existence of landfill-related chloride plumes within it. Stormwater discharge to ground should be directed outside the area where these plumes exist and are monitored.

The closest intake protection zone is identified in Lake Ontario, located more than 25 kilometers away from the Study Area. No impacts to this intake protection zone are anticipated from this Project.

10.6.5 Hydrogeology

The current design appears to avoid impacts to the landfill purge well systems and the vast majority (all but three Keele Valley Landfill monitoring wells) of the groundwater monitoring systems. The current design, specifically the MUP on the north side of the road, may conflict with three Vaughan Landfill gas collection wells and associated header pipe. The current design definitely conflicts with approximately nine (9) Vaughan Landfill gas monitoring probes and up to three (3) Keele Valley Landfill gas monitoring probes. Any changes to the landfill infrastructure will require amendments to the ECAs under which the affected landfills operate.

The study has determined that the hard surfacing and drainage changes may result in slight changes in landfill plume chemistry (less dilution of the chloride plumes that are present beneath the landfills), but this is not expected to be significant and may not be detectable in the existing groundwater monitoring program. Conversely, infiltration of salt-impacted road-runoff into the highly permeable soils in the area of the landfills does have the potential to contribute to the existing chloride plumes and to interfere with the ongoing landfill monitoring.

The study has determined that there may be relatively minor lowering of the groundwater level at and around the dewatering locations, particularly at the proposed bridge over the East Branch of the Don River and at the proposed culvert modifications (new headwalls) east of Dufferin Street which are proposed as part of the road improvements and groundwater dewatering will likely be required during construction. Impacts are expected to be temporary and minor but will be further assessed as part of the permitting of water taking activities.

The possibility exists for a small number of domestic wells to remain in use, within 500m of the project. At later design stages of the project, additional desk-top and field well surveys can provide further information. Availability of municipal water supply mitigates the risk to wells and provides a ready contingency measure.

The following mitigation measures are recommended:

- All the conflicts identified with the Vaughan Landfill, Keele Valley Landfill and Disposal Services Landfill infrastructure should be communicated to the landfill operators. Detailed assessment of the severity of the conflict and the appropriate mitigation measures is recommended in later design stages. Any changes to the landfill infrastructure will require amendments to the ECAs under which the affected landfills operate.
- The existing landfill gas flare facility may induce exposure of the combusted gases to the construction workers and future road users and modifications to the ECA (or EASR registration) for air/noise may be required.
- The purge well leachate main should be protected during the construction activities and the proposed design should provide adequate protection against the dynamic load of future traffic on Teston Road.
- All storm drains between Keele Street and the Don River East Branch should be designed to minimize leakage of storm water from the storm drains into the subsurface.

- While the infiltration of storm water is a common practice for “Low Impact Development” or LID, it should not be included in the design of the current project between Keele Street and the Don River East Branch.
- Enhanced monitoring of the eastern edge of the chloride plume is recommended during construction of the bridge over the Don River East Branch.
- Effective erosion and sediment control measures should be put in place at all outfalls to prevent surface water contamination by sediment.
- Follow all Ontario regulations concerning the taking and discharging of water. This may include application for a permit to take water (PTTW), or registration in the Environmental Activity and Sector Registry (EASR), depending on the nature and duration of each taking.
- Develop and implement a Spill Management Plan (SMP) for all construction activities. The contractor will develop and implement the SMP to ensure the construction activities do not increase the risk of release of fuel, oils, or other hazardous materials to the environment which could impact the aquifer systems and/or surface water. The SMP will describe the procedures and equipment in place to minimize spills, leaks, or releases of hazardous materials. In addition, the plan will address the reporting and response procedures in the event of an incident.
- Perform a desktop and possibly a field survey to further identify in-use water wells within 500m of the proposed road alignment. Inform all well users withing 500m of the construction project and its potential effect on wells.

10.6.6 Contamination Overview Study & Phase 1 ESAs

Former and current activities within the Study Area have the potential to impact the soil and/or groundwater along the proposed alignment section. A Contamination Overview Study (for the entire Study Area) and property specific Phase 1 Environmental Site Assessments (ESAs) were undertaken by MH to identify actual or potential issues of environmental concern within the Study Area. See **Appendix N.**

The Phase 1 ESAs included an investigation into current and historic potentially contaminating activities (PCAs) that have occurred on the Phase One Property and on the surrounding properties within the 250m radius (Phase One Study Area) that would contribute to an area of potential environmental concern (APEC) on the Phase One Property. There are seven Phase 1 ESAs covering properties along the Teston Road extension corridor, the locations of the properties can be found in **Appendix N.**

Several areas of potential environmental concern were identified within the Phase 1 ESAs for the Teston Road Study Area:

- Properties 1 & 2 consist of a vacant parcel of land with no buildings on-site. There are two areas of potential environmental concern (APEC) due to a possible importation of fill of unknown quality during the development of former residential dwelling at the property, and a spill of diesel fuel at the intersection of Teston Road and Keele Street.

- Property 3 includes Sutong Tire Resources Inc. (a tire warehouse and distribution facility). There are no Potential Contaminating Activities (PCAs) identified that would result in an APEC at the Phase One Property.
- Property 4 includes the City of Vaughan Landfill. There are two APECs due to a possible importation of fill material of unknown quality during the development of the Phase One Property, and waste disposal sites at the Phase One Property, adjacent north, and south as well as 75m northwest of the Phase One Property.
- Property 5 includes Naverstak Contractors and the Keele Valley Landfill. Two areas of potential environmental concern were identified at the Phase One Property, due to a possible importation of fill material of unknown quality during the development of the Phase One Property, and waste disposal sites at the Phase One Property, adjacent north, and south as well as 75m northwest of the Phase One Property.
- Most of the land at Property 6 is undeveloped with a surface water body on-site. There were no PCAs identified that would result in an APEC at the Phase One Property.
- Similar to Property 6, the majority of the land at Property 7 is undeveloped with a surface water body on-site. Similarly, there were no PCAs identified that would result in an APEC at the Phase One Property.
- At Property 8 one APEC was identified due to historical fuel spills/leaks.

Mitigation Recommendations

Following the Contamination Overview Study (COS) Report, it was identified that the potential contaminants of concern (PCOC) to consider for any future assessment purposes in soil and groundwater include:

- Petroleum related parameters, including PHC fractions F1 to F4 and BTEX, from fuels, vehicular fluids, and landfills
- VOC from solvents, fuel additives, cleaning products, vehicular fluids, and landfills
- PAH from diesel, oils, landfills, and railroad operations
- OC Pesticides from vegetation management and landfills
- PCB from transformer oils and landfills
- Phenols from landfills
- Phthalates from plastics manufacture
- Metals from gasoline, waste oils, pesticides, landfills, and industrial waste
- Inorganic parameters from landfills and industrial waste

A Phase Two ESA is required across properties with PCAs before a Record of Site Condition (RSC) can be submitted for the Site. A Phase Two ESA is therefore recommended for Properties 1 & 2, 4, 5 and 8 which includes seven APEC.

The following mitigation measures are recommended to address the environmental risk identified in this study:

The Contractor must ensure that machinery arrives on site in a clean condition and is maintained free of excess or leaking fuel, lubricants, coolant, or any other contaminants for the duration of construction.

A Spill Response Plan must be prepared that outlines the measures that will be implemented, such as spill kits, and drip pans under all non-mobile machinery, and must be kept on site at all times.

All disturbed soils will be properly contained to prevent silt and sediment from entering watercourses, ditches, and adjoining properties

Further mitigation measures include additional soil quality sampling and analysis, the development of a Soil Management Plan, and a mitigation plan should be developed against the possibility of encountering landfill related waste during excavation activities.

11. Future Commitments

11.1 Future Consultation

11.1.1 Property Acquisitions

Although property and easement requirements have been reduced to the greatest extent possible for this level of design, approximately 4.3 hectares of public and private property will need to be acquired by York Region to construct the project and approximately 2.2 hectares of temporary easements are required for the construction of the project. No full buyouts are required to construct the project. Future consultation is required with property owners to discuss potential acquisitions.

11.1.2 Access

To implement the ultimate design of the grade separation, closures or consolidation of property accesses may be required. Where feasible, avoidance of these access closures will be implemented. Future consultation with property owners is required to inform them of potential access changes.

11.2 Additional Studies

11.2.1 Aquatic Field Surveys

During the detailed design stage, it is recommended that aquatic field investigations take place to update or confirm fish habitat and aquatic conditions to ensure they are consistent with those collected in 2020 and 2022. Field investigations should include confirmation of the following at Sites 1, 2 and 3:

- Watercourse type characterization
- Determination or confirmation of fish species present

- Confirmation of in water timing windows
- Identification of specialized habitat features
- Identification of physical barriers to fish movement
- Confirmation of aquatic habitat sensitivity
- Water quality monitoring

11.2.2 Terrestrial Field Surveys

Based on the existing conditions documented on site to date and the impact assessment presented in this report, recommendations for additional terrestrial field surveys are outlined below. It is noted, however, that the next steps of the project as they relate to natural environment assessment will need to be conducted in accordance with up-to-date guidelines and legislation at the time of the detailed design. Legislation and listed species are periodically updated and will need to be consulted during the detailed design stage to identify any changes. The following recommendations are written based on current requirements. See **Appendix E** for more details.

- As numerous potential maternity roost trees for SAR bats have been identified, acoustic surveys per Phase III: Acoustic Surveys of The Protocol are recommended, as soon as possible before Phase II: Identification of Suitable Maternity Roost Trees surveys need to be completed again. Acoustic surveys will confirm whether SAR bats are present in potential maternity roost trees in the area and will assist in determining whether authorization under the ESA will be required.
- As tree conditions and characteristics are subject to change (e.g., further decay, new loss of limbs or woodpecker activity creating cavities, wind blowdown, etc.), if Phase III: Acoustic Surveys of the protocol are not initiated in the next few years (~2 years), Phase II: Identification of Suitable Maternity Roost Trees of The Protocol should be completed again prior to completing Phase III, to ensure current maternity roost tree conditions are captured.
- Wetland boundaries within the project limits, particularly surrounding PSWs and wetland communities of regional conservation concern (L1-L3), should be confirmed closer to the undertaking.
- As several potential Significant Wildlife Habitat types are present (e.g., Reptile Hibernaculum, Bat Maternity Roosting Colonies, etc.) further surveys to assess these SWH within and adjacent to the project limits are recommended. Alternatively, these SWHs can be presumed present, and planned for accordingly within the design and restoration plans.
- Due to regulation changes that came into force under the Migratory Bird Conventions Act (MBCA) in Year 3 (2022) which have resulted in the requirement to identify nests (either active or abandoned) belonging to Schedule 1 species that may have potential nesting habitat within or adjacent to the project limits, it is recommended that surveys to confirm locations of these species’ nests, if present, are completed. Schedule 1 species requiring nest searches within the Technically Preferred Alternative limits include: Pileated Woodpecker, Great Blue Heron, and Green Heron.

- Surveys must be completed to confirm presence/absence of nests belonging to Schedule 1 species within or adjacent to the project limits, closer to commencement of the project but with enough time to complete any multi-season or multi-year surveys if required (as outlined below for abandoned nests).
- Targeted surveys to determine the presence or absence of SAR Blanding's Turtles within and adjacent to the project limits are required to determine whether actions/authorization under the ESA are required for this species.
- Surveys for SAR trees (Butternut and Black Ash) are recommended within and adjacent to the project limits again, closer to commencement of the project, to determine whether these species have exploited new locations, and whether actions/authorizations under the ESA are required.
- Field investigations to confirm locations and limits of invasive species should be completed as part of the detailed design, to inform appropriate removal and management measures or best management practices for their removal and disposal.

11.2.3 Noise Impact Studies

There are anticipated noise impacts above come of the noise impact criteria in the York Region Policy. During detail design locations for potential noise barriers will be reviewed using the current policies and site conditions at the time. Additional noise impact studies may be undertaken prior to construction due to anticipated noise impacts. An additional noise impact study will be required for the residential properties located south of Teston Road and west of Keele Street if a decision is made in the future to implement a grade separation of Teston Road with the GO Rail line and to significantly raise the profile grade elevation of Teston Road and Keele Street to the west.

11.2.4 Archaeological Studies

A portion of the Keele Valley landfill lands (7 Eagle Court) that overlap with the Project Study Area exhibits archaeological potential and requires a Stage 2 archaeological assessment test pit survey at five metre intervals prior to any soil disturbing activities. These areas are identified in **Appendix I.**

If the proposed works extend beyond the current Project Study Area or any changes are made to the project design or workspace requirements that results in the inclusion of previously un-surveyed lands, the lands should be subject to a Stage 2 archaeological assessment.

11.2.5 Cultural Heritage – Heritage Impact Assessment and Vibration Studies

One Built Heritage Resource (BHR) and five Cultural Heritage Landscapes (CHL) are located within or adjacent to the Teston Road extension alignment. A resource specific Heritage Impact Assessment (HIA) may need to be conducted on CHL 17, located at 981 Teston Road, to evaluate alternatives, assess potential impacts to the resource, and recommend appropriate mitigation measures if avoidance measures cannot be implemented.

Vibrations during construction activities have the potential to impact two cultural heritage features, CHL 17 and CHL 16 (located at 814 Teston Road), due to their proximity to the proposed alignment. A baseline vibration assessment should be undertaken during detail design. Should this assessment conclude that any structures or potential heritage attributes will be subject to vibrations, a monitoring plan should be prepared and implemented to lessen vibration impacts related to construction.

11.2.6 Phase 2 Environmental Site Assessment

Phase One Environmental Site Assessments were conducted for Potentially Contaminating Activities (PCAs) within the project study area. Several areas of potential environmental concern (APEC) were identified in Properties 1 & 2, 4, 5, and 8.

A Phase Two Environmental Site Assessment is required for properties with PCAs before a Record of Site Condition (RSC) can be submitted for the site. A Phase Two Environmental Site Assessment is therefore recommended for Properties 1 & 2, 4, 5, and 8 which all include APECs.

11.3 Permit Approvals

11.3.1 Request for Review from Fisheries & Oceans Canada (DFO)

Due to the level of expected impact associated with the Don River East Branch crossing, and the potential for the work to result in the Harmful Alteration, Disruption or Destruction (HADD) of fish and fish habitat, a Request for Review should be submitted to Fisheries and Oceans Canada during the detailed design phase of the project. Impacts to watercourses and fish and fish habitat will need to be reassessed when new design details become available.

11.3.2 Endangered Species Act (ESA)

As there will be impacts to Eastern Meadowlark and Bobolink, both of which are Threatened species receiving habitat protection under the ESA, actions under the ESA are required. For impacts to areas of habitat equal to or less than 30 ha, the proponent must satisfy one of the two following options as prescribed in O. Reg. 830/21 Section 13:

- Pay a Species Conservation Charge to the Species at Risk Conservation Trust:
  - Prior to commencing the activity, submit a notice of activity (NOA) to the Minister through the Registry.
  - Before, during, and after carrying out the activity, minimize adverse effects on Bobolinks, Eastern Meadowlarks, and their habitat.
    - Retain a copy of the management plan for at least five (5) years and provide a copy to the Ministry within 14 days of receiving a request.
- Create or Enhance Grassland Habitat.
  - Prior to commencing the activity, submit a notice of activity (NOA) to the Minister through the Registry.

- Before, during, and after carrying out the activity, minimize adverse effects on Bobolinks, Eastern Meadowlarks, and their habitat.
- Prepare and update a Bobolink and Eastern Meadowlark management plan as per the regulation.
  - Retain a copy of the management plan for at least five (5) years and provide a copy to the Ministry within 14 days of receiving a request.
- Within 12 months of commencing the activity, create new habitat or enhance existing habitat for Bobolinks and Eastern Meadowlarks as per the regulation.
  - Manage the created habitat for five (5) years after the habitat is created or enhanced.
- Before commencing the activity, give the Minister a written undertaking to continue, after the end of the five-year management period (above), to manage any habitat created or enhanced until the earlier of:
  - The end of the 20-year period that follows the creation or enhancement of the habitat; or
  - If the habitat that was destroyed by the activity is returned to a suitable state to be used by Bobolinks or Eastern Meadowlarks, the day on which the area reaches that state.
- Prepare a record of created or enhanced habitat as per the regulation.
  - For a period of five years after the habitat is created or enhanced, monitor the area in which the habitat was created or enhanced by conducting at least three (3) surveys every year at a time when Bobolinks or Eastern Meadowlarks are likely to be present, to determine if the species are present and, if so, to assess fledgling success.
  - Retain the habitat record until December 31 of the final year of the five-year period of managing and monitoring the new or enhanced habitat and provide a copy to the Ministry within 14 days of receiving a request.

Species at Risk habitat compensation will be addressed as part of detailed design based on up-to-date site conditions and legislative requirements. Based on information gathered within the Technically Preferred Alternative limits, confirmed SAR habitat requiring compensation includes habitat for Bobolink and Eastern Meadowlark, and potential SAR habitat requiring compensation includes habitat for SAR bats.

11.3.3 Conservation Authority Authorization

It is anticipated that an authorization from TRCA under O. Reg. 41/24: Prohibited Activities, Exemptions and Permits will be required. Mitigation measures regarding the regulated area should be discussed with TRCA at the time of the application. However, measures proposed within **Section 10** of this report have considered likely requirements based on meetings and discussions held to date with TRCA and past experience for these requirements.

11.3.4 Noise Bylaw Exemption

The City of Vaughan's normally allowed hours specified in the City of Vaughan by-law, restricts the operation of any construction vehicle or equipment between the hours of 7pm-7am.

During Detail Design requirements for work during the restricted time will be determined and the need for an exemption of the Noise Bylaw will be discussed with the City of Vaughan.

11.3.5 Environmental Compliance Approvals

The current design of the Teston Road project conflicts, or has the potential to conflict, existing leachate, and gas collection/monitoring infrastructure and/or buffer zones associated with the Vaughan Landfill, Keele Valley Landfill, and the Disposal Services Landfill sites. A detailed assessment of the severity of the conflicts is recommended in later design stages. Any changes to the landfill infrastructure and/or encroachment within the existing buffer zones will likely require amendments to the Environmental Compliance Approval (ECA) under which the landfill operates. These will likely need to be prepared by the owners of these facilities in consultation with the Ministry of the Environment Conservation and Parks and with input from the Regional Municipality of York.

Prior to applying for an ECA amendment, several considerations must be made to ensure all requirements are met, including review of other federal, municipal, or provincial requirements such as the review of environmental land use planning guidelines, federal guidance related to environment and natural resources, and consultations with municipalities, Indigenous communities, and the source water protection agency.

Consultations with all affected property owners, stakeholders, First Nations communities, and affected municipalities (City of Vaughan and City of Toronto) have occurred throughout the entirety of the EA process to inform them of the project, as well as ensure the activities required for the project are permitted. Consideration was also made for Source Water Protection and the proper policies have been addressed for the works near the waste disposal sites, as documented in **Appendix L.**

Numerous ECA's are currently present for all three landfill sites adjacent to the Project Study Area: the Keele Valley Landfill, Vaughan Landfill, and Disposal Services Landfill sites. The ECA's within the Project Study Area that may potentially require amendments include:

- Provisional Certificate of Approval of Keele Valley Landfill Site Parts of Lots 21 to 28 inclusive, Concession 3 (No. A230610)
  - Issued on May 26, 1983, and amended on March 29, 2022
  - For the use and operation of a 99.2 hectares (ha) Landfill Area with a total waste disposal site area of 375.9 ha.
- Environmental Compliance Approval of City of Vaughan Landfill Site, Lot 26, Concession 3 (No. A230601)
  - Issued on September 19, 1977, and amended on August 19, 2021.
  - For the use and operation of a 28 ha. waste disposal site within a total area of 40 ha.

- Environmental Compliance Approval of the Disposal Services Landfill, Part of Lot 26, Concession 3 (No. A230604)
  - Issued on July 31, 1974, and amended on December 13, 2018.
  - For the closure of the Disposal Servies Landfill
- Certificate of Approval Air of the Disposal Services Landfill, Part of Lot 26, Concession 3 (No. 4898-59AHZ7) on August 20, 2002
  - For the approval of one (1) passive gas venting system with nine (9) exhausts, serving the subsurface soil gas collection system.

An ECA amendment is required if a technical change or modification to the landfill facility or site for which the ECA was issued, is proposed. ECAs for this project fall under section 27 of the Environmental Protection Act (EPA) which requires an ECA for the transportation, management and/or disposal of certain types of waste.

When preparing and completing the amendment application, *Ontario Regulation 255/11: Applications for Environmental Compliance Approvals*, which sets out ECA application requirements should be reviewed. The process for amending an ECA is outlined below:

- Start a new application
- Complete the required application questions and attach supporting documents
- Attest and Submit
- Pay the application fee, which will be automatically calculated
- Get your application status
- Provide additional information through information requests (if applicable)
- Receive notification of Ontario's decision on the application
- Access the issued ECA

11.4 Project Monitoring

11.4.1 EA Compliance Monitoring

EA Compliance Monitoring will take place throughout the detailed design and construction phases of the project to ensure the commitments within this EA are adhered to and the project effects are as predicted.

EA compliance monitoring will also ensure receipt of, and compliance with, all required federal, provincial, and municipal permits, licenses, and approvals.

11.4.2 Archaeological Monitoring

The Teston Road IEA Study Area includes lands within the established ossuary monitoring buffer associated with the Late Woodland period and will require burial avoidance strategies should those lands be proposed for development. The identified lands include:

- McNair Site: South of Teston Road on Vanda Drive, north of Sir Angelo Way
- McGaw site: Inside Twickenham Park, north of Canyon Hill Avenue

To minimize the risk of impacting an ossuary within the project limits, archaeological monitoring of any proposed construction activities by a licensed archaeologist is required within both 1000 metres of the McNair and McGaw village sites and 300 metres of water. This will include a monitoring program specifically tailored to project impacts and may include systematic testing of fill soils and mechanical trenching to determine if there are any extant topsoil deposits. The archaeological monitoring will cease once it is determined that there will be no further construction excavations within the sensitive areas.

11.4.3 Cultural Heritage Monitoring

One Built Heritage Resource (BHR) and five Cultural Heritage Landscapes (CHL) are located within or adjacent to the Teston Road extension alignment. A resource specific Heritage Impact Assessment may be conducted on CHL 17 to evaluate alternatives, assess potential impacts to the resource, and recommend appropriate mitigation measures if avoidance measures cannot be implemented.

Vibrations during construction activities have the potential to impact two cultural heritage features (CHL 16 and CHL 17) due to their proximity to the proposed alignment. A baseline vibration assessment should be undertaken during detail design. Should this assessment conclude that any structures or potential heritage attributes will be subject to vibrations, a monitoring plan should be prepared and implemented to lessen vibration impacts related to construction.

11.5 Construction & Implementation Timing

A construction staging plan will be prepared prior to construction.

It is anticipated that some traffic delays may occur during construction, leading to potential idling, increased noise, and vehicular accidents. Traffic staging and detours will be determined prior to construction to ensure disruption is minimized to traffic flow and an accident/incident management plan will be prepared to minimize potential vehicular conflicts.

Notice of any traffic closures will be communicated to Emergency Services, Municipalities and Transportation agencies in advance of any closures. The travelling public will be advised of construction works prior to any closures.

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Closure

York Region retained Morrison Hershfield to conduct the work described in this report, and this report has been prepared solely for this purpose.

This document, the information it contains, the information and basis on which it relies, and factors associated with implementation of suggestions contained in this report are subject to changes that are beyond the control of the author. The information provided by others is believed to be accurate and may not have been verified.

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We trust the information presented in this report meets Client's requirements. If you have any questions or need addition details, please do not hesitate to contact one of the undersigned.

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