Block 27 Landowners Group Inc.
as co-proponents with the City of Vaughan

BLOCK 27 COLLECTOR ROADS

MUNICIPAL CLASS ENVIRONMENTAL ASSESSMENT

Environmental Study Report

February 2025
20009.03

BLOCK 27 LANDOWNERS GROUP INC.

VAUGHAN

Disclaimer

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EXECUTIVE SUMMARY

INTRODUCTION AND PROJECT BACKGROUND

The Block 27 Collector Roads Municipal Class Environmental Assessment (MCEA) Study has been completed to develop, identify, evaluate, and recommend a preferred collector road network for the new community in Block 27, located within the City of Vaughan, in the Regional Municipality of York. The Block 27 study area is bounded by Kirby Road to the north, Keele Street to the east, Teston Road to the south, and Jane Street to the west.

This MCEA study builds upon the recommendations of the North Vaughan and New Communities Transportation Master Plan (NVNCTMP) and Block 27 Secondary Plan work, which identified the transportation requirements for the North Vaughan New Community Areas and selected an alternative road network within Block 27. The City of Vaughan and Block 27 Landowners Group Inc., as co-proponents, initiated the Block 27 Collector Roads MCEA to complete the environmental assessment of the collector roads identified in the NVNCTMP and Block 27 Secondary Plan. In accordance with the requirements of the Municipal Class Environmental Assessment (Municipal Engineers Association, October 2000, as amended in 2007, 2011, 2015, and 2023) for a Schedule 'C' project, this study further develops the recommended alternative road network, evaluates, and selects the preferred design alternatives for the collector roads within the study area.

On December 22, 2022, the Ministry of Natural Resources updated the Ontario Wetland Evaluation System (OWES) in support of Ontario's *Bill 23, More Homes Built Faster Act, 2022*. This update introduces new guidelines for the re-evaluation of wetlands and updates the mapping of assessed wetland boundaries. The assessments documented within this MCEA predate any OWES policy changes and represent the existing conditions at the time of the study's initial preparation. It is acknowledged that any alterations resulting from OWES policy updates, such as changes in buffer widths or wetland status, would not materially change the recommendations provided in the Block 27 MCEA.

PUBLIC AND STAKEHOLDER CONSULTATION AND INDIGENOUS COMMUNITY ENGAGEMENT

Throughout the study, external federal and provincial government agencies, representatives from relevant City and Regional departments, community groups, relevant stakeholders, and members of the public were given opportunities to make comments, raise issues, and provide additional information. Indigenous communities were also engaged throughout the study to provide project updates and request comments on the study. **Table E-1** outlines the key consultation events and meetings with interested parties and Indigenous Communities during the study.

Table E-1: List of Consultation Events and Agency and Indigenous Community Meetings

Consultation Event	Date
Issue Notice of Pre-Engagement Letters to Potentially Interested Indigenous Communities	December 6, 2021
Issue Notice of Study Commencement	December 16, 2021
Curve Lake First Nation Engagement Meeting #1	February 25, 2022
Toronto Region Conservation Authority (TRCA) Meeting #1	March 16, 2022
Technical Advisory Committee (TAC) Meeting #1	March 22, 2022

Consultation Event	
Curve Lake First Nation Engagement Meeting #2	March 29, 2022
Mississaugas of the Credit First Nation Engagement Meeting #1	May 9, 2022
TRCA Meeting #2	July 27, 2022
TAC Meeting #3	August 29, 2022
TRCA Meeting #4	September 16, 2022
Issue Notice of Public Information Centre	November 2, 2022
Held Public Information Centre (virtual)	November 16, 2022
York Region Consultation Meeting	November 28, 2022
TRCA Meeting #5	May 11, 2023
Notice of Study Completion	October 29, 2024

ALTERNATIVE SOLUTIONS AND RECOMMENDED DESIGN

Horizontal Road Alignments

Based on the NVNCTMP and Block 27 Secondary Plan recommended road network, alternative alignments were developed for eight collector roads, consisting of three major collectors and five minor collectors. These alternative alignments were proposed for evaluation to potentially reduce environmental impacts identified through field investigations and enhance the overall road network.

Each alternative alignment was evaluated against the following broad categories: transportation and technical considerations, natural environment, socio-economic environment, cultural environment, and cost and constructability. The evaluation considered feedback from all stakeholders and was completed using professional judgement and the results of various environmental and technical studies conducted.

Based on the evaluation, a preferred alignment for each collector road was identified. The preferred alignments are illustrated in **Figure E-1** and described below. With the exception of Street 2 and Street 8/Vista Gate on Keele Street, and the right-in right-out of Street 8 to Kirby Road, all intersections with regional roads achieve a minimum separation of 215 m measured from curb return, and where possible, meets the Region's target of 300 m. Adjustments to the preferred alignments and preliminary designs may be considered in response to changes in development plans or in consideration of more detailed field investigations during detailed design or the draft plan review/approval process.

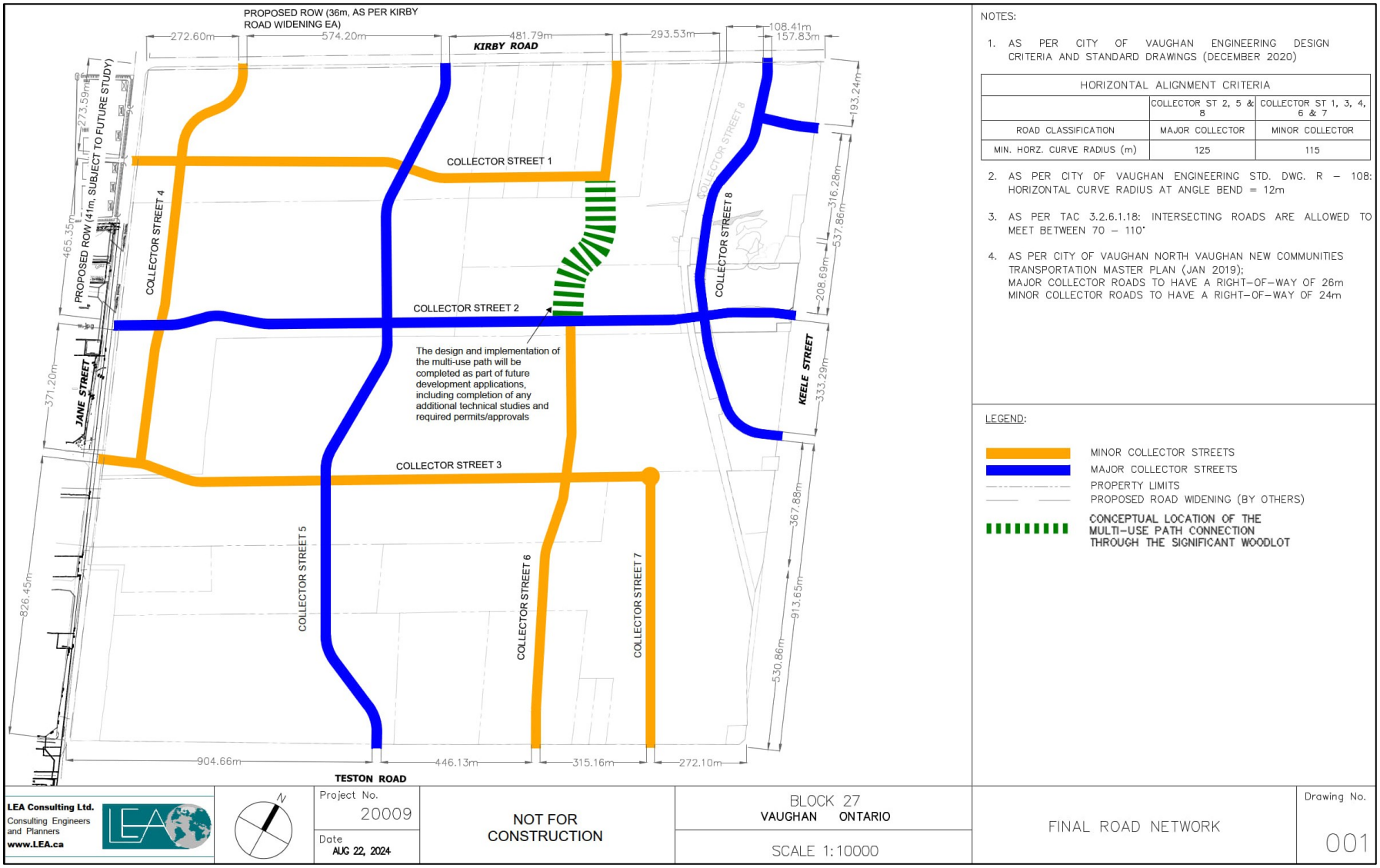
Street 1 (Minor Collector) Preferred Alignment

Street 1 is proposed as a minor collector with a 24.0 m right-of-way (ROW). The preferred east-west Street 1 alignment extends from Jane Street in the west to Street 6 in the east. The design criteria used for Street 1 are as follows:

- Design Speed: 50 km/h
- Minimum horizontal curve radius: 115 m

Street 1 will have one watercourse crossing location within the Greenbelt Plan area, approximately 300 m south of Kirby Road.

Figure E-1: Final Collector Road Network



NOTES:

1. AS PER CITY OF VAUGHAN ENGINEERING DESIGN CRITERIA AND STANDARD DRAWINGS (DECEMBER 2020)

HORIZONTAL ALIGNMENT CRITERIA		
	COLLECTOR ST 2, 5 & 8	COLLECTOR ST 1, 3, 4, 6 & 7
ROAD CLASSIFICATION	MAJOR COLLECTOR	MINOR COLLECTOR
MIN. HORZ. CURVE RADIUS (m)	125	115

2. AS PER CITY OF VAUGHAN ENGINEERING STD. DWG. R – 108: HORIZONTAL CURVE RADIUS AT ANGLE BEND = 12m
3. AS PER TAC 3.2.6.1.18: INTERSECTING ROADS ARE ALLOWED TO MEET BETWEEN 70 – 110°
4. AS PER CITY OF VAUGHAN NORTH VAUGHAN NEW COMMUNITIES TRANSPORTATION MASTER PLAN (JAN 2019):
   MAJOR COLLECTOR ROADS TO HAVE A RIGHT-OF-WAY OF 26m
   MINOR COLLECTOR ROADS TO HAVE A RIGHT-OF-WAY OF 24m

LEGEND:

- MINOR COLLECTOR STREETS
- MAJOR COLLECTOR STREETS
- PROPERTY LIMITS
- PROPOSED ROAD WIDENING (BY OTHERS)
- CONCEPTUAL LOCATION OF THE MULTI-USE PATH CONNECTION THROUGH THE SIGNIFICANT WOODLOT

LEA Consulting Ltd.
Consulting Engineers and Planners
www.LEA.ca

Project No. 20009
Date AUG 22, 2024

NOT FOR CONSTRUCTION

BLOCK 27
VAUGHAN ONTARIO
SCALE 1:10000

FINAL ROAD NETWORK

Drawing No. 001

Street 2 (Major Collector) Preferred Alignment

Street 2 is proposed as a major collector with a 26.0 m ROW. The preferred east-west Street 2 alignment extends from Jane Street in the west to Keele Street in the east. The design criteria used for Street 2 are as follows:

- Design Speed: 60 km/h
- Minimum horizontal curve radius: 125 m

Street 2 will have two watercourse crossing locations. One within the Greenbelt Plan area at Drainage Feature (DF) 1 and another at DF3-2, located approximately 340 m and 1 km east of Jane Street, respectively.

Street 3 (Minor Collector) Preferred Alignment

Street 3 is proposed as a minor collector with a 24.0 m ROW. The preferred east-west Street 3 alignment extends from Jane Street in the west and connects with Street 7 to the east via a roundabout. The design criteria used for Street 3 are as follows:

- Design Speed: 50 km/h
- Minimum horizontal curve radius: 115 m

Street 3 will have three watercourse crossing locations. One within the Greenbelt Plan area at DF1, one at DF3-2, and one at DF4, located approximately 270 m, 895 m, and 1.3 km east of Jane Street, respectively.

Street 4 (Minor Collector) Preferred Alignment

Street 4 is proposed as a minor collector with a 24.0 m ROW. The preferred north-south Street 4 alignment extends from Kirby Road in the north to Street 3 in the south. The design criteria used for Street 4 are as follows:

- Design Speed: 50 km/h
- Minimum horizontal curve radius: 115 m

Street 4 does not require the crossing of any natural environmental features.

Street 5 (Major Collector) Preferred Alignment

Street 5 is proposed as a major collector with a 26.0 m ROW. The preferred north-south Street 5 alignment extends from Kirby Road in the north to Teston Road in the south and will connect with Cranston Park Avenue. The design criteria used for Street 5 are as follows:

- Design Speed: 60 km/h
- Minimum horizontal curve radius: 125 m

DF3 is located directly across from Cranston Park Avenue. A connection of Street 5 with Cranston Park Avenue results in extending the existing Teston Road culvert to accommodate this new road. This would require realignment of a portion of DF3 to avoid requiring two new crossings, address flooding conditions at Teston Road, and improve the watercourse alignment from both a geomorphic and ecological perspective.

With realignment of DF3, Street 5 will have one watercourse crossing location at DF3-2 at Teston Road. It should be noted that the alignment of Street 5 was designed to minimize impacts to DF3 to the extent

possible while intersecting Street 5 to Teston Road at a 90-degree angle, as required by the City of Vaughan.

Street 6 (Minor Collector) Preferred Alignment

Street 6 is proposed as a minor collector with a 24.0 m ROW and originally extended from Teston Road to the south to Kirby Road to the north, per the NVNCTMP recommendations. Based on comments received from external review agencies and Indigenous Communities during the study on the proposed impacts to the significant woodlot associated with Street 6. Further assessment was completed to determine mitigation measures to minimize impacts to the significant woodlot, including completing additional traffic modelling to determine whether the road network could support the anticipated traffic without a Street 6 road connection through the significant woodlot. Based on traffic results, the road network would perform at an acceptable level of service without a road connection through the significant woodlot. Based on the 2023 MCEA, the construction of a multi-use path outside an existing right-of-way with an anticipated construction cost under $4.1 million is exempt from the MCEA and EA approval is not required. The design and implementation of the multi-use path will be completed as part of future development applications, and in consultation with the City of Vaughan. Further technical studies will be required to support the design of the multi-use path (e.g., alignment), including but not limited to additional natural environmental studies (e.g., arborist report, tree inventory, etc.). Any required permits/approvals in support of the trail must be obtained prior to start of construction of the multi-use path.

The final preferred north-south Street 6 alignment extends from Street 2 in the north to Teston Road in the south to avoid crossing a significant woodlot. An additional segment of Street 6 from Kirby Road in the north to Street 1 in the south is proposed for access to properties in the northern portion of the block. The design criteria used for Street 6 are as follows:

- Design Speed: 50 km/h
- Minimum horizontal curve radius: 115 m

Street 7 (Minor Collector) Preferred Alignment

Street 7 is proposed as a minor collector with a 24.0 m ROW. The preferred north-south Street 7 alignment extends from Teston Road in the south and connects with Street 3 via a roundabout. The design criteria used for Street 7 are as follows:

- Design Speed: 50 km/h
- Minimum horizontal curve radius: 115 m

Street 7 does not require the crossing of any natural environmental features.

Street 8 (Major Collector) Preferred Alignment

Street 8 is proposed as a major collector with a 26.0 m ROW. The preferred north-south Street 8 alignment extends south from Kirby Road and curves east to connect with Keele Street, aligning with the North Maple Regional Park north access. An additional extension off Street 8 is proposed to align with Vista Gate. This connection would serve as a gateway to the potential future Kirby GO station and is optimal from a traffic flow perspective. The design criteria used for Street 8 are as follows:

- Design Speed: 60 km/h
- Minimum horizontal curve radius: 125 m

Street 8 will have one watercourse crossing location at DF3-2 approximately 575 m south of Kirby Road. It is noted that work on the potential Kirby GO transit station area is currently underway. The intersection of Street 8 with Kirby Road and any modifications to the Street 8 alignment to better accommodate or avoid environmental impacts are subject to further review as part of the Transit Hub Special Study for the Kirby GO Station.

Vertical Road Alignments

All proposed collector roads are designed in accordance with the City of Vaughan's design criteria and to a maximum slope of 5%. The exception is Street 2 which crosses under the Canadian National Rail (CNR) corridor to connect with Keele Street. The section of Street 2 under the rail corridor is designed with a maximum slope of 6.6% to accommodate the grade difference between the railway crossing and Keele Street as a result of the underpass. This profile solution and configuration achieves the minimum requirement of 5.3 m vertical clearance for the underpass.

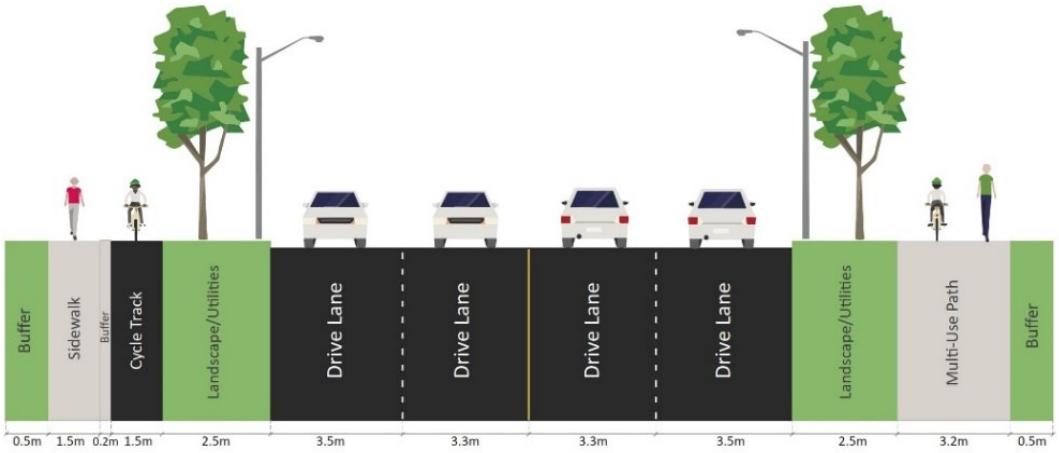
Cross-Sections

In addition to the preferred road alignments, cross-section alternatives were developed in accordance with the City of Vaughan Engineering Design Criteria and Standard Drawings (EDCSD). The NVNCTMP recommended that major collector roads be designed with a 26 m ROW and minor collector roads be designed with a 24 m ROW. These ROW widths were used to generate alternative major and minor collector road cross-sections.

Each cross-section alternative was evaluated to determine the appropriate cross-section design for each collector road based on the following broad categories: transportation, socio-economic environment, and cost & constructability.

Based on the evaluation, preferred typical major and minor cross-sections were identified. A modified minor cross-section with a multi-use path was developed to provide flexibility to connect to the Block's proposed trails and create a safe continuous active trail connection. The preferred cross-section elements are illustrated in **Figure E-2** to **Figure E-4** and outlined in **Table E-2**.

Figure E-2: Preferred Major Collector Cross-Section (Alternative MA1)



Note: This alternative provides flexibility to implement multi-use paths or side-by-side facilities. Both are illustrated as an example.

Figure E-3: Preferred Minor Collector Cross-Section – With Parking (Alternative MI1)

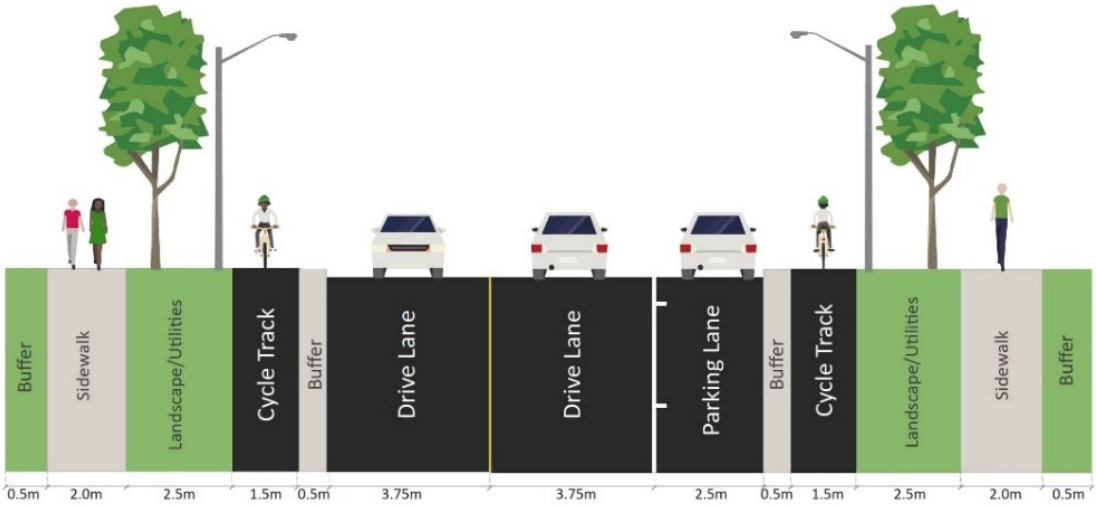


Figure E-4: Preferred Minor Collector Cross-Section – With Parking (Alternative MI1)

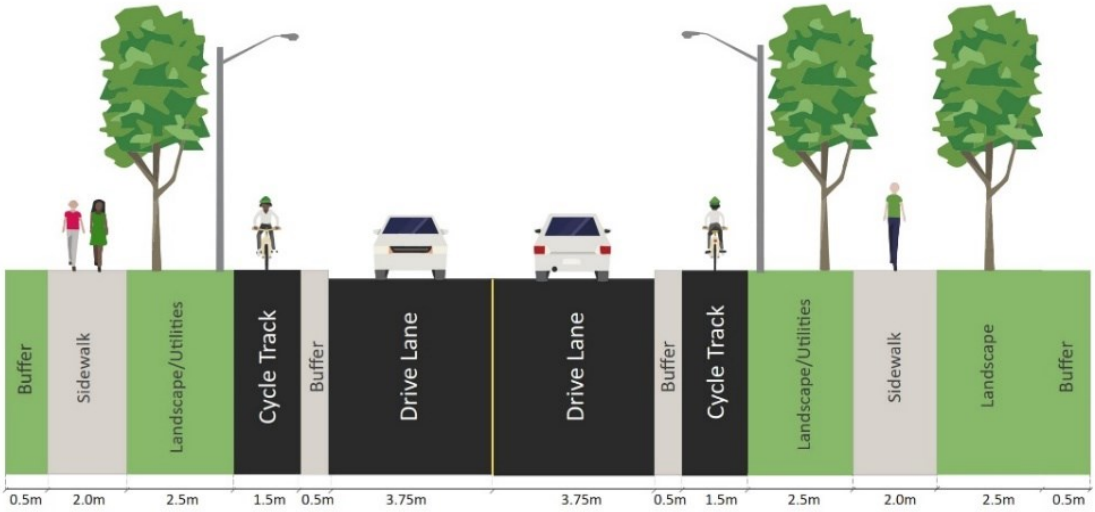


Table E-2: Preferred Major and Minor Collector Cross-Section Elements

Preferred Major Collector Cross-Section (Side-by-Side Facilities) * (Figure 2)	Preferred Minor Collector Cross-Section (Separated Facilities) (Figure 3 and Figure 4)

• **Right of Way:** 26 m
• **Edge Buffers:** 0.5 m
• **Side-by-Side Facilities**
  • **Sidewalk:** 1.5 m
  • **Buffer:** 0.2 m
  • **Cycle Track:** 1.5 m
• **Multi-Use Path:** 3.2 m
• **Landscape/Utilities:** 2.5 m
• **Drive Lane:** 3.5 m
• **Through Lane:** 3.3 m
	• **Right of Way:** 24 m
	• **Edge Buffers:** 0.5 m
	• **Sidewalk:** 2.0 m
	• **Landscape/Utilities:** 2.5 m
	• **Cycle Track:** 1.5 m
	• **Buffer:** 0.5 m
	• **Drive Lane:** 3.75 m
	• **Parking Lane:** 2.5 m
	
	No On-Street Parking Alternative:
	• Parking lane is converted to a 2.5 m landscape facility (one side)
	
	Multi-Use Path Alternative:
	• Landscape/buffer area is converted to a 3.2 m multi-use path (one side)

** The preferred alternative provides flexibility to implement multi-use paths or side-by-side facilities.*

Structures

Grade Separation Structures

An underpass grade separation (rail over road) was selected as the preferred solution for Street 2 at the CNR corridor as it minimizes cut/fill length and maximizes grade. Based on a review of the surrounding natural features, track diversion was not carried forward as the alignment curvature immediately north would require extensive diversion and high-fill embankment, significantly impacting the area's wetlands and woodlots. Furthermore, based on discussions with Metrolinx, a staged construction approach was not carried forward as single-track closures for a long duration would impact freight and commuter rail operations. Given the identified limitations, the structural design of the underpass grade separation for Street 2 is subject to further discussion with Metrolinx and will be determined as part of the subsequent detailed design phase.

Watercourse Crossing Structures

There are eight watercourse crossings associated with the preferred road network design, all of which are proposed as culvert structures. This includes three proposed crossings of DF1, four proposed crossings of DF3, and one proposed crossing of DF4. There are no proposed road crossings of DF2.

The proposed watercourse crossings were sized adequately to convey the regulatory flows, and where appropriate, meet required openness ratio for target species. Crossings were also designed based on the TRCA Crossing Guideline for Valley and Stream Corridors, MTO Highway Drainage Design Standards, and Ministry of Natural Resources' (*formerly Ministry of Natural Resources and Forestry*) Technical Guide Flooding Hazard Limit. In addition to the hydraulic factors, design considerations included the proposed road geometry, grading design, and fluvial geomorphological and ecological conditions and design requirements. **Table E-3** summarizes the structure types and size of the road crossings. A variety

of structure types and crossings were considered including free-spans in the area. However free-spans were not determined to be required as the proposed structure type satisfies the requirements from a hydraulic and ecological perspective.

Table E-3: Summary of Proposed Road Crossing Sizing

Street Name and Crossing ID	Reach	Type	Culvert Dimensions	
			Depth (m) x Span (m)	Length (m)
Crossing A (Street 1)	DF1	Structural Open-Bottom Culvert	2.44x12.81	45
Crossing B (Street 2)	DF1	Structural Open-Bottom Culvert	3.35x14.64	45
Crossing C (Street 3)	DF1	Structural Open-Bottom Culvert	3.35x14.64	55
Crossing D (Street 8)	DF3	Structural Open-Bottom Culvert	1.83x7.315	55
Crossing E (Street 2)	DF3	Structural Open-Bottom Culvert	2.44x12.81	50
Crossing F (Street 2)	DF3	Structural Open-Bottom Culvert	2.44x12.81	55
Crossing G (Street 3)	DF4	Structural Open-Bottom Culvert	1.22x4.27	40
Crossing H (Teston Rd.)	DF3	Box*	1.36x7.744*	90
		New Pipe	Ø1.5 Conc. Pipe	90

** Existing box culvert to be extended to accommodate Street 5*

Channel Realignments

Natural channel realignments are required at four locations (DF3 (Culvert D), DF3 (Culvert E), DF3 (Box Culvert at Collector Street 5), and DF4 (Culvert G). Localized channel realignments are proposed at Crossings D, E, and G to align drainage feature planform with the road crossing structures. Natural channel design principles will be implemented to replicate the existing form and function of the drainage feature in these locations.

The proposed Street 5 alignment requires the extension of the existing Teston Road culvert and channel realignment along the downstream portions of DF3 and DF4, east of this new collector road. The DF3 watercourse is proposed to be realigned for approximately 250 m before exiting the Block 27 area. The existing box culvert at Teston Road will be extended further upstream (by approximately 40 m) to convey the DF3 watercourse to accommodate the proposed Street 5 alignment.

Intersection Control and Network Performance

Technical transportation assessments were completed as part of the Block 27 Block Plan submission to forecast future operations of the preferred road network and to identify auxiliary lane requirements and intersection controls.

For all new Block 27 intersections (both external and internal), intersection control and lane configurations were determined through an assessment of the initial intersection capacity analysis results. Intersections were recommended for signalization based on signal warrants, the analysis results, and additional non-traffic considerations (e.g., facilitating pedestrian/cyclist movement). Furthermore,

turn lanes were added to support inbound and outbound movements from the surrounding regional arterial roads, where applicable. The location of turn lanes from the surrounding regional roads will be coordinated during detailed design. This includes coordination between Block 27 and the design of Kirby Road.

The recommended intersection controls for the study area are summarized in **Table E-4**, based on the traffic assessment conducted for the Block 27 development, however the signalization and design of intersections along regional roads (i.e., Jane Street, Keele Street and Teston Road) are subject to traffic signal warrants and are subject to the Regional Municipality of York's approval during the detailed design/development approvals phase.

Table E-4: Recommended Intersection Control

Location of Intersection	Intersection With	Recommended Control*
Jane Street	All intersections between and including Kirby Road and Teston Road	Signalized
Kirby Road	Street 5	Signalized
	Street 4, Street 6, Street 8	Unsignalized
Keele Street	All intersections between and including Kirby Road and Teston Road	Signalized
Teston Road	All intersections between and including Jane Street and Keele Street	Signalized
Street 1	Street 4, Street 5	Unsignalized
Street 2	Street 4	Unsignalized
	Street 5, Street 6, Street 8	Signalized
Street 3	Street 4, Street 6	Unsignalized
	Street 5	Signalized
Street 8	Vista Gate	Signalized

**Subject to traffic signal warrant and Regional Municipality of York approval during detailed design*

ANTICIPATED IMPACT, MITIGATION, AND MONITORING

Table E-5 summarizes the anticipated impacts of the preferred road network and proposed mitigation measures.

Table E-5: Summary of Anticipated Impacts and Mitigation Measures

Anticipated Impacts		Mitigation Measures
Noise & Vibration	• Ground-borne vibration due to construction activity • Potential noise impact from road construction	• Applicable noise control by-law (City of Vaughan By-law 96-2006) should be obeyed. • Detailed noise and vibration studies to be completed as part of future land use approval applications (e.g., draft plan and Site Plan approval applications) to further refine the noise control requirements and to ensure compliance with the MECP's *Environmental Noise Guideline* limits.
Air Quality	• Air pollutant emissions during construction	• A construction best management practice plan is recommended with mitigation measures such as anti-idling policies for all vehicles and machinery on-site during construction, as well as ensuring that all vehicles, machinery, and equipment are in good working condition to reduce inefficiencies in the operation of the equipment. • Mitigation measures such as setback distances, proper air filtration equipment, and the incorporation of greenspaces will be considered during initial project planning. • Further air quality assessments will be conducted throughout the development of Block 27.
Contamination	• Potential for contamination of soils/groundwater during construction	• Completion of a Phase 1 ESA is recommended for areas impacted by the major roads to identify if there are any areas of potential environmental concerns requiring further Phase 2 ESA to identify soil and/or groundwater management during construction. • Where required, full Phase 1 ESAs, Phase 1 ESA Updates, Phase 2 ESAs, and Phase 2 ESA Updates will be completed and be in accordance with O. Reg 153/04. • It will be the responsibility of the landowners to complete any required contamination studies and adhere with MECP regulations during construction. • Any required mitigation measures to address contaminated soils/groundwater will be considered throughout the MESP phase.
Transportation System	• Increase in traffic volumes, leading to potential capacity constraints	• Although there are intersections operating near capacity, it is expected that all intersections will continue to operate sufficiently. The City of Vaughan and York Region will monitor the operations of the study area intersections and make the necessary

Anticipated Impacts		Mitigation Measures
	• Disrupt access to adjacent properties during construction	changes to the signal timings to optimize traffic movements in the area. • The City will require all future development applications to demonstrate integration with the proposed design through transportation impact studies, intersection control reviews, and other related studies. • The City will require all future developments to consider the implications of the proposed infrastructure phasing to ensure adequate capacity and connectivity is provided in the network prior to proceeding with development. • A construction staging plan should be completed during the draft plan review/approval process, as determined during detailed design, to maintain access for and mitigate impact on the adjacent properties through the construction process.
Natural Environment	• Road crossing of natural habitat and drainage features • Loss of vegetated areas (i.e., wetlands, woodlands, and cultural communities) • Removal of portions of wildlife habitat	• Optimize road alignment to avoid natural features and maintain existing drainage feature channel alignment, where possible. • Open bottom structures to maintain natural substrate and any groundwater-surface water intersections. • Headwalls and wing walls to minimize culvert length and slope encroachment into riparian habitat. • Minimize geomorphic hazards through the provision of spans that support long-term form and function of each drainage feature. • Accommodate the existing channel planform, active channel width, and maintain sediment and flow transport to downstream reaches. • Maintain terrestrial habitat and wildlife connectivity and restore channel and riparian habitat of the proposed culverts. • Implement Best Management Practices for all fuel handling and storage and prepare a spill response plan. • Restoration of disturbed areas and edge management planning along proposed roads within areas of required vegetation clearing and crossing locations. • Fencing, in conjunction with an appropriately sized crossing structure to guide wildlife to a given crossing structure and reduce-road mortality.

Anticipated Impacts		Mitigation Measures
		• Full list of mitigation measures detailed in the Natural Heritage Impact Assessment report.
Groundwater and Source Protection	• Lowering of water table from dewatering activities at watercourse crossings • Removal of sand lenses due to excavations for installation of services • Reduction in recharge due to addition of hard surfaces • Increase in sodium and chloride in groundwater	• Complete a dewatering assessment prior to road construction to identify potential zones of influence from dewatering. Well surveys should be completed during the detailed design phase. A well interference and reporting protocol should be established which outlines actions to be taken should a complaint from a private well owner be received. • Prepare erosion and sediment control (ESC) plans that outline methods and structures to ensure sediment laden water is not discharged to the surface water features. Environmental permissions such as Environmental Activity and Sector Registry (EASR) or permit-to-take-water (PTTW) may be required. • Conduct water balance calculations to determine the potential reduction in recharge. Implement low impact development (LID) measures to promote infiltration and maintain pre-development recharge volumes. • Manage road salt application through York Region's Salt Management Plan and Guidance for Best Management Practices for Road Salt Usage Standards.
Stormwater Management	• Need for stormwater quantity and quality control • Controls required to minimize erosion and sedimentation during construction	• Ten stormwater management (SWM) facilities are proposed within Block 27 to service majority of the development including the collector road system. All SWM ponds will be sized to provide quality, erosion, and quantity control. • SWM facilities will control future peak flows to target levels for the 2 year to 100 year events and the Region Storm • While LIDs are not being implemented specifically within the ROW, LID measures part of the overall Block 27 development will maintain recharge volumes. • SWM facilities in catchments discharging to DF1 will provide for 48-hour extended detention for 30 mm storm event and 3 mm retention. Facilities draining to catchments discharging DF3 and DF4 will provide for 48-hour extended detention for 25 mm storm event and 5 mm retention.

Anticipated Impacts		Mitigation Measures
		• During subsequent design stages, erosion and sediment control should be identified for implementation during construction.
Climate Change	• Greenhouse gas emissions associated with the operation, maintenance, and construction of the proposed collector road network	• To minimize the project's effect on climate change, construction contracts should encourage sourcing from suppliers with strong sustainability policies and practices. Materials that have a lower carbon footprint including sustainable and permeable concrete and asphalt should be considered. • The provision of dedicated active transportation facilities along all collector roads will reduce vehicle use and result in decreased greenhouse gas (GHG) emissions caused by automobiles. • To further reduce and mitigate the impacts of climate change, opportunities to implement stormwater management LID strategies and additional space to accommodate vegetation should be considered. • Use of materials that can tolerate extreme heat or reduce heat absorption such as light-colored aggregates in asphalt or concrete can also help mitigate impacts of climate change. • A commitment shall be made to review, address, and reconfirm sustainable measures in the design of the collector roadways to further reduce and mitigate the negative effects of climate change.
Built Heritage Resource & Cultural Heritage Landscape	• Potential for direct or indirect impact to the identified built heritage resources Permanent impacts • to the context of the cultural heritage landscape, specifically for CHL 1 and CHL 7 as identified as Properties of Architectural and Historical Significance.	• Conduct Heritage Impact Assessments (HIAs) for CHL 1 and CHL 7 in accordance with the City of Vaughan's *Guidelines for Cultural Heritage Impact Assessment (2017)* and submit to City heritage staff for review and approval prior to road construction. • Erect protective property fencing prior to road construction along the north property line of the cemetery on CHL 3 and BHR 18 to limit construction encroachment. • Prepare cultural heritage photo documentation and historical mapping for CHL 2 for local archival records. This should be provided to Heritage Planning at City of Vaughan prior to road construction.
Archaeology	• Unanticipated discovery of	• Areas with archaeological potential requiring further Stage 2-3 archaeological assessment were identified

Anticipated Impacts		Mitigation Measures
	archaeological and/or human remains	within the study area. All areas shall be cleared of archeological potential prior to an area being impacted. • Archaeological monitoring will be required even after a Stage 2 archaeological assessment for the pre-development topsoil removal (grading) for lands located within 1000 m of documented village sites and within 300 m of any current or former water source or within 100 m of the Teston ossuary. • Indigenous Peoples will be contacted prior to initiating all remaining archaeological assessment work to ensure engagement and inclusion for outstanding archeological fieldwork within Block 27.
Operations and Maintenance Activities	• Operations and maintenance activities to be conducted to ensure all mitigation measures are effective	• Operations and maintenance activities will center around preventing negative environmental impacts, protecting the existing environment, and capitalizing on opportunities for the rehabilitation and enhancement of impacted areas. • Operating and maintenance costs will be determined in the detailed design phase of the project.

COST AND IMPLEMENTATION

The proposed road improvements for the Block 27 collector network are estimated to cost approximately **$138,531,685** based on base and top asphalt, storm sewers, culvert structures, bridge structures, gas pipeline crossings, streetlighting, and landscaping.

Development within the Block 27 study area is anticipated to occur by year 2031. The preferred road network identified as part of this Block 27 MCEA study are to be implemented at once and prior to development on the site. Details of the proposed collector roads will be determined through subsequent functional design work and refined through future Draft Plan submissions. For roads that extend beyond a single property owner, maintaining the identified boundary location and road geometry is critical to not result in increased impacts for implementation of the road. It is expected that the City will enforce the adherence to the road geometry at the time of approval of the individual plans and subdivision.

REVISIONS AND ADDENDA TO THE ESR

Subsequent to the filing of the ESR, any modification to the project or change in the environmental setting for the project shall be reviewed by the proponent. A minor change to the undertaking can proceed without an addendum as long as they are in line with the intent of the environmental assessment. At the time of preparing this Class EA, significant wetlands and associated boundaries were identified in accordance with policies prior to the OWES update. Should the identification of certain hydraulic features be modified or reduced in size, an update to the hydraulic analysis would be required as part of detailed design of crossing structures. This is expected to proceed without needing an addendum to this ESR.

1 INTRODUCTION

The Block 27 Collector Roads Municipal Class Environmental Assessment (MCEA) Study (Schedule 'C') has been completed for the City of Vaughan as co-proponents with the Block 27 Landowners Group Inc. to develop, identify, evaluate, and recommend a preferred collector road network within Block 27 that can support sustainable long-term growth and the efficient and safe movement of people for the new community in Block 27, located within the City of Vaughan, Ontario. This study builds upon the recommendations of the North Vaughan and New Communities Transportation Master Plan (NVNCTMP) and Block 27 Secondary Plan which identified the transportation requirements for the North Vaughan New Community Areas and selected an alternative road network within Block 27 to ensure external connectivity to the broader North Vaughan area.

The purpose of this Environmental Study Report (ESR) is to document the Municipal Class Environmental Assessment (MCEA) process (Phases 1 to 4) completed for the Block 27 collector roads, including:

- Project Background;
- Consultation and Engagement;
- Existing and Future Conditions;
- Alternative Road Alignments and Evaluation and Recommended Collector Road Network;
- Alternative Design Concepts and Evaluation;
- Description of the Recommended Plan;
- Potential environmental effects, mitigation, and monitoring measures; and
- Future commitments, revisions, and addenda to the ESR.

1.1 PROJECT BACKGROUND

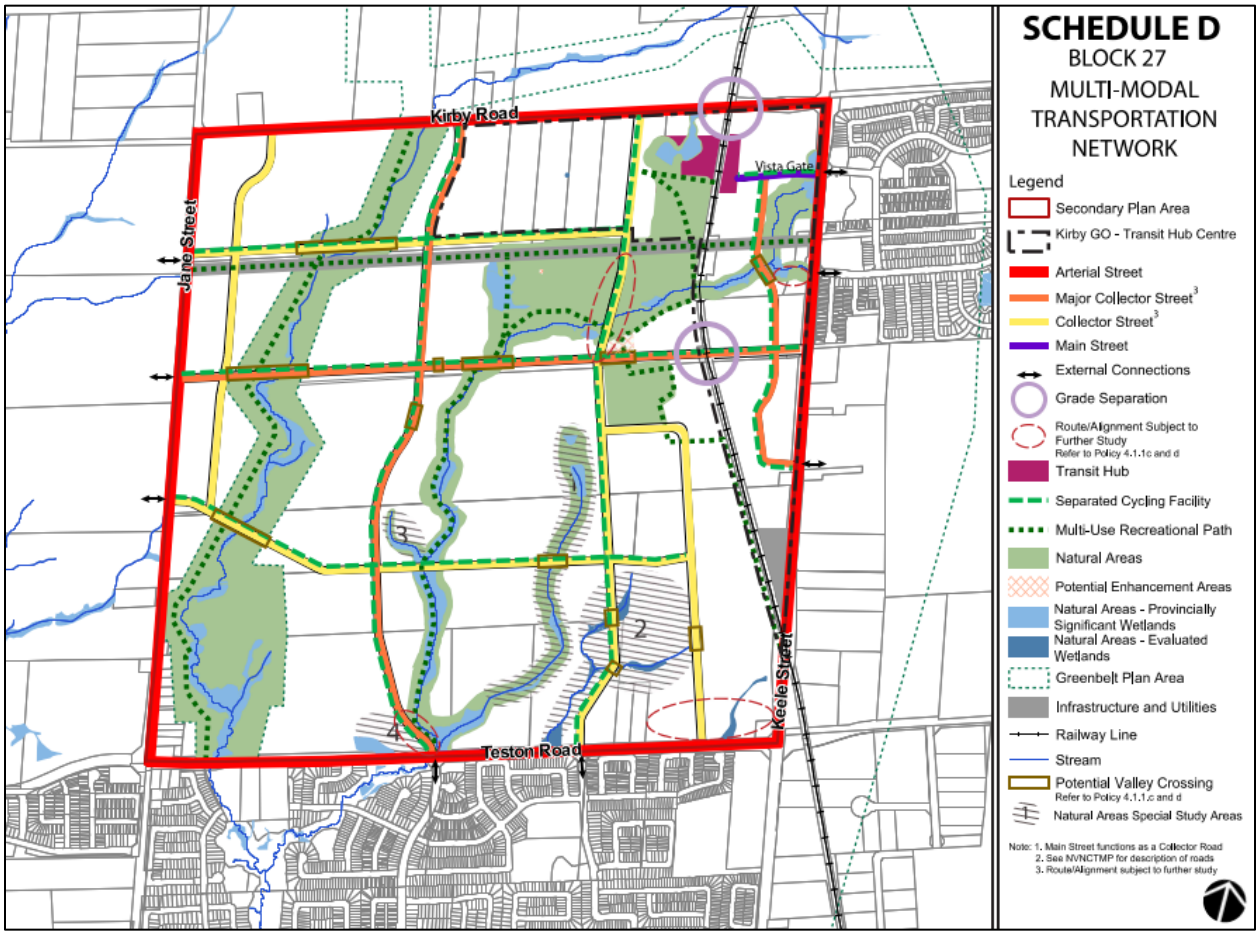
In accordance with the Regional Municipality of York's Official Plan (2010) and the City of Vaughan's Official Plan (2010), the City of Vaughan began the planning process for Block 27 in January 2015. In 2019, the City of Vaughan completed the NVNCTMP to develop a well-integrated and sustainable transportation network for the North Vaughan study area, including Block 27, to accommodate both existing residents and new residents to 2031 and beyond. The NVNCTMP study followed Approach #1 of the Municipal Class EA guidelines (October 2000, as amended in 2007, 2011, and 2015) to establish the need and justification for proposed collector roads and identify the internal transportation network within the Block 27 Secondary Plan Area. The completion of the NVNCTMP study in 2019 thereby fulfilled the requirements of Phase 1 and 2 of the MCEA process.

The Block 27 Secondary Plan was adopted by Vaughan Council in September 2018 and by Regional Council in May 2020 to provide for the development of the City's New Community Areas to the year 2031 and beyond. The evolution of the preferred network for Block 27 included in the Secondary Plan followed an integrated approach in consultation with the Block 27 Secondary Plan team, participating landowners and their representatives, and the NVNCTMP study team. The evaluation ultimately identified the recommended alternative collector road network for Block 27 as documented in Schedule 'D' of the Block 27 Secondary Plan (see **Figure 1-1**).

Through the development of the NVNCTMP and Block 27 Secondary Plan, Block 27 has been designed to be transit-oriented, compact, vibrant, inclusive, healthy, sustainable, and diverse. Block 27 is proposed to include a mix of uses, such as low- and mid-rise residential housing, and includes community facilities such

as community hub, schools and parks. The Block 27 Secondary Plan incorporates and protects for a Kirby GO Transit Hub Centre for the Kirby GO Station proposed by Metrolinx in the north-east quadrant of the block.

Figure 1-1: NVNCTMP and Block 27 Secondary Plan Recommended Transportation Network



Source: Block 27 Secondary Plan (City of Vaughan, 2018)

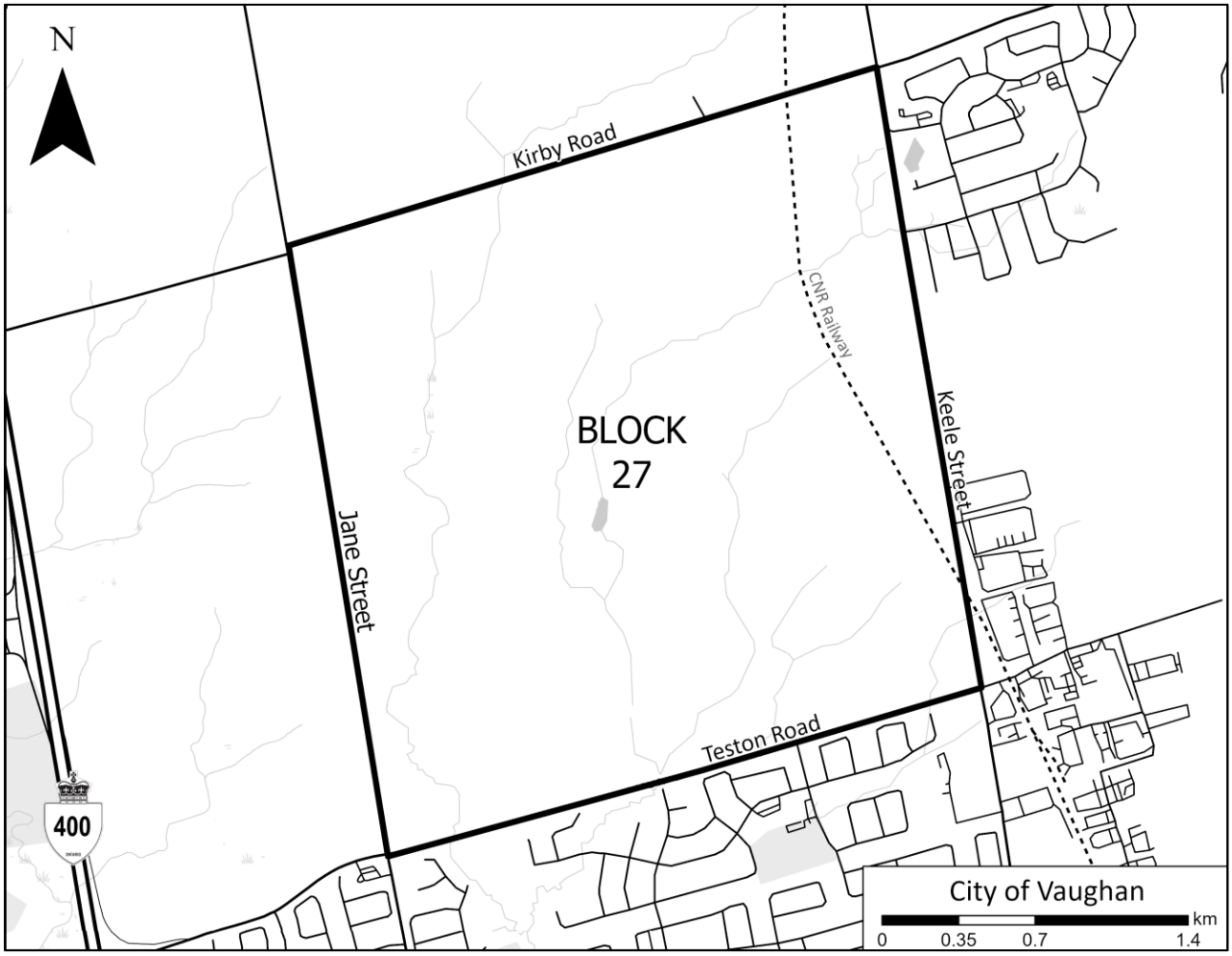
The recommended road network established in the NVNCTMP and Block 27 Secondary Plan provides the basis for further detailed studies in accordance with Phase 3 and 4 of the MCEA process. The City and Block 27 Landowners Group, as co-proponents, has initiated the Block 27 MCEA to complete the environmental assessment of the collector roads identified in the NVNCTMP and Block 27 Secondary Plan. This study furthers the work completed in the NVNCTMP and documents existing conditions, further refines the recommended alternative road network, develops and evaluates the preferred design alternatives for major and minor collector roads in Block 27, identifies potential impacts, and proposes recommended mitigation measures.

1.2 STUDY AREA

Block 27 is located in the City of Vaughan within the Regional Municipality of York, and is bounded by Kirby Road to the north, Keele Street to the east, Teston Road to the south, and Jane Street to the west, as shown in **Figure 1-2**: .

Block 27 has an area of approximately 400 hectares (990 acres) with the majority comprised of agricultural land uses. Other existing land uses within Block 27 include a place of worship, a historic cemetery, and some small scale residential and commercial uses near Teston Road and Jane Street. Parts of the Block 27 New Community Area are located within the Provincial Greenbelt, and a reach of the West Don River. Additionally, a central tributary of the West Don traverses through the area. The TransCanada Pipeline Canadian Mainline also crosses the north portion of the block in an east-west direction, while the CNR Rail Line runs north to south, west of Keele Street.

Figure 1-2: Study Area



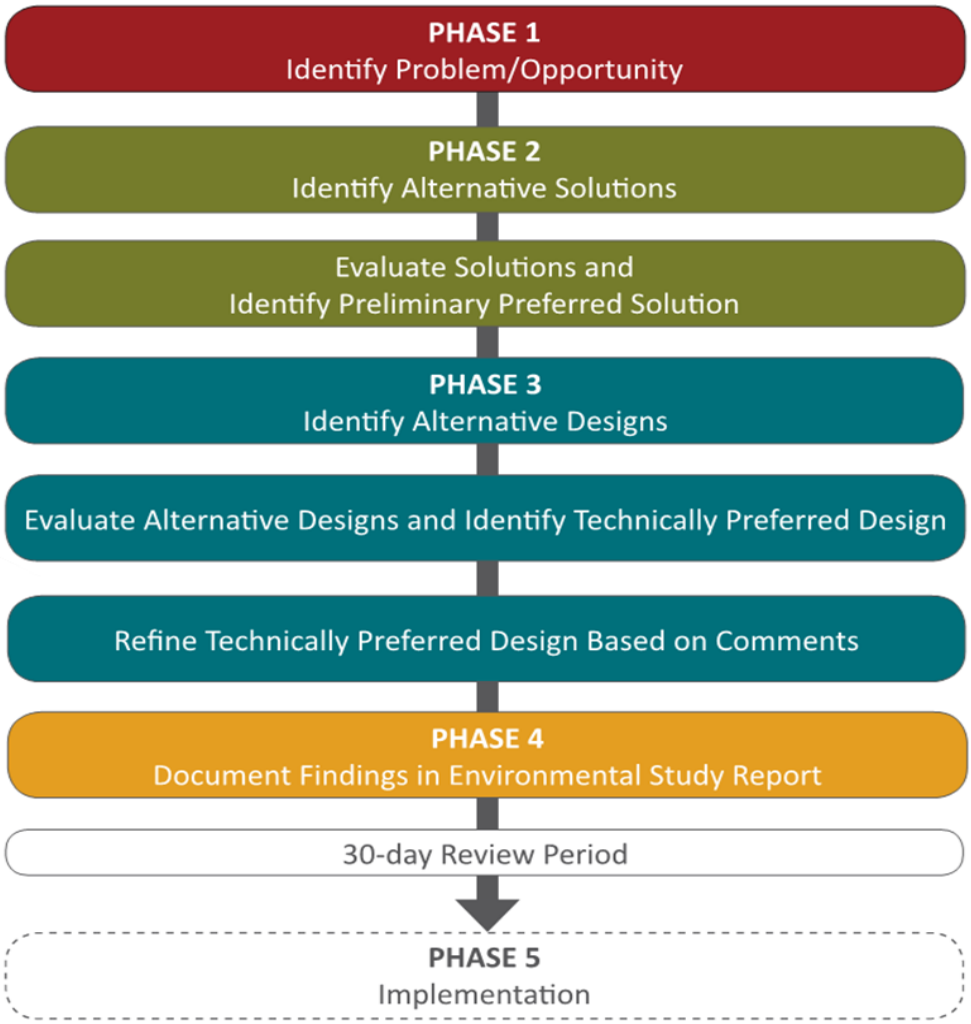
1.3 ENVIRONMENTAL ASSESSMENT PROCESS

The Block 27 MCEA study was initiated to complete Phases 3 and 4 of the MCEA process. The MCEA process is illustrated in **Figure 1-3**. Concurrent with this MCEA study, the Block 27 Landowners Group is developing a Block Plan for Block 27 and is undertaking a Master Environmental Servicing Plan (MESP) which is going through the Block Plan process for Block 27. The Block 27 MCEA and MESP have been closely coordinated from the on-set of the study.

It should be noted that the Minister of the Environment, Conservation and Parks recently approved an amendment to the MCEA on March 3, 2023. As the Notice of Commencement for the Block 27 Class EA was issued prior to the 2023 amendment to the MCEA, this study was undertaken in accordance with the requirements of the Municipal Class Environmental Assessment (Municipal Engineers Association, October 2000, as amended in 2007, 2011, 2015, and 2023) for a Schedule 'C' project.

As previously noted, the NVNCTMP completed Phases 1 and 2 of the MCEA process, which included defining the problems and/or opportunities and evaluating and selecting a preferred alternative solution. A comprehensive review of the NVNCTMP was conducted to confirm whether the findings are applicable to this Block 27 MCEA and is further discussed in **Section 4**. As part of the Phase 2 review, alternative alignments of the collector roads were developed and evaluated to identify a refined preferred recommended collector road network within Block 27. After further consultation with review agencies, stakeholders, Indigenous Communities, and members of the public, the preferred alignments were further refined to address comments raised.

Figure 1-3: MCEA Process



1.3.1 ENVIRONMENTAL STUDY REPORT

The purpose of this ESR is to document Phases 1 to 3 of the MCEA process, satisfying the requirements of Phase 4. This study includes reviewing and confirming the work completed in Phases 1 and 2 as part of the NVNCTMP, and completing Phases 3 and 4 of the MCEA, including developing and evaluating design concept alternatives, selecting a recommended design, assessing potential environmental effects, and identifying mitigation measures and commitments to future work.

As required in Phase 4 of the MCEA process, this ESR is being placed on the public record for a 30-day review period starting from October 29, 2024 and ending on November 29, 2024. During the review period, individuals with outstanding concerns are encouraged to submit their comments to one of the Project Team listed below:

Paul Grove, MCIP, RPP
Transportation Engineering Lead
City of Vaughan
2141 Major Mackenzie Drive
Vaughan, ON L6A 1T1
Tel: 905-832-2281, ext. 8857
Email: paul.grove@vaughan.ca

Chris Sidlar, MCIP, RPP
Vice President, Transportation
LEA Consulting Ltd.
625 Cochrane Drive, 5th Floor
Markham, ON L3R 9R9
Tel: 416-572-1791
Email: CSidlar@lea.ca

1.3.2 SECTION 16 ORDERS

The Minister of the Environment, Conservation and Parks (MECP) has the authority and discretion to make an Order under Section 16 of the *Environmental Assessment Act*. A Section 16 Order may require that the proponent of a project going through a Class Environmental Assessment (Class EA) process:

1. Submit an application for approval of the project before they proceed
2. Meet further conditions in addition to the conditions in the Class EA. This could include conditions for:
    a. Further study
    b. Monitoring
    c. Consultation

If a Section 16 Order request is made, the project proponent cannot proceed with the project until the minister makes a decision on the request. A Section 16 Order request may only be submitted on the grounds to prevent, mitigate, or remedy adverse impacts on the existing constitutionally protected aboriginal and treaty rights of the Aboriginals peoples of Canada. Requests on other grounds will not be considered.

Eligible individuals may submit a Section 16 Order request by mail, email, fax, or hand deliver to the Minister of the Environment, Conservation, and Parks and the Director of Environmental Assessment Branch at their contact information below, prior to the end of the review period. Please visit the ministry's website for more information on the procedure for making a Section 16 Order request at: https://www.ontario.ca/page/class-environmental-assessments-section-16-order

Any Section 16 Order requests should be submitted to the Minister of MECP, Director of Environmental Assessment Branch:

Minister
Ministry of Environment, Conservation and Parks
777 Bay Street, 5th Floor
Toronto, ON M7A 2J3
Email: minister.mecp@ontario.ca

Director, Environmental Assessment Branch
Ministry of Environment, Conservation and Parks
135 St. Clair Avenue West, 1st Floor
Toronto, ON M4V 1P5
Email: EABDirector@ontario.ca

1.4 STUDY TEAM

This study was initiated by the Block 27 Landowners Group Inc. with the City of Vaughan as co-proponents. LEA Consulting Ltd. (LEA) was the lead consultant undertaking the MCEA study, along with a multi-disciplinary team of sub-consultants:

- Delta Urban Inc. – Development Coordinator and Landowner Representative
- Schaeffers Consulting Engineers – Civil Engineering & Stormwater Design
- Bousfield Inc. – Development Land Use Planning
- Beacon Environmental – Natural Heritage
- Stonybrook Consulting Inc. – Master Environmental Servicing Plan (MESP) Lead
- R.J. Burnside & Associates Ltd. – Hydrogeology
- Valcoustics Canada Ltd. – Noise & Vibration
- Dillion Consulting Ltd. – Air Quality
- Archaeology Consultants Canada – Archaeology
- Unterman McPhail Associates – Cultural Heritage
- Soil Engineering Ltd. – Geotechnical Engineering

2 CONSULTATION AND ENGAGEMENT

Consultation and engagement are critical components of the MCEA process and has been an integral component to this study. The consultation plan for the Block 27 MCEA included engagement with external federal and provincial government review agencies, representatives from relevant City and Regional departments, Indigenous Communities, potentially interested organizations and stakeholders, adjacent property owners, and members of the public. A summary of the public correspondence and input received during the study is provided in **Appendix A**.

2.1 PROJECT WEBSITE

At the onset of the study, a project website (vaughan.ca/Block27EA) was developed to provide members of the public and agencies with information about the project, including: background information and resources, project updates, consultation/engagement materials, and study team contact information to submit questions or comments at any time during the study or be added to the study contact list. A link to the project website was provided on all project notifications.

2.2 CONSULTATION APPROACH

A contact list was developed at the start of the study that included relevant external agencies, Indigenous Communities, municipal staff, property owners, other key stakeholders, and members of the public. The contact list built upon the contacts on the NVNCTMP contact list to ensured agencies, and all interested persons and organizations and stakeholders were continually informed as the study progressed.

Key consultation events undertaken throughout the Block 27 MCEA study are listed in **Table 2-1** and are further detailed in the following sections.

Table 2-1: List of Consultation Events

Consultation Event	Date
Notice of Pre-Engagement Letters (Indigenous Communities)	December 6, 2021
Notice of Study Commencement	December 16, 2021
Curve Lake First Nation Consultation Meeting #1	February 25, 2022
Toronto Region Conservation Authority (TRCA) Meeting #1	March 16, 2022
Technical Advisory Committee (TAC) Meeting #1	March 22, 2022
Curve Lake First Nation Consultation Meeting #2	March 29, 2022
Mississaugas of the Credit First Nation Consultation Meeting #1	May 9, 2022
TRCA Meeting #2	July 27, 2022
TAC Meeting #2	August 29, 2022
TRCA Meeting #3	September 16, 2022
Notice of Public Information Centre	November 2, 2022
Public Information Centre	November 16, 2022
York Region Consultation	November 28, 2022
TRCA Meeting #4	May 11, 2023
Notice of Study Completion	October 29, 2024

2.2.1 NOTICE OF STUDY COMMENCEMENT - DECEMBER 2021

The Notice of Study Commencement was sent to external review agencies, Indigenous Communities, potentially interested organizations and stakeholders, and members of the public on the study mailing list on December 16, 2021. The notice was also published on the project website and sent via Canada Post unaddressed (bulk) mail to approximately 6240 properties within an approximate 500 m radius from Block 27. A copy of the notice of study commencement is provided in **Appendix Ai**.

2.2.2 PUBLIC INFORMATION CENTRE (NOVEMBER 2022)

Public consultation meetings provide an opportunity for members of the public, interested parties, agencies and Indigenous Communities to review project information, identify concerns, ask questions and provide input to the Project Team.

One virtual public consultation event was held on November 16, 2022 for this project to present project updates and provide members of the public with an opportunity to review and comment on the study. The notice of public information centre was sent to external review agencies, Indigenous Communities, potentially interested organizations and stakeholders, and members of the public on the study mailing list on November 2, 2022 and published on the project website. In addition, the notice was circulated via Canada Post unaddressed (bulk) mail to approximately 6240 properties within an approximate 500 m radius from Block 27. A copy of the Notice of Public Information Centre is provided in **Appendix Ai**.

A virtual public information centre (PIC) was held on November 16, 2022 from 6:00 pm to 7:30 pm to share information with the community about the new collector street network planned for Block 27. The PIC required participants to register prior to the event in which a total of 54 participants signed up to attend the session. The PIC included a presentation with question & answer segments throughout the event. The PIC presented information on:

- Project background;
- Recap of the North Vaughan & New Communities Transportation Master Plan;
- Existing Conditions;
- Preliminary alignments and preferred transportation network; and
- Preliminary cross sections.

Following the PIC, a recording of the session and a PDF version of the slide deck was made available on the project website. Members of the public were encouraged to review the materials and were provided the opportunity to submit questions and comments via email or phone throughout the period of November 16th to November 30th, 2022. Comments received included clarification regarding background studies, timeline of the project, and a range of design suggestions which the study team has taken to revisit the design and alignment of certain roadways. **Table 2-2** provides the comments made by the public and the study team's responses.

Table 2-2: Feedback from Public Information Centre

Key Public Comments/Questions Raised During the PIC and Comment Period		Study Team Response
Intersection Spacing	There are too many intersections proposed on Keele Street. It would be best not to have traffic light intersections too close together because of queuing and timing conflicts (e.g., northbound traffic queues at Keele Street/Kirby Road would pass Vista Gate).	The Block 27 Environmental Assessment (EA) maintains the requirement from the approved Block 27 Secondary Plan and Transportation Master Plan to introduce three intersections on Keele Street including at Vista Gate, Street 2, and Street 8. Traffic analyses completed for Keele Street show acceptable operations along the corridor. The introduction of a signal at Vista Gate will break up the existing northbound queues and manage flows during the heaviest traffic period. A break in the northbound platoon of traffic would permit existing and future residents to exit into the flow of traffic along Keele Street.
	Collector Street 8 should connect to Keele Street at Peak Point Boulevard rather than Vista Gate. There is already a signal at Peak Point Boulevard and the Vista Gate intersection would be too close to Kirby Road.	The intersection of Street 8/Keele Street at Vista Gate was reviewed in detail as part of the Block 27 EA. The connection was deemed desirable based on the following reasons: • The Vista Gate connection was recommended in the approved Block 27 Secondary Plan and TMP and is an important access point for traffic driven by the future Kirby GO Station. • Alignment of Street 8 with Peak Point Boulevard would result in greater impact to environmentally sensitive areas west of Peak Point Boulevard. Further, there are challenges in topography that would complicate the development of any crossing of sensitive areas and would result in added cost of construction, maintenance, and property impacts. • The intersection planned at Vista Gate is separated by approx. 210m or over 600ft to Kirby Road. The traffic analysis conducted for the Block demonstrates that this separation distance is adequate to accommodate the anticipated vehicle queueing and facilitate acceptable traffic operations along Keele Street.
	Street 7 and its terminus at Teston Road is too close to Keele Street.	Through consultation and engagement with York Region, the study team explored options to increase the intersection spacing between Street 7 and Keele Street. A shift of Street 7 to the west, would better accommodate queues and traffic flow from the Block.

Key Public Comments/Questions Raised		Study Team Response
Road Alignment	One east-west mid-block collector crosses the rail tracks, connecting Jane Street to Keele Street; two would be better to accommodate the higher density developments in this Block.	The review of an additional east-west connection, along with the possibility of other crossing locations of the rail corridor, was considered extensively through the North Vaughan and New Communities Transportation Master Plan process. Due to the alignment of the rail corridor in relation to Keele Street, an acceptable and safe roadway slope for an additional east-west grade-separation is not feasible.
	Option 1C is the preferred alignment of Street 1 as it has the least impact on properties and has a straight alignment.	Option 1C would be the least impactful to properties. This has been factored in the evaluation options for Street 1. Additional criteria identified through the EA process such as environmental impact, structure requirements for the greenbelt crossing, cost of construction and maintenance, and potential for accommodating future land uses in the Block outweigh property impact through the EA evaluation with Option 1A being returned as the preferred. There are opportunities for refinements to the preferred alignment of Street 1 through any future development application processes, should those be advanced.
	The alignment of Street 5 has shifted west from the Secondary Plan under Options 5A and 5B. The alignment should be shifted east to better utilize the planned public transportation on Street 5 and Kirby Road.	Option 5A has been selected as the preliminary preferred alignment for Street 5 which largely follows the alignment shown in the Secondary Plan and the Transportation Master Plan. The alignment does shift slightly east of where it has been shown in the Secondary Plan at the intersection with Street 2 and the intersection with Teston Road. The alignment of Street 5 at Kirby Road is maintained from the Secondary Plan.
Kirby Road Widening EA + Kirby GO studies	Will the Kirby Road widening study between Dufferin Street and Keele Street be carried through to this project?	The Kirby Road widening study is included in the baseline conditions of the Block 27 EA. The improvements along Kirby Road are reflected in the proposed collector road network. Future detailed drawings will integrate the recommendations of the Kirby Road study.
	Will there be a GO transit stop at Keele Street/Kirby Road?	The Block 27 Secondary Plan and the North Vaughan and New Communities Transportation Master Plan (NVNCTMP) completed in 2019 identifies a potential GO Station at Kirby Road/Keele Street. While the Block 27 EA acknowledges this recommendation, planning of the GO Station is currently at a high-level and there are no set timelines currently in discussion.
Noise Impacts	Are there any plans of taking the rail crossing underground	The Regional Municipality of York is undertaking an Individual Environmental Assessment (IEA) to examine transportation improvements in the Teston Road area

Key Public Comments/Questions Raised During the PIC and Comment Period		Study Team Response
	at Keele Street/Teston Road and Keele Street/Kirby Road?	between Highway 400 to Bathurst Street and between Major Mackenzie Drive and Kirby Road. As part of the ongoing IEA, Teston Road grade separation studies are currently underway. With respect to the rail crossing at Kirby Road, an underpass (rail over road) was the preferred GO rail crossing alternative as evaluated under the Kirby Road Widening EA study.
	Will there be any sound barrier walls with respect to the Kirby GO project?	A Transit Hub study will be undertaken with respect to the potential GO station in the northeast quadrant. Previous studies have been undertaken by Metrolinx with respect to the implementation of GO service along the Barrie line. These studies have included noise studies.
Other	What is the timeline for Phase 4 of the project and full completion of the project?	This study is to be completed in the new year (2023). Phase 4 is anticipated in commence in early 2023 upon completion of Phase 3. Next steps include detailed design and implementation. Construction of roadways are anticipated to commence in 2025-2026.
	Will a copy of the presentation be sent to us?	Yes. A recording will be shared to the participants. A PDF and recording of the presentation will also be provided on the project website.

The Block 27 MCEA project team review and responded to all comments received as part of the environmental assessment process. The PIC communication materials, detailed comments, and study team responses are provided in **Appendix Aii**.

2.3 AGENCY CONSULTATION AND ENGAGEMENT

In addition to City of Vaughan technical staff, federal and provincial government review agencies, municipal staff, emergency services, utilities, developers, and other potentially interested stakeholders were contacted for information, comments, and input to the study. The agencies and stakeholders contacted are summarized in **Table 2-3**.

Table 2-3: List of Agencies and Stakeholders Consulted

Federal Agencies and Stakeholders	
▶ Canada Post	▶ Canadian National Rail
Provincial Agencies and Stakeholders	
▶ Metrolinx/GO Transit	▶ Ministry of Environment, Conservation and Parks (MECP)
▶ Ministry of Citizenship and Multiculturalism (*formerly Ministry of Heritage, Sport, Tourism, and Cultural Industries*)	▶ Ministry of Municipal Affairs and Housing
▶ Ministry of Natural Resources (MNR) (*formerly Ministry of Natural Resources and Forestry*)	▶ Ministry of Transportation (MTO)
▶ Toronto Region and Conservation Authority (TRCA)	
Municipal and Regional Municipalities and Stakeholders	
▶ City of Vaughan	▶ City of Richmond Hill
▶ King Township	▶ Regional Municipality of York
▶ York Region Transit (YRT)	
Emergency Services	
▶ City of Vaughan – Fire and Rescue Service	▶ Ontario Provincial Police
▶ York Region – Paramedic Services	▶ York Region – Police Services
School Boards	
▶ Conseil Scolaire Catholique	▶ Conseil Scolaire Viamonde
▶ York Catholic District School Board	▶ York Region District School Board
Other Stakeholders	
▶ Alectra Utilities	▶ Bell Canada
▶ Carrick Macross Golf	▶ DPM Energy
▶ Humphries Planning Group Inc.	▶ Integro Building Systems
▶ Mackenzie Ridge Ratepayers' Association	▶ Mid Ontario Truck Centre
▶ Panelized Building Solutions Inc.	▶ PointA
▶ Quality & Company Inc	▶ Revera Sherwood Court Long Term Care Home
▶ Rogers Telecommunication	▶ Rose Textiles
▶ TC Energy	▶ Terumo Medical Canada Inc.
▶ TOC Logistics Inc.	▶ Together We Grow
▶ Upper Thornhill & Area Community Association	▶ Vernacare Canada Inc.
▶ Walmart Canada	

Technical Advisory Committee (TAC)

A Technical Advisory Committee (TAC) with staff from the City of Vaughan and external government agencies was formed during the Block 27 Secondary Plan and NVNCTMP process. During this MCEA study,

TAC members were consulted at various points to get preliminary feedback regarding the vision for the project as well as detailed design input to incorporate into the development of alternative design solutions and evaluation criteria. TAC members included various City and external agency stakeholders and included representation from the following agencies:

- City of Vaughan
- Metrolinx
- MHBC Planning
- Ministry of Environment, Conservation and Parks
- Ministry of Citizenship and Multiculturalism
- Ministry of Natural Resources
- Ministry of Transportation
- PointA
- TC Energy
- Toronto Region and Conservation Authority
- York Region
- York Region Transit

As part of the project, two TAC meetings were held. The first TAC meeting was held on March 22, 2022 to introduce the Block 27 MCEA study, discuss and obtain feedback on the study including existing conditions, proposed evaluation criteria, alternative road alignments, alternative cross-sections, study schedule, and next steps.

The second TAC meeting was held on August 29, 2022 to provide an update on the Block 27 MCEA study, including a summary of the consultation/engagement efforts. The focus of the meeting was on the evaluation criteria, alternative road alignment evaluation, and preferred cross-sections. Feedback received during the meeting was reviewed and incorporated into the design prior to undergoing additional consultation to ensure an iterative design process.

A summary of comments received from the TAC can be found in **Table 2-4**. Detailed correspondence and meetings minutes with the TAC are provided in **Appendix Aiii**.

Table 2-4: Summary of TAC Comments and Responses

Stakeholder	Comment	Study Team Response / Action
Development Services and Environmental Engineering	• Requested for noise studies and contaminant overview studies	Provided noise memo and contaminant overview study.
Transportation Planning (York Region)	• Concerned with minimum intersection spacing and alignment with adjacent Blocks	A meeting was held with the Region on November 28, 2022, to discuss the intersection spacing requirements along regional roads.

Stakeholder	Comment	Study Team Response / Action
	• Concerned with minimum intersection spacing of Street 2 at Keele Street • Suggested revising the Street 7 and Street 3 intersection to a roundabout configuration	Street 1 and Street 4 alignments were revisited to provide the minimum intersection spacing of 215 m. In addition, Street 7 was refined to provide a roundabout intersection at Street 3 & 7 allowing for the Street 7 & Teston Road intersection to shift further west. The project team has also coordinated with the adjacent Block 34E to align the collector roads along Jane Street. There is limited ability to shift Street 2 due to the proposed grade separation at Street 2 and its location relative to the CNR to achieve an acceptable road slope. The location of Street 2 is also influenced by cultural heritage/natural heritage features to the north and a cemetery to the south.
Public Health (York Region)	• Interested in reviewing air quality and noise impact studies • Are climate change impacts being assessed?	Provided noise memo and air quality report (qualitative). Climate change and associated mitigation measures will be outlined within the Environmental Study Report.
TransCanada PipeLines Ltd. (TCPL)	• Requested that the project team meet the minimum setback distances (7 m from TCPL right-of-way (ROW)) • Requested for final detailed cross-sections and engineering analyses of all roads expected during construction and operation of the crossings • Outlined pathway crossings, landscaping, and storage of materials/equipment requirements	A 7 m offset has been provided from the easement to the proposed stormwater management pond as well as the collector road crossings within the vicinity of the TCPL facility. The final cross-section details and required engineering analyses will be completed and provided for review and approval during the next design phase. Pathway crossings, landscaping, and storage of material requirements were noted, and the project team will continue to correspond with TCPL during the next design phase.
Cultural Heritage (City of Vaughan)	• Inquired if Indigenous Nations were consulted • Flagged that a few alignments come in proximity to the cemeteries by Keele Street • Flagged areas of high archaeological potential • Requested for cultural heritage studies	Notice of pre-consult letters were sent to Indigenous Nation communities. Only Curve Lake First Nation and Mississaugas of the Credit First Nation expressed interest. The project team has made an effort to shift the alignments away from the cemeteries. Impacts within the ossuary model are factors that were considered when selecting the preferred

Stakeholder	Comment	Study Team Response / Action
		alignments. During implementation and construction, recommendations from cemetery investigations will be incorporated in correspondence with the project team's archaeological specialist. The project team is aware of the areas with archaeological potential and will ensure any areas impacted by the collector road network will be cleared of archaeological potential prior to construction and/or monitored during construction. This will be included as a future commitment with the Environmental Study Report. Provided cultural heritage studies.
Ministry of Natural Resources (MNR)	• Concerned with wildlife crossing. Recommended free-span bridges for the collector streets traversing the Greenbelt Plan (Streets 1, 2, and 3) • Recommended arcing Street 5 to the west to further minimize impacts to the watercourse (DF3) • Concerned with the environmental impacts of Street 6 between Streets 1 and 2 • Suggested eliminating the side road connection of Street 8 to Vista Gate to avoid impact on a wetland	A variety of structure types and crossings were considered for the area. However, free-spans were not determined to be required as the proposed culverts satisfy the requirements from a hydraulic and ecological perspective. It was determined that all culvert crossings of the Greenbelt can accommodate the necessary hydrogeological flows while ensuring the appropriate openness ratios are provided for the target species. The project team noted MNR's request to arc Street 5 further west at the connection to Cranston Park Boulevard. However, the angle of Street 5 has been aligned to minimize impacts to DF3 while maintaining its connection to Teston Road at a 90-degree angle, as required by the City of Vaughan design standards. The project team reviewed the feasibility of terminating Street 6 south of the woodlot and the possibility of shifting Street 6 to avoid impacts to the woodlot. Due to intersection spacing considerations and uncertainty on the timing of development on a non-participating landowner property, there are limited opportunities to remove/shift Street 6 from its current alignment. In addition, the City of Vaughan Official Plan requires the provision of

Stakeholder	Comment	Study Team Response / Action
		two north-south and two east-west connections in all new Block communities. Street 6 forms a major function for Block 27 to avoid reliance on arterial roads surrounding the Block. The project team has reviewed mitigation opportunities which will be documented in the Environmental Study Report. Maintaining the connection to Vista Gate is critical from a traffic flow and network perspective to serve the potential Kirby GO Transit Hub.
Policy Planning and Special Programs (City of Vaughan)	• Requested confirmation that open culvert crossings are appropriate • Requested that the proposed alignments conform with VOP 2010 policy 7.2.3.1 and Block 27 Secondary Plan policy 3.9.2 with respect to public street frontage regarding the proposed school sites, where applicable	Openness ratios and dimensions of the proposed open bottom culverts are considered adequate for the target species and do not warrant the use of a free-span bridge. The proposed culverts satisfy the requirement from a hydraulic and ecological perspective. Detailed hydraulic modelling and ecological considerations will be documented in the Environmental Study Report. The project team understands that the public street frontage requirements are a preference of the school boards rather than a requirement in policy 7.2.3.1 of the VOP or policy 3.9.2 in the Secondary Plan. The Block Plan is able to accommodate the school board's preference.
York Region Transit (YRT)	• Street 7 should have signalized intersection with Teston Road • Cross-sections for major collector roads: YRT prefers alternative MA-1 and MA-2. In addition, drive lanes being 3.3 m is below the standard for YRT. Should be 3.5 m • Cross-sections for minor collect roads: YRT prefers alternative MI-2. In addition, drive lanes being 3.75 m creates safety concerns • Reduced cross-sections through the woodlot: YRT may not install bus stops on the stretch of the road due to safety concerns	Location for signalized intersections will be confirmed at a later design stage. However, upon initial review, the distance between the signalized intersection of Keele Street & Teston Road and Street 7 meets the minimum spacing requirement based on York Region standards. The cross-section evaluation for the major collector roads was updated based on YRT's comment on drive lane widths. Based on the updated evaluation and balancing all aspects (i.e., natural, socio-economic, cultural environments, and constructability), the preferred cross-section for major collector roads is MA-1 which provides 3.5 m drive lanes. City of Vaughan design standards for minor collector roads provide 3.75 m drive lanes. YRT

Stakeholder	Comment	Study Team Response / Action
		will be contacted during the next detailed design phase to discuss appropriate design considerations. The location for transit stops will be determined at a later design stage and in correspondence with YRT. It is likely that providing a transit stop through the woodlot will not be recommended due to the natural environmental impacts.
Urban Design (City of Vaughan)	• Creek crossing locations should be determined based on meander belt analysis • Cross-sections for collector roads: requested that all sidewalks be 2.0 m wide • Expressed preference for wider active transportation facilities	Fluvial geomorphological assessments were completed as part of the MESP and the recommendations have been incorporated into the design. The preferred minor collector cross-section includes 2.0 m wide sidewalks. For major collector roads, this would require a reduction of 0.5 m from another facility (e.g., landscape). Given constraints in the width of the right-of-way, the preferred major collector cross-section includes 1.5 m wide sidewalks which follow the City of Vaughan's engineering guidelines. Furthermore, due to the sensitivities of the woodlot, reduced sidewalk widths are being considered for Street 6 to minimize the impacts of the road.
Kirby Road Widening MCEA	• Concerned for the feasibility of Street 8 at Kirby Road due to the changes in elevation from the Kirby Road grade separation	The project team is actively monitoring and participating in the Kirby Road EA to ensure coordination with the Block 27 EA. Following receipt of the comment, the project team has confirmed that the Street 8 location is feasible with the Kirby Road grade separation.

Toronto Region and Conservation Authority (TRCA)

The Toronto Region and Conservation Authority (TRCA) was identified as a key stakeholder given proximity of the study area to TRCA regulated lands. The study team engaged TRCA as part of the TAC and throughout the study.

In addition to the two TAC meetings, four meetings were held between the study team and TRCA. TRCA meeting #1 was held on March 16, 2022. The purpose of the meeting was to introduce the Block 27 MCEA study, provide an overview of the existing conditions, proposed alternative road alignments, and proposed alternative cross-sections, with a focus on addressing TRCA comments and concerns received in January 2022. TRCA meeting #2, meeting #3, and meeting #4 were held on July 27, 2022, September 16, 2022, and May 11, 2023, respectively. The purpose of the meetings was to provide an update on the Block 27 MCEA

study, provide an overview of the existing conditions data and reports from the MESP, and obtain feedback on the alternative road alignments, with a focus on addressing TRCA comments and concerns.

A summary of the comments received from the TAC can be found in **Table 2-5**. Detailed correspondence and meetings minutes with TRCA are provided in **Appendix Aiv**.

Table 2-5: Summary of TRCA Comments and Responses

Comment		Study Team Response
General Comments	• Road design must consider natural hazard and natural heritage objectives	The following considerations have been provided in the Block 27 Class EA: • Reduced cross-section widths • Appropriate openness ratios to accommodate target species and wildlife objectives • Fluvial geomorphic recommendations for watercourse crossings • Post-construction restoration plans to be developed in the detailed design phase • Appropriate compensation to be provided as part of the MESP process
	• Concerned that road cross-sections do not contain any ROW low impact development (LID) measures	Alternatives to provide additional LID's that cannot drain to the proposed SWM ponds will be reviewed at the MESP stage. LID measures are not being implemented specifically within the ROW. Road run-off will be redirected and treated within the SWM facilities.
Street 1	• Utilize ecological and natural hazard objectives and requirements in crossing design	Culvert designs will maintain flow and sediment transport and accommodate wildlife passage. Additionally, floodplain crossing will be designed to provide conveyance to minimize impacts to upstream/downstream conditions.
Street 2	• Maintain ecological connectivity of DF3 crossing and enhance a functional connection between the 2 woodlots • Consider crossing designs that maintain wildlife passage	The crossing of DF3 has been reviewed from a geomorphological perspective and will be designed to the recommended openness ratio. There are challenges with providing a wildlife connection between the 2 woodlot. Constraints include: • Topography constraints (Street 2 is lower than the 2 woodlots and is in a trenched condition) • Grade separation (Street 2 will begin to slope downward to accommodate the underpass at the CNR. Retaining walls are also required north of Street 2, which

Comment		Study Team Response
		would further impede the provision of a wildlife crossing under Street 2) Wording will be included in the Environmental Study Report to explore incorporating mitigative measures to address wildlife crossing where feasible in the next design phase.
Street 3	• Preference for Alternative 3A • Consider ecological objectives and fluvial and hydraulic capacity	The project team noted the preference for Alternative 3A. However, there are significant impacts associated with Alternative 3A which are avoided by Alternative 3B. Alternative 3A has a greater fragmentation effects as it splits a contiguous wetland into 2 large units while Alternative 3B only encroaches into the northern fringes of the wetland. Dividing habitat into two or more patches weakens the resilience and stability of ecological systems. The preferred alignment will be selected based on evaluation of all technical considerations. The crossings associated with Street 3 have been reviewed from a geomorphological perspective and will be designed to the recommended openness ratio.
Street 4	No comments on Street 4	
Street 5	• No alternative alignment that avoids the NHS entirely (i.e., does not connect directly to Cranston Park) • Transportation challenges should not be resolved by relocating natural heritage features (i.e., realignment of DF3) • Effort to minimize impact to the natural heritage network and demonstrate the net gain in natural feature form and function is required • Road impacts should be considered alongside anticipated impacts with the proposed SWM facilities	A Street 5 alignment alternative that does not connect directly to Cranston Park Avenue was not developed because providing a continuous road between Blocks was a critical land-use and transportation planning consideration for the City and Region. Understanding the environmental conditions north of Teston Road and objectives to minimize impacts to DF3, flexibility on road alignment design was reviewed. However, this review concluded that there is limited flexibility to allow for the design of a proper intersection that meets the City's road design standard at the Street 5 and Teston Road intersection. As such, the project team proposed to extend the existing culvert over Teston Road and realign a portion of DF3. The strategy avoids requiring two new crossings (per NVNCTMP) and improves the watercourse alignment from a geomorphic and ecological perspective.

Comment		Study Team Response
		Reduced road cross-sections, appropriate radius design, use of retaining walls etc. will be addressed to minimize environmental implications. Riparian wetland creation and compensation for impacted wetlands will be provided. SWM is being coordinated between the MESP and Block 27 Class EA. Two SWM facilities are proposed near Street 5/Teston Road
Street 6	• Fragmentation of the woodlot will have a significant impact on the features' form and function • Encouraged that the woodlot be protected in its entirety • Suggested terminating Street 6 at Street 2, redirecting traffic to Street 5 or Street 8 • Level of opportunity to mitigate impacts is negligible in relation to extent of woodland removal • Suggested reduction to cross-sections for sensitive areas / crossing of the NHN	The needs and justification of the connection through the woodlot was initially documented in the NVNCTMP and shown in the Secondary Plan. Based on additional traffic modelling, Street 6 through the woodlot is not required from a traffic perspective if Street 5 develops north of the pipeline and as a 4-lane roadway at the onset of development. However, removal of the Street 6 connection would require the non-participating landowner in the northwest quadrant to permit a road connection (Street 5) that supports development south of Kirby Road. Given the uncertainty in the timing of the development of the non-participating landowner property, the continuous north-south connection of Street 6 has been included in the preferred road network. The connection of Street 6 through the woodlot would not be required if access is provided through the non-participating lands. While the removal of woodland ecosystems could be replicated through reforestation measures, fragmentation effects cannot be entirely mitigated. This has been considered in the assessment. A reduced cross-section was developed for Street 6 from 24 m to 16.9 m (i.e., 7.1 m reduction)
Street 7	No comments on Street 7	
Street 8	• Requirement for coordination with Metrolinx to ensure no additional impacts to NHN • Current flood plain on the east side of the rail line is extensive • Natural heritage and natural hazard objectives must be considered	The Block 27 Class EA accommodates the future potential Kirby GO station to the extent possible. The Street 8 alignment does not preclude the development of the Kirby GO Station. The station design is still underway, and alignment will be subject to further adjustments and refinements.

Comment		Study Team Response
		The natural environmental impacts were considered in the design of road alignments. (e.g., removal of road connection from Street 8 to Peak Point Blvd. given environmental sensitivities)

2.4 INDIGENOUS COMMUNITY ENGAGEMENT

In accordance with the Ontario government's process for Indigenous and First Nations engagement, Indigenous Communities were contacted at multiple points throughout the study process. The study team contacted the Indigenous and First Nations communities at key engagement milestones throughout the study, including pre-engagement letters, Notice of Commencement, the Public Information Centre, and study completion.

The study team obtained a list of potentially interested Indigenous Communities to be engaged as part of the MCEA study. The following Indigenous Communities were communicated with as part of the study:

- Curve Lake First Nation
- Mississaugas of the Credit First Nation
- Huron-Wendat First Nation
- Six Nations of the Grand River First Nation
- Haudenosaunee Confederacy Chiefs Council
- Beausoleil First Nation
- Hiawatha First Nation
- Mississaugas of Scugog Island First Nation
- Chippewas of Georgina Island First Nation

Of note, Alderville First Nation and Chippewas of Rama First Nation were not engaged as part of this study because both nations have previously contacted the City of Vaughan indicating that they do not have an interest in the City of Vaughan area.

Prior to study commencement, the study team sent pre-engagement letters to the Indigenous Communities on the study mailing list on December 6, 2021 to introduce the project, provide a summary of technical information, and inquire level of interest.

The study team has worked closely with Indigenous Communities who have reached out with interest following receipt of the Notice of Pre-Consult, including holding additional one-on-one meetings to discuss the project, and sending relevant technical reports for Indigenous Nation review.

A letter from Curve Lake First Nation dated January 5th, 2021 was received in response to the Notice of Pre-Consult. The letter indicated areas of concerns including natural environment, aboriginal heritage, and cultural values, and drinking water. The letter also requested for the Stage 1 archeological assessment to include Indigenous Knowledge of the land in the process and for Cultural Heritage Liaisons to be involved in any Stage 2-4 assessments, including test pitting, and/or pedestrian surveys to full excavation. A response was sent February 24th, 2022, providing a brief summary of the natural environment, archaeology, and hydrogeology under existing conditions and commitment to contact Curve Lake First Nation prior to

initiating remaining archaeological assessment work to ensure engagement and inclusion for outstanding archeological fieldwork within Block 27.

Project introduction engagement meetings were held virtually with Curve Lake First Nation on February 25th, 2022 and with the Mississaugas of the Credit First Nation on May 9th, 2022. The purpose of the meeting was to introduce the study team, provide a study overview, summarize existing conditions, and discuss next steps. A follow-up engagement meeting was held virtually with Curve Lake First Nation on March 29th, 2022.

A summary of the comments received from the interested Indigenous Communities can be found in **Table 2-6**. Key correspondences and meeting minutes with Indigenous Communities are provided in **Appendix Av**.

Table 2-6: Summary of Indigenous Community Comments and Responses

Indigenous Community	Comment	Study Team Response
Curve Lake First Nation (CLFN)	• Requested for a summary statement indicating how the project will address the following concerns: impact to drinking water; endangerment to fish and wildlife; impact on Aboriginal heritage and cultural values; and impact to endangered species; lands, savannas etc.	A response letter was sent to Curve Lake First Nation in February 2022. This letter provided a summary of the existing natural environment, archaeology, and hydrogeology conditions. This letter indicated that the existing conditions data collected are informing the Block 27 Class EA through the development of alternative road alignments, evaluation of road alignment alternatives, impact assessment of the proposed road alignments, and recommendations for site-specific mitigation measures to minimize/avoid environmental impacts.
	• Expressed concerns about Redside Dace and requested for the methodology used to assess fish and fish habitat	A detailed Methodology Memo was sent to Curve Lake First Nation in March 2022. The project team noted that based on correspondence MECP and other studies (e.g., Subwatershed Study and the City of Vaughan's Natural Heritage Network studies) watercourses within Block 27 are not designated as contributing Redside Dace habitat.
	• Expressed concerns with the destruction that comes with development and replying on compensation as mitigation • Expressed concerns about severing woodlots	The project team has been balancing the recommendations of the Secondary Plan with environmental considerations. Through discussions with TRCA and the project's technical advisory committee, the project team has been working towards addressing/minimizing environmental impacts and have committed to developing reduced cross-sections for environmentally

Indigenous Community	Comment	Study Team Response
		sensitive areas. Additional actions to maximize mitigation and protection as part of the broader development include developing a trails system and use of the City's sustainability metric to balance the legislated provincial growth requirements while protecting the environment.
Mississaugas of the Credit First Nations (MCFN)	• Requested that notice be provided to the Mississaugas of the Credit First Nations prior to any future archaeological assessments	The project team will inform the Block 27 archaeologist to provide MCFN with a minimum of two weeks advance notice of any future archaeological assessments.

3 EXISTING AND PLANNED CONDITIONS

The MCEA process requires an assessment of the existing socio-economic, natural, and cultural environment to support the evaluation of alternatives, identify potential environmental effects, and recommend mitigation measures to minimize impacts. Background studies were conducted during the preparation of the NVNCTMP and Block 27 Secondary Plan, including socio-economic, natural environment, transportation, archaeological, built heritage resources, and cultural heritage landscape. These studies were reviewed and confirmed as part of the Block 27 MCEA. Furthermore, the Block 27 MCEA and Block 27 MESP have been closely coordinated from the on-set of the study. Technical studies from the MESP have also been reviewed and documented in this study.

The following discussions outline the existing and planned conditions within the Block 27 study area.

3.1 PROVINCIAL, REGIONAL AND LOCAL PLANNING POLICY

3.1.1 EXISTING LAND USE

Block 27 is located with the City of Vaughan and is largely composed of agricultural lands and includes the following additional land uses: places of worship, a historic cemetery, residential, and commercial. Parts of the Block 27 New Community Area are located within the Provincial Greenbelt, and a reach of the West Don River. Additionally, a central tributary of the West Don traverses through the area. South and east of the study area features established residential neighbourhoods, while the northern portion includes natural and undeveloped lands, including agricultural lands.

3.1.2 POPULATION, HOUSING, AND EMPLOYMENT

A *Land Budget and Housing Mix Analysis for the Block 27 Secondary Plan Area (*May 2015) was prepared in support of the Block 27 Secondary Plan. The report reviewed historical development patterns in the region and city, assessed opportunities for transit-supportive densities, conducted a housing needs analysis, examined residential and employment capacity, and assessed the intensification potential for Block 27. The primary purpose was to determine a capacity population and employment for Block 27 as well as the additional high-density development around the Kirby GO mobility hub. The analysis was guided by provincial, regional, and local policy, including the Growth Plan for the Greater Golden Horseshoe (Growth Plan), York Region Official Plan (YROP), York Region New Communities Guidelines, and City of Vaughan Official Plan.

To meet the Growth Plan greenfield density target of 50 people and jobs per ha, the York Region greenfield density target of 70 people and jobs per ha for New Community Areas, and Metrolinx's minimum recommendation of 150 people and jobs per ha for Express Rail mobility hubs, Block 27 would require a shift in the general housing mix from 63% low density, 14% medium density and 23% high density housing units, to a 36% low, 34% medium, and 29% high density mix with all apartment supply allocated to the mobility hub area.

Population and employment capacity within the Block 27 Secondary Plan boundaries were studied to determine the growth potential for the New Community Area. The report examines full-build out of the developable lands, excluding Core Natural Heritage features, Greenbelt protected lands, and all relevant transit and pipeline right of ways, which is expected to take place after 2031. The analysis assumes that future development will adhere to the direction provided by provincial, regional, and local planning

policies, including the minimum density, intensification and housing mix targets described above. Overall, the Housing and Employment Analysis report identified that Block 27, including the Kirby GO mobility hub, can reach a capacity of approximately 27,800 residents and 3,600 jobs at full development. The anticipated level and density of development will allow Block 27 to contribute to the City of Vaughan, meeting its policies for housing development, density, and the provision of transit-oriented development.

3.1.3 PROVINCIAL PLANS, POLICIES, AND GUIDELINES

Provincial plans, policies, and guidelines considered as part of the development of the Block 27 MCEA are summarized below.

3.1.3.1 Provincial Planning Statement (2024)

The Provincial Planning Statement guides land use planning and development in Ontario. It contains a set of policies that outline a municipality's responsibility regarding transportation infrastructure and corridors to align with land use patterns and support multimodal travel for the efficient movement of people and goods. The Provincial Policy Statement was updated in 2024 which replaces both the *Provincial Policy Statement* (2020) and the *A Place to Grow: Growth Plan for the Greater Golden Horseshoe* (2019) while building upon housing-supportive policies from both documents.

Relevance to Study: Section 3 of the PPS outlines the direction for building strong healthy communities and includes guidance in relation to managing effective land uses and implementation of infrastructure and public service facilities. Furthermore, Section 4 of the PPS provides policy direction on the wise use and management of resources.

3.1.3.2 Greenbelt Plan (2017)

The Greenbelt Plan identifies where urbanization should be avoided to permanently protect agricultural land use and the ecological function of the area. Development applications that began after 2004 under the Ontario Planning and Development Act, the Planning Act, or the Condominium Act must conform to the Greenbelt Plan.

Relevance to Study: Furthermore, a portion of the lands within Block 27, outside of the "Settlement Areas" designation, was designated as "Protected Countryside" by the Greenbelt Plan 2005. This includes Agricultural and Natural Systems in the western portion of Block 27. The updated Greenbelt Plan (2017) generally maintains the same designations for all lands within Block 27 with two exceptions. There are two areas in the southwest quadrant of the Block, where lands were removed from the "Protected Countryside" designation of the Greenbelt Plan Area and are now part of the "Settlement Areas". Drainage Feature (DF) 1 runs through Block 27 and is included in the Greenbelt Plan area.

The Block 27 MCEA study strives to support complete communities and community hubs that are conveniently accessible by active transportation and transit. Infrastructure will integrate with land use planning while minimizing environmental impacts in the "Protected Countryside" of the Greenbelt Area. Ecological connectivity will be maintained by minimizing encroachment into the Greenbelt Natural Heritage System and incorporating appropriate wildlife crossing measures into the design of roadways. Measures will be recommended within this study to mitigate any negative impacts to the natural features during construction.

3.1.3.3 2041 Regional Transportation Plan (Metrolinx 2008)

In November 2008, Metrolinx adopted a Regional Transportation Plan for a 25-year horizon, entitled *The Big Move: Transforming Transportation in the Greater Toronto and Hamilton Area* (The Big Move) to address gridlock across the Greater Toronto and Hamilton Area (GTHA). A key initiative of The Big Move is the GO Expansion project (formerly known as Regional Express Rail (RER) to provide frequent all-day, two-way express rail service on existing GO Rail lines with 15-minute frequencies using future electrification infrastructure.

Relevance to Study: Both the York Region Official Plan and Vaughan Official Plan identify the potential for a GO Rail Station in the vicinity of Kirby Road and Keele Street (Kirby GO Station). This station is included as a new station along the Barrie GO Corridor as part of the GO Expansion project with direct access to Kirby Road within the Block 27 study area limits. It is understood that the City will work with Metrolinx to implement transit-supportive planning around the station and support the works required for GO Expansion, including planning for grade separation of rail crossings.

3.1.3.4 Highway 413 Transportation Corridor Route Planning, Preliminary Design and Provincial Environmental Assessment Study (Formerly GTA West Study)

The Ontario government is in Stage 2 of the Highway 413 planning study for the proposed Highway 413, a new 400-series highway and transit corridor across the Halton, Peel and York Regions. Further details on the proposed Highway 413 are provided in **Section 3.3.1**.

3.1.4 REGIONAL PLANS, POLICIES, AND GUIDELINES

Regional plans, policies, and guidelines considered as part of the development of the Block 27 MCEA are summarized below.

3.1.4.1 York Region Official Plan (2022)

The 2022 Regional Official Plan (ROP) sets the direction for growth and development across its nine local municipalities. Objectives of the ROP include sustainability, protection of the natural environment, economic growth, and success while meeting the needs of existing residents and businesses in the Region. The ROP represents' York Region's ongoing engagement to confirm the way communities are designed, serviced, and supported as "complete communities." Key guiding principles include managing growth that integrate land use planning with infrastructure planning while protecting the Natural and Agricultural System and enhanced mobility system to connect land use and transportation planning.

Relevance to Study: The 2022 ROP states that local municipalities should support the development of complete communities by improving access to active transportation infrastructure, improving walkability and connectivity, and integrating climate change mitigation/adaptation plans. The design of street systems should have due regard to support multimodal transportation, including walking, cycling, transit, automobile use, and the efficient movement of goods. The plan emphasizes providing complete streets to enhance the interconnected and accessible mobility systems, with a priority on pedestrian movement, transit use, and access. It further encourages the development of a sustainable Region based on a variety of community considerations including promoting active lifestyles and providing safe, accessible mobility systems. Based on these policies, this study will ensure that the road designs are developed in a way that considers all travel modes, encourage community vibrancy, and minimize the impact on climate change.

3.1.4.2 York Region Transportation Master Plan (2022)

The York Region Transportation Master Plan (YRTMP) was recently approved in September 2022 to address the Region's mobility needs to 2051. The YRTMP provides the long-term vision for the Region's transportation network, encompassing strategy, initiatives, and infrastructure. It provides a 30-year outlook to manage the Region's transportation infrastructure needs to support growth and the changing needs of travelers. The 2022 YRTMP identifies five new focus areas:

- Safety for all travelers;
- Transportation equity and inclusion;
- Reduce car travel;
- Fiscal and environmental sustainability; and
- Role and function of Regional corridors.

Relevance to Study: The YRTMP identifies a number of road improvements within and surrounding the NVNCTMP and Block 27 Secondary Plan study area including improvements along Kirby Road, Jane Street, and Teston Road. The YRTMP also identifies two grade separations, along Keele Street at Kirby Road and Teston Road which are subject to Future Study. The transportation network developed as part of the NVNCTMP and Block 27 Secondary Plan study identified transportation network improvements within Block 27 which built upon the Region's plans, including the collector road, transit, cycling, and goods movement networks.

3.1.4.3 York Region New Communities Guidelines (2013)

The York Region New Communities Guidelines is a document which outlines both mandatory and encouraged policies to guide the successful development of complete communities. These include guidelines that address specific performance targets and provide more general guidance that is meant to inform local planning processes and directions.

Relevance to Study: The new community areas policies apply at a community scale in the urban expansion areas including Vaughan, East Gwillimbury, and Markham. As part of the guidelines, checklists have been developed for use in new community areas for planning applications at a variety of scales.

3.1.4.4 York Region Water and Watershed Environmental Assessment Process

The full build-out of the New Community Areas will be dependent upon the construction of York Region's Northeast Vaughan water and wastewater servicing solution. In advance of the anticipated Regional infrastructure delivery date 2028, York Region has advised that interim servicing capacity is available within the existing Regional network for approximately 10,000 people (3,000 residential units). Although this Regional system capacity will not fulfill the ultimate water and wastewater servicing needs for both Blocks 27 and 41, initial phases of development within these areas may proceed based on available residual capacity within the City's network. However, residual local system capacity will be confirmed in conjunction with Block Plan/MESP approval. Servicing for the Kirby GO Station has been identified as a priority in the Draft Secondary Plan policies.

3.1.5 LOCAL PLANS, POLICIES, AND GUIDELINES

Local plans, policies, and guidelines considered as part of the development of the Block 27 MCEA are summarized below.

3.1.5.1 City of Vaughan Official Plan (2010)

The City of Vaughan Official Plan (VOP) was approved by Council in September 2010 and endorsed by Regional Council in June 2012. The VOP is part of a Growth Management Strategy "that will shape the future of the City and guide its continued transformation into a vibrant, beautiful, and sustainable City." The VOP addresses the City's long-term planning requirements and sets out a vision for its urban areas that support economic growth, active transportation, public transit, and goods movement.

Relevance to Study: Chapter 4 of the VOP outlines the transportation policies to support a sustainable multimodal transportation network. Relevant policies include:

- 4.1.1.1 – To establish a comprehensive transportation network that allows a full range of mobility options, including walking, cycling, and transit
- 4.1.1.6 – To support the development of a comprehensive network of on-street and off-street pedestrian and bicycle routes
- 4.2.1.3 – To plan for a street network that prioritizes safe and efficient pedestrian travel while effectively accommodating cyclists, transit, and other vehicles, and to create more pedestrian and transit-friendly street cross-sections
- 4.2.1.5 – To develop a connected and continuous, grid-like street network that supports convenient and efficient travel by all modes of transportation
- 4.2.1.20 – To plan for the development of a collector street network that provides for short to medium distance trips within the City in order to support and augment the capacity of the arterial street network
- 4.2.1.23 – To provide a minimum of 2 north-south and 2 east-west collector streets in new development where feasible, including grade-separated crossings of 400-series highways and rail corridors

Furthermore, the VOP 2010 designates the lands within Block 27 as New Community Areas. Consistent with YROP, New Community Areas "… are part of Vaughan's Urban Area and are intended to develop as complete communities with residential and local population - serving retail and commercial uses" (Section 9.2.2.14.a). The VOP further provides guidance on the preparation and content of Secondary Plans for New Community Areas. Policies outlined in Section 9.2.2.14 of VOP 2010 list specific objectives and describe the desired character of development for New Community Areas.

3.1.5.2 City of Vaughan Transportation Master Plan (2012)

The City of Vaughan Transportation Master Plan (VTMP) identifies citywide transportation needs to the year 2031, including local improvements, strong regional investments in transit service, arterial road improvements, sidewalks, on-street and off-street bicycle facilities, and a mix of land uses.

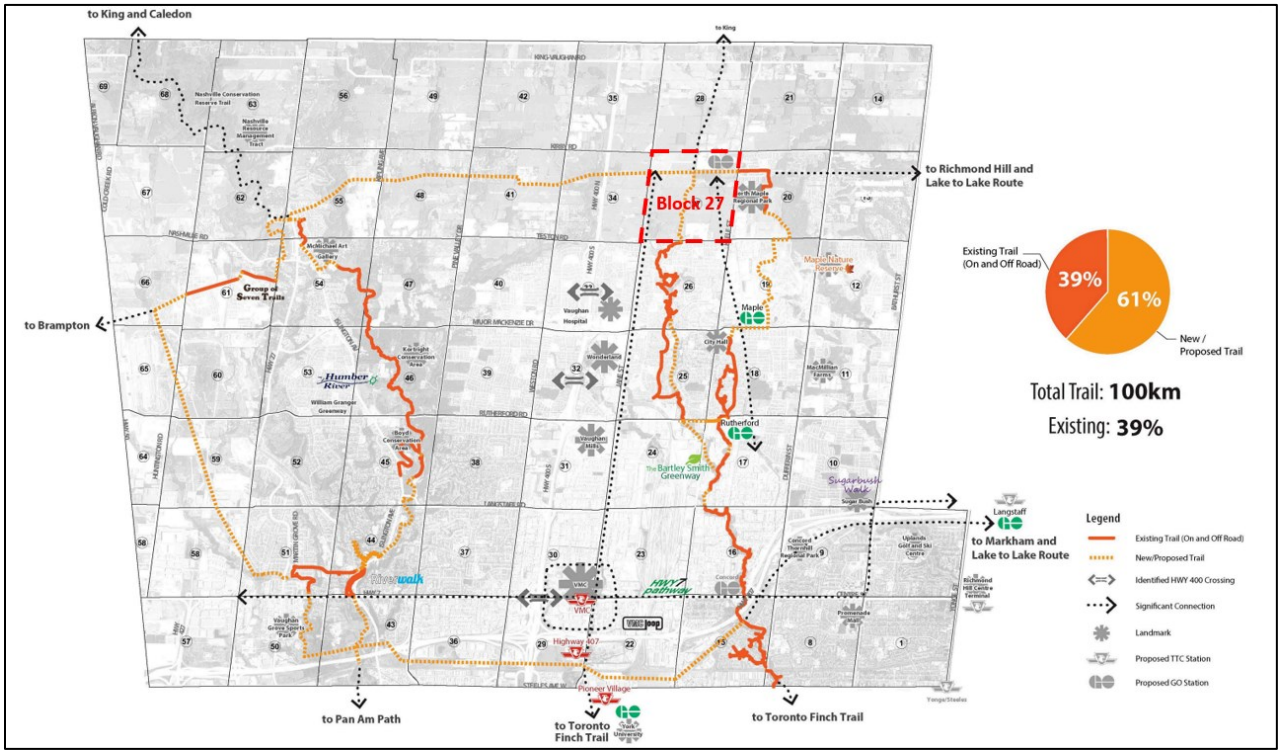
Relevance to Study: The VTMP identifies a number of road improvements within and surrounding the NVNCTMP and Block 27 Secondary Plan study area. The timing of recommended improvements identified in the VTMP varies from the YRTMP recommendations given there is more up-to-date information on the timing of development. As an example, the Kirby Road widening (from 2 to 4 lanes) is 2021 as per the VTMP versus 2031 as per the YRTMP. It should be noted that the VTMP is currently being updated.

3.1.5.3 City of Vaughan Pedestrian and Bicycle Master Plan (2020)

The City of Vaughan Pedestrian and Cycling Master Plan builds upon the original 2007 Pedestrian and Bicycle Master Plan to address key challenges, including building community and internal understanding and support, and understanding community priorities while also updating technical content to reflect current state practice. The 2020 Plan outlines a dynamic strategic plan that centres around four key themes, including prioritizing safety of pedestrian and cycling infrastructure, leveraging larger capital projects to advance infrastructure, increasing connectivity of trails and cycling networks, and expanding the awareness and culture of active transportation to facilitate an increase in walking and cycling for leisure and utilitarian purposes.

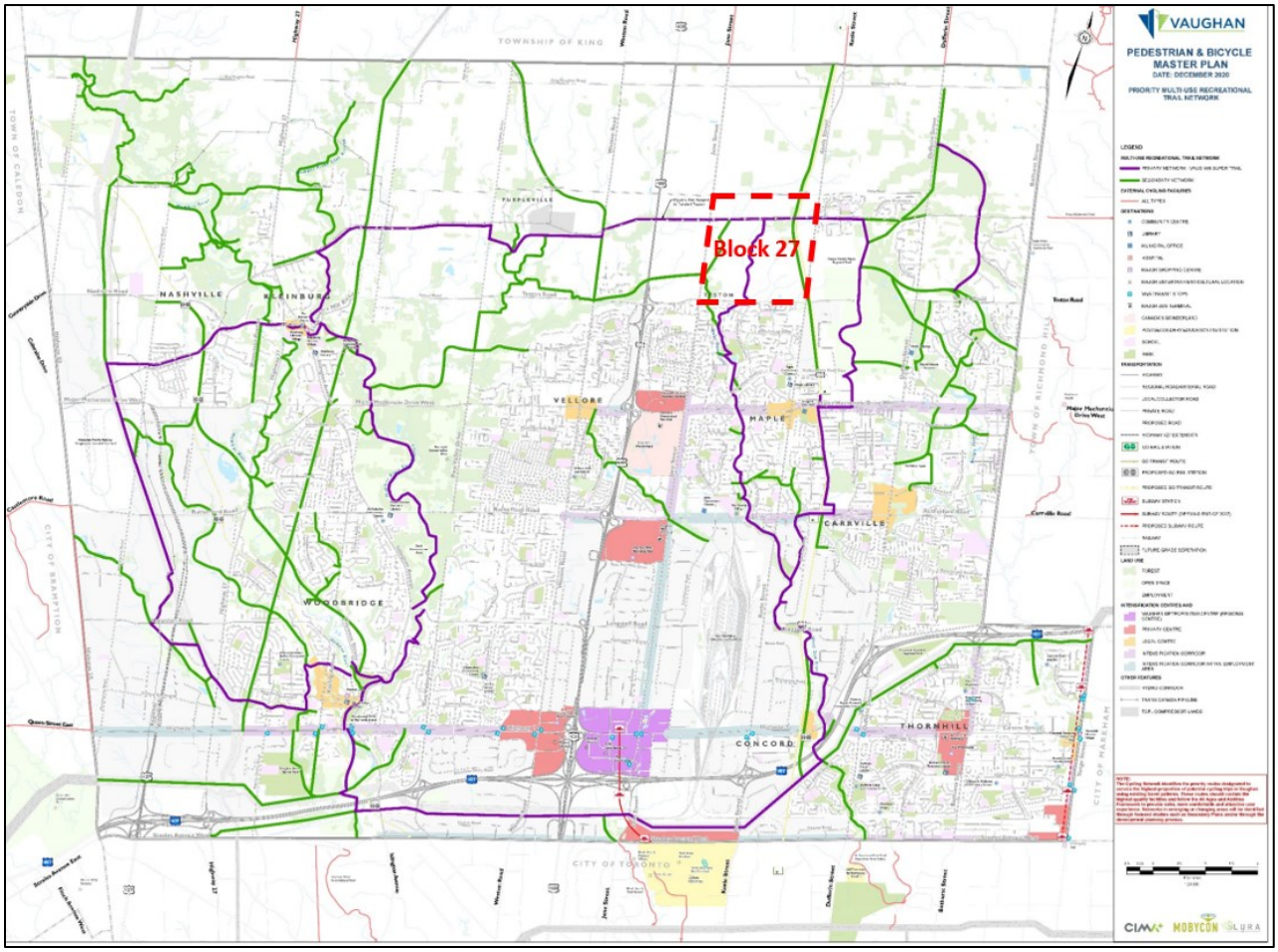
Relevance to Study: Four priority multi-use recreational trails, including two new super trails are identified within Block 27 as per the City's Pedestrian and Bicycle Master Plan, as shown in **Figure 3-1** and **Figure 3-2**.

Figure 3-1: City of Vaughan Pedestrian and Bicycle Master Plan: Super Trail Proposed Concept Framework (2017)



Source: Vaughan Pedestrian and Bicycle Master Plan (City of Vaughan, 2020)

Figure 3-2: City of Vaughan Pedestrian and Bicycle Master Plan: Priority Multi-Use Recreational Trail Network



Source: Vaughan Pedestrian and Bicycle Master Plan (City of Vaughan, 2020)

3.1.5.4 Kirby GO Transit Hub Sub-Study

The Kirby GO Transit Hub Sub-Study was initiated in April 2016 following Council's approved recommendation for the preparation of a Terms of Reference for a Sub-Study. The objectives set out in the Terms of Reference for the study included a conceptual design of the proposed GO Station and Kirby Road improvements; as well as to inform the future Environmental Assessment requirements for the GO Station, Kirby Road, and the ongoing Metrolinx Regional Express Rail Study.

Relevance to Study: The Kirby GO Station is a new station located within Block 27 along the Barrie GO Corridor. The purpose of the sub-study is to develop a vision that will direct future development of the Kirby GO transit hub and integration with the rest of Block 27 and surrounding areas. The sub-study is being undertaken by the City and is intended to identify the required infrastructure/elements, such as parking facilities, pick-up/drop-off areas, and access points to the station platform.

3.1.5.5 Green Directions Vaughan (2019)

Green Directions Vaughan is the City's Community Sustainability Plan. This long-term plan was designed to guide the community to a more sustainable future by addressing environmental, cultural, social, and

economic issues. It identifies actions to ensure the health, well-being, and vitality of the community and provides direction to ensure that getting around Vaughan is easy and has a low environmental impact.

Relevance to Study: The NVNCTMP and Block 27 Secondary Plan reviewed and considered options to promote sustainable and active transportation in accordance with Green Directions Vaughan.

3.1.5.6 Kirby Road Widening EA

The City of Vaughan completed a Schedule 'C' MCEA study for improvements, including the widening Kirby Road between Jane Street and Dufferin Street in June 2022. The study completed Phases 3 and 4 of the MCEA process for the Kirby Road widening identified as part of the NVNCTMP.

Relevance to Study: The study area is bounded by Kirby Road to the north. The NVNCTMP recommended widening Kirby Road from its current two-lane configuration to four lanes, grade separation at the Barrie GO railway crossing, eliminating the existing jogged intersection with Jane Street to improve traffic flow, and improving pedestrian and cycling facilities. The Environmental Study Report was filed for a 30-day review period in June 2022. The study team was in correspondence with the Kirby Road Widening EA project team to ensure the two studies were coordinated.

Further information is available here: https://www.vaughan.ca/about-kirby-road-widening-environmental-assessment.

3.1.5.7 Teston Road IEA (on-going)

The Regional Municipality of York is undertaking an Individual Environmental Assessment (IEA) to identify transportation improvements within the Teston Road area bounded by Highway 400 to the east, Bathurst Street to the west, Major Mackenzie Drive to the south, and Kirby Road to the north. The purpose of the IEA is to address existing transportation deficiencies along Teston Road, accommodate planned growth in the area, and improve the efficiency, safety, and continuity of the transportation network within the Teston Road area.

Relevance to Study: As part of the IEA, four alternative solutions have been identified and evaluated. Based on the preliminary evaluation results, the recommended alternative for the Teston Road study area is to extend the existing Teston Road from Keele Street to Dufferin Street as a new four-lane facility with provisions for pedestrian, cycling, and transit infrastructure. Furthermore, opportunities for a grade-separated GO rail crossing between Keele Street and Rodinea Road was explored as part of the IEA. Recommendations from the IEA indicated that a at-grade GO rail crossing with improved Teston Road alignment was to be carried forward with protection for a grade separation in the long term. The study team was in correspondence with the Regional Municipality of York throughout the Block 27 MCEA study to ensure the two projects were coordinated.

Further information is available here: https://www.york.ca/transportation/roads/road-construction-schedule/teston-road-iea-study.

3.1.5.8 North Maple Regional Plan

The North Maple Regional Park was opened in September 2018 and is located adjacent to Block 27 on the east side of Keele Street north of Teston Road. The Park currently features 200 acres of open green space, two soccer fields with lighting and spectator seating, 5 km of walking trails, and a park pavilion with washroom and change room facilities. A future expansion will increase the Park to 900 acres.

Relevance to Study: Multimodal transportation connections between Block 27 and other surrounding areas are important to connect communities to this key destination in the study area.

3.1.5.9 Highway 400 North Employment Lands Secondary Plan

The Highway 400 North Employment Lands (Block 34 and Block 35) are designated as future employment and are situated along Highway 400, encompassing the lands between Weston Road, Jane Street, Major Mackenzie Drive, and the northern boundary of the City of Vaughan. The Land Use Plan for the Highway 400 North Secondary Plan comprises of prestige areas, prestige offices and business campuses, and general employment areas, with some lands designated as low-rise residential and employment/commercial mixed-use areas.

Relevance to Study: Block 34 East is located directed west of Block 27, bounded by Teston Road to the south, Jane Street to the east, Weston Road to the west, and Kirby Road to the north. The road network within Block 27 connecting to Jane Street will be coordinated with Block 34 East to maximize connectivity between Blocks.

As noted above, the NVNCTMP and Block 27 Secondary Plan were completed concurrently as part of the integrated approach permitted by the MCEA process. These studies were initiated in 2015 and completed in 2018. Official Plan Amendment #33 to the City Vaughan Official Plan, which implements the Block 27 Secondary Plan, was approved by the City in 2018. These key foundation documents of the Block 27 EA are discussed in detail in the sections below.

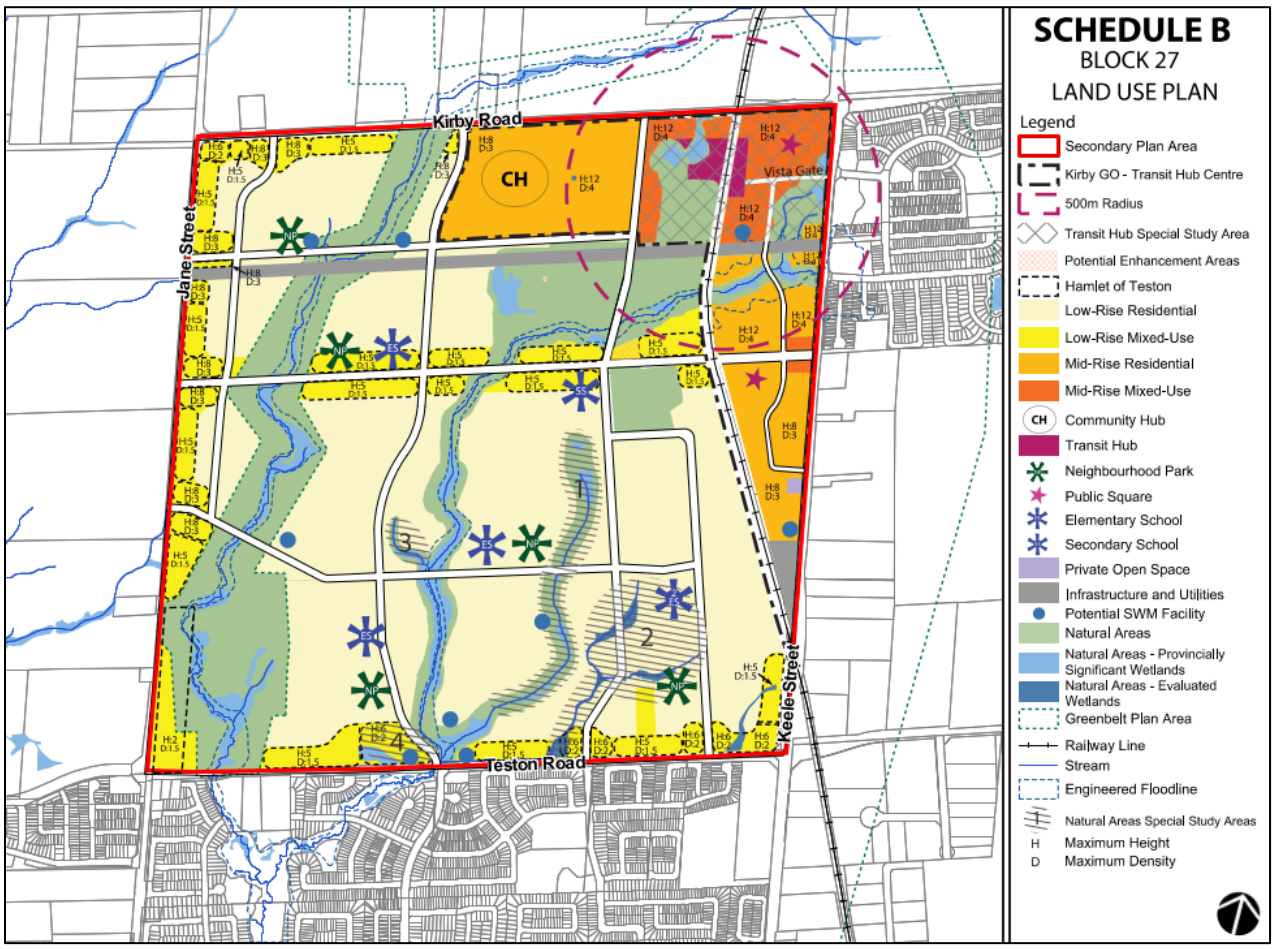
3.1.5.10 Block 27 Secondary Plan (2018)

The purpose of the Block 27 Secondary Plan was to establish a land use planning and urban design policy framework to guide development in the Block 27 Secondary Plan Area. The Block 27 Secondary Plan was designed to create a complete community focused on a new Local Centre – the Kirby GO Transit Hub in the northeast quadrant of Block 27, located south of Kirby Road and west of Keele Street. The new community will be compact, vibrant, inclusive, healthy, sustainable, and diverse while being designed to have a net positive environmental outcome. The Block 27 Secondary Plan outlined several strategic objectives for Block 27 pertaining to transportation that has been reflected in the TMP's recommended transportation network, and subsequently, in the road designs prepared as part of the Block 27 EA:

- The transportation network for Block 27 will be designed to accommodate all modes of travel while prioritizing transit, cycling, and walking, particularly in the Kirby GO - Transit Hub Centre
- The transportation network will be connected and continuous with a grid-like street network while recognizing constraints such as the railway, TransCanada pipeline, and natural areas
- Active and safe routes to community facilities will be provided through the overall multimodal transportation system
- The street network should be porous and be designed to promote alternatives for traffic flow through neighbourhoods

The Block 27 Secondary Plan includes a preferred land use plan for the new community area. It includes a mix of uses such as low-rise and mid-rise residential housing, mixed-use, and retail, as well as a community hub. The community hub will consist of a variety of community facilities such as a community centre, schools, parks, a library, and other community facilities. The new community will be linked by a connected multi-modal transportation system including off-road multi-use trails, sidewalks, walkways, and cycling facilities. The plan focuses higher-density residential, commercial, and mixed users within and surrounding the Kirby GO – Transit Hub Centre and smaller low- to medium-residential uses throughout the rest of the block. The preferred land use plan is provided in **Figure 3-3**.

Figure 3-3: Block 27 Secondary Plan: Land Use Plan

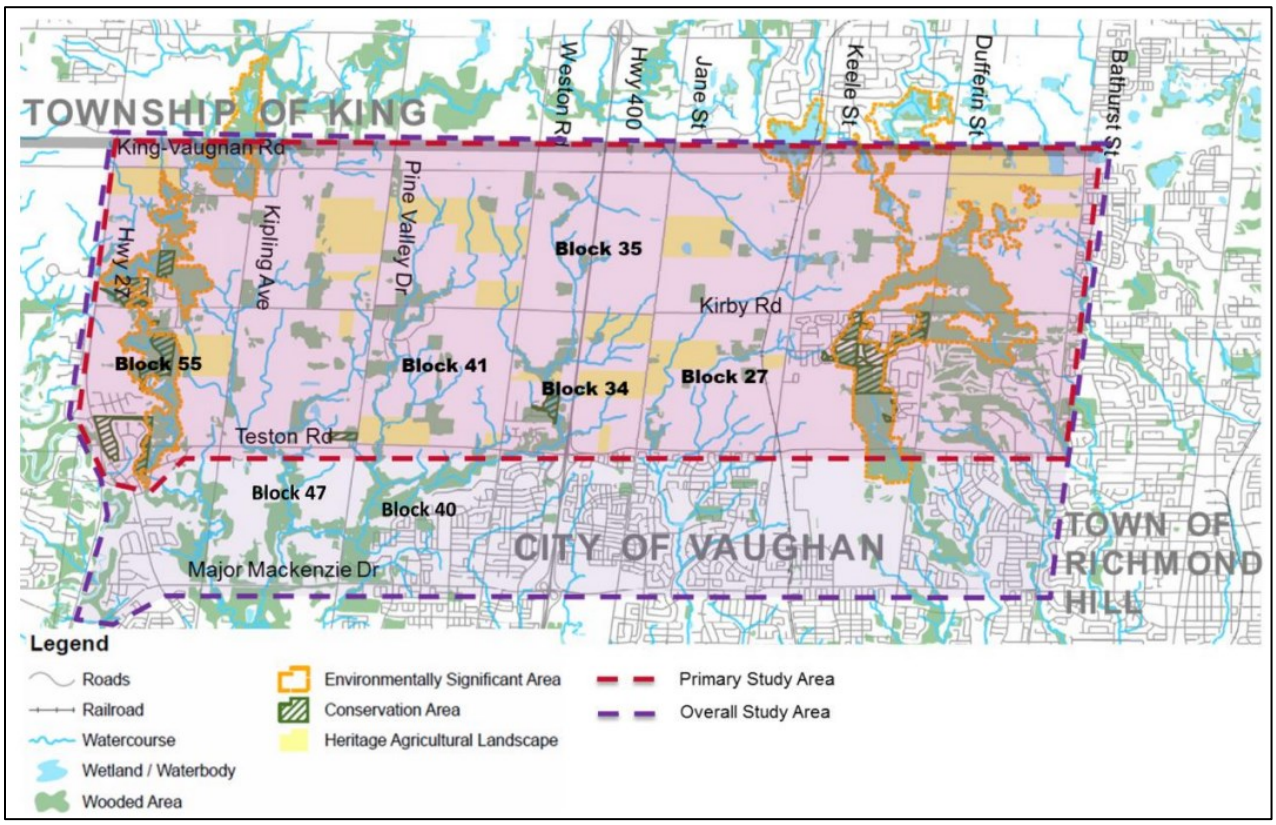


Source: Block 27 Secondary Plan (City of Vaughan, 2018)

3.1.5.11 The North Vaughan and New Communities Transportation Master Plan (2019)

The City of Vaughan initiated the *North Vaughan and New Communities Transportation Master Plan* in January 2015 to establish the internal transportation network that is needed to support each of the new community blocks and the Kirby GO Station within the Transit Hub designation of Block 27. The long-range plan supports policies, programs, and infrastructure required to meet existing and future mobility needs and provides context for transportation decisions within North Vaughan. The connectivity of the New Community Area blocks to the remainder of the Regional transportation network, and the required road and transit network improvements necessary to accompany the planned growth in the North Vaughan area were the main objectives of the NVNCTMP. The primary and overall study area for the NVNCTMP is shown in **Figure 3-4**.

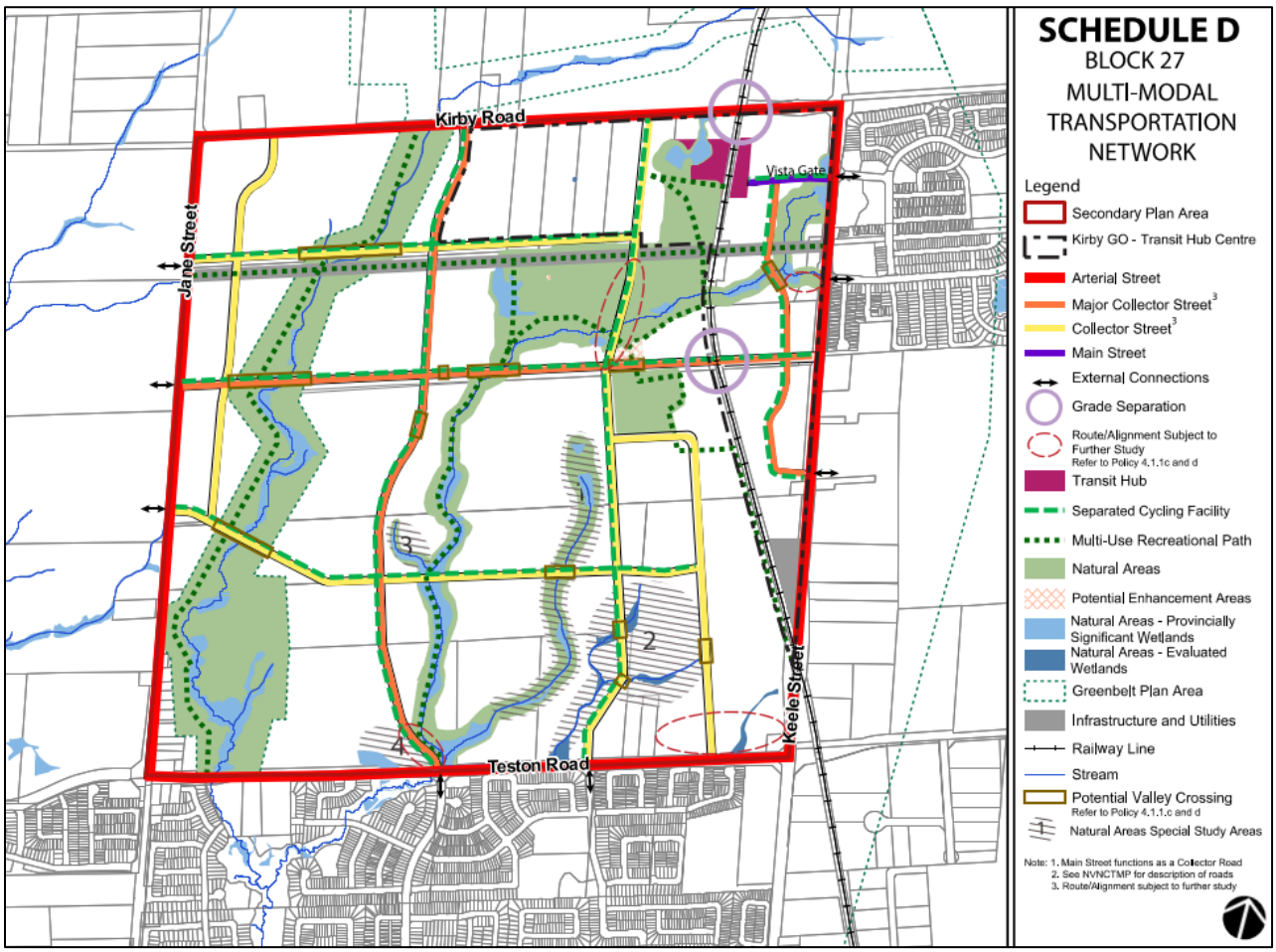
Figure 3-4: NVNCTMP: Primary and Overall Study Area



Source: North Vaughan and New Communities Transportation Master Plan (City of Vaughan, 2019)

The NVNCTMP study supported the Block 27 Secondary Plan through the identification and justification of the preferred transportation network. The process for the network development included the consideration of alternative network solutions, evaluation of those alternatives to select a preferred alternative, and detailing of the preferred alternative. Through consultation with the Block 27 Secondary Plan team, participating landowners and their representatives, and the NVNCTMP study team, three distinct networks were identified and evaluated based on transportation, natural environment, socio-economic environment, and cost and implementation implications. The recommended transportation network as identified in the NVNCTMP and Block 27 Secondary Plan is illustrated in **Figure 3-5**.

Figure 3-5: NVNCTMP and Block 27 Secondary Plan: Recommended Transportation Network



Source: Block 27 Secondary Plan (City of Vaughan, 2018)

3.1.5.12 Block 27 Subwatershed Study

Block 27 is located within the Upper West Don Subwatershed area. Policy 9.2.2.14.d.ii) of VOP 2010 "requires the completion of a subwatershed study to be undertaken by the Toronto and Region Conservation Authority (TRCA) in coordination with the City, either preceding the Secondary Plan or concurrent with it." Prior to the initiation of the Block 27 Secondary Plan Study, it was determined that the participating landowner's consulting team would be responsible for the preparation of the subwatershed study, which would then be reviewed by the required government agencies. It is recommended that refinement of the ecological, hydrological, and hydraulic analyses be completed in support of the subwatershed study through the MESP Block Plan process.

3.2 SOCIO-ECONOMIC ENVIRONMENT

3.2.1 NOISE

As part of the Block 27 MCEA, noise and vibration studies were conducted to support the evaluation and selection of a preferred road design. The results of these studies are summarized below.

An Environmental Noise Feasibility Study was prepared by Valcoustics Canada Ltd. (VCL) in 2021 as part of the Block 27 development process to identify existing conditions and assess the noise impact from the transportation and stationary sources in the vicinity onto the sensitive land uses within the Block 27 area. The existing noise-sensitive land uses within Block 27 include the existing residential dwellings and Buddhist temple which could be impacted by noise and vibration from construction and operation of the Block 27 collector roads.

The predominant existing transportation noise sources include rail traffic from the GO Transit/CN Railway Newmarket Subdivision that runs north/south through the eastern portion of the site, and road traffic along Keele Street, Teston Road, Kirby Road, and Jane Street. The highest predicted sound level at a plane of window is 81 dBA during the daytime and 75 dBA during the nighttime. This occurs at the building closest to the railway line and Kirby Road. The sound level is dominated by whistle noise at the railway crossing. Further, predominant stationary noise sources include various commercial and industrial facilities on the east side of Keele Street, as well as industries on the south side of Teston Road. The assessment concludes the sound levels at the site from the non-impulse sources and impulse sources are predicted to comply with Class 1 level limits, with mitigation where required.

Based on the preliminary results of the Block 27 Environmental Noise Feasibility Study, some portions of the overall future development have the potential to generate noise which may impact adjacent noise sensitive uses (e.g., multi-family buildings, the schools, community hub, and commercial uses on the mixed-use blocks). Potential noise sources include rooftop or other mechanical equipment, emergency generators, and noise generated by on-site traffic (such as from truck deliveries or drive-thru queues, depending on the uses). The study concluded that the proposed development is feasible acoustically and can achieve land use compatibility with the surrounding environment and existing land uses.

Noise impacts based on the preferred road network is discussed in later sections of this report (see **Section 9.1**) and is provided in **Appendix B.**

3.2.2 VIBRATION

A Railway Vibration Study was prepared by VCL in 2021 as part of the Block 27 development process. The anticipated vibration source with the potential to impact the development is the Canadian National Railway (CNR) Newmarket Subdivision/GO Transit Barrie line. Ground-borne vibration due to vehicle movements on surrounding roadways is not expected to create significant impact on the proposed development and thus, has not been considered further in the analysis. There are no other sources of vibration in the vicinity of the site. Railway induced ground-borne vibration was measured at ten locations within three areas on the site. The ground-borne vibration on site due to the train pass-bys was measured and compared with the vibration criteria presented in *Guidelines for New Development in Proximity to Railway Operations*, (FCM/RAC) to determine the need for mitigation.

Based on preliminary results of the Block 27 Railway Vibration Study, all dwellings located at setback distances of at least 20 m from the rail right-of-way (ROW) are expected to meet the Federation of Canadian Municipalities (FCM) and the Railway Association of Canada (RAC) vibration guideline limit.

Detailed findings of the Railway Vibration Study are provided in **Appendix B.**

3.2.3 AIR QUALITY

An air quality assessment was completed in 2024 to describe potential impacts to air quality that may be associated with increased traffic volumes resulting from the development of the Block 27 project. There are

a number of sensitive receptors surrounding Block 27 including residential dwellings, multiple schools, churches, community centres, childcare facilities, health care facilities, and parks/recreational sites. The Block 27 development will introduce additional sensitive receptors including schools, residential areas, and park/recreational spaces.

As part of the air quality assessment, a review of ambient air quality data from the MECP and Environment and Climate Change Canada (ECCC) National Air Pollution Surveillance (NAPS) program stations was completed to establish existing local air quality in the study area. Background air quality was quantified by compiling historic monitoring records proximate to the study area. The majority of the indicator compounds were identified to be below the air quality criteria established in O. Reg 419/05, Ontario's Ambient Air Quality Criteria (AAQC), and Canadian Ambient Air Quality Standards (CAAQS) including: $PM_{2.5}$, total suspended particulate (TSP), carbon monoxide, sulphur dioxide, benxene, and 1,3-Butadiene.

Ambient nitrogen dioxide was found to be greater than both 2020 and 2025 CAAQS criteria, however, it should be noted that the CAAQS are stringent, aspirational regional air quality targets and not project-specific air quality criteria. While the maximum concentrations exceed the most stringent criteria, the 90th percentile and average concentrations demonstrate that these exceedances are infrequent, and the typical concentrations are well below the criteria.

Ambient concentrations of particulate matter were below all applicable criteria with the exception of the AAQC 24 hr criteria for PM10. While the maximum concentrations may approach or exceed the most stringent criteria, the 90th percentile and average concentrations demonstrate that typical concentrations are well below the criteria.

Based on the preliminary results of the air quality assessment, the main sources of emissions will come from local traffic level as well as emissions generated from initial construction and continued maintenance activities (e.g., snow removal, landscaping, road repairs, etc.). To further protect sensitive receptors, mitigation measures such as setback distances, proper air filtration equipment, and the incorporation of greenspaces should be considered during initial project planning. Further details of the air quality assessment based on the preferred road network and recommended mitigation measures are discussed in later sections of this report (see **Section 9.1.3**) and is provided in **Appendix C.**

3.2.4 CONTAMINATION

A Contamination Overview Study (COS) was completed by Soil Engineers Ltd. in 2022 to identify any potential environmental concerns associated within Block 27. Historical records and a site reconnaissance were reviewed to assess and evaluate past and present uses to identify properties with potentially contaminating activities (PCAs) and to determine next steps for any ESA requirements in accordance with O. Reg. 153/04

Based on the review completed, Phase 1 and Phase 2 Environmental Site Assessments (ESAs) were completed on a number of property parcels within Block 27. Where no ESAs have been completed, a Phase 1 ESA was recommended to be completed on areas impacted by the major roads to identify if there are any areas of potential environmental concerns requiring further Phase 2 ESA. It will be the responsibility of the landowner to complete any required contamination studies and adhere to MECP regulations during construction.

Full details of the potential concerns are included within the COS report provided in **Appendix D**. Details on the recommended next steps are outlined in **Section 9.1.4**.

3.3 TRANSPORTATION NETWORK AND UTILITIES

As part of the Block 27 Block Plan process, the existing and future conditions with respect to transportation infrastructure and multi-modal level-of-service (LOS), including vehicular traffic, transit, cycling, and pedestrian facilities were assessed for the road network surrounding and within the Block 27 development. A review of the existing and future transportation conditions and modelling done for Block 27 is documented in the Transportation Mobility Plan Study conducted by LEA Consulting Ltd. in July 2022 and is provided in **Appendix E**. A summary of existing and future transportation conditions is provided in the following sections.

3.3.1 EXISTING ROAD NETWORK

Block 27 is comprised of agricultural land uses without an existing road network within the study area. The following provincial, regional, and city roads are located within the vicinity of Block 27:

Provincial Road Network

There are two existing / proposed provincial highways within the vicinity of Block 27, including:

- **Highway 400** is an existing north-south Provincial 400-series highway located approximately 975 m west of Block 27 and is a major transportation link connecting northern Ontario to southern Ontario. Highway 400 turns into Highway 69 and is part of the Trans-Canada Highway network north of Perry Sound. Provincial highways are maintained by the Ontario Ministry of Transportation.
- **Highway 413** is a proposed highway and transit corridor running through York, Peel, and Halton Regions. The preferred route for the proposed Highway 413 was announced in August 2020. The corridor is expected to include a 4 to 6 lane, 59-kilometre 400-series highway with connections to Highways 400, 427, 410, 401, and 407 ETR. The highway would have 11 interchanges at municipal roads. Features such as electric charging stations, service centres, carpool lots, and truck inspection stations will all be explored as part of the design. Further details on the proposed highway are available here: https://www.highway413.ca.

Regional Road Network

Block 27 is bounded by the following regional roads:

- **Jane Street (Region Road 55)** is a north-south major arterial roadway that operates with a two-lane cross-section (one lane in each direction), shifting to a four-lane cross-section (two lanes in each direction) near its intersection with Teston Road. Jane Street operates between Bloor Street in the City of Toronto to the south and Edward Street in the Township of King to the north. The posted speed limit of 60 km/hr is observed on Jane Street through the residential/commercial area, which increases to 80 km/hr further north. Jane Street is the western boundary of Block 27.
- **Keele Street (Regional Road 6)** is a north-south major arterial roadway with a four-lane cross-section (two lanes in each direction). Keele Street operates between Bloor Street in the City of Toronto to the south and King Street in the Township of King to the north. The posted speed limit of 70 km/hr is observed on Keele Street between Kirby Road and Teston Road. Keele Street is the eastern boundary of Block 27.

- **Teston Road (Regional Road 49)** is an east-west major arterial roadway with a four-lane cross-section (two lanes in each direction) with a centre median. Teston Road operates between Bathurst Street in the east to Kipling Avenue in the west. The roadway exhibits a gap between Keele Street and Dufferin Street. The posted speed limit of 60 km/hr is observed on Teston Road between Jane Street and Keele Street. Teston Road is the southern boundary of Block 27.

City Road Network

Block 27 is bounded by one road under the City of Vaughan's jurisdiction to the north:

- **Kirby Road** is an east-west minor arterial roadway with a two-lane cross-section (one lane in each direction). Kirby Road operates between Dufferin Street in the east and Albion Vaughan Road in the west. The roadway currently ends at Highway 27, is jogged at Jane Street, and exhibits a missing link between Dufferin Street and Bathurst Street. The posted speed limit of 60 km/hr is observed on Kirby Road between Jane Street and Keele Street. An at-grade signalized railway crossing is located along this this stretch of Kirby Road. Kirby Road is the northern boundary of Block 27.

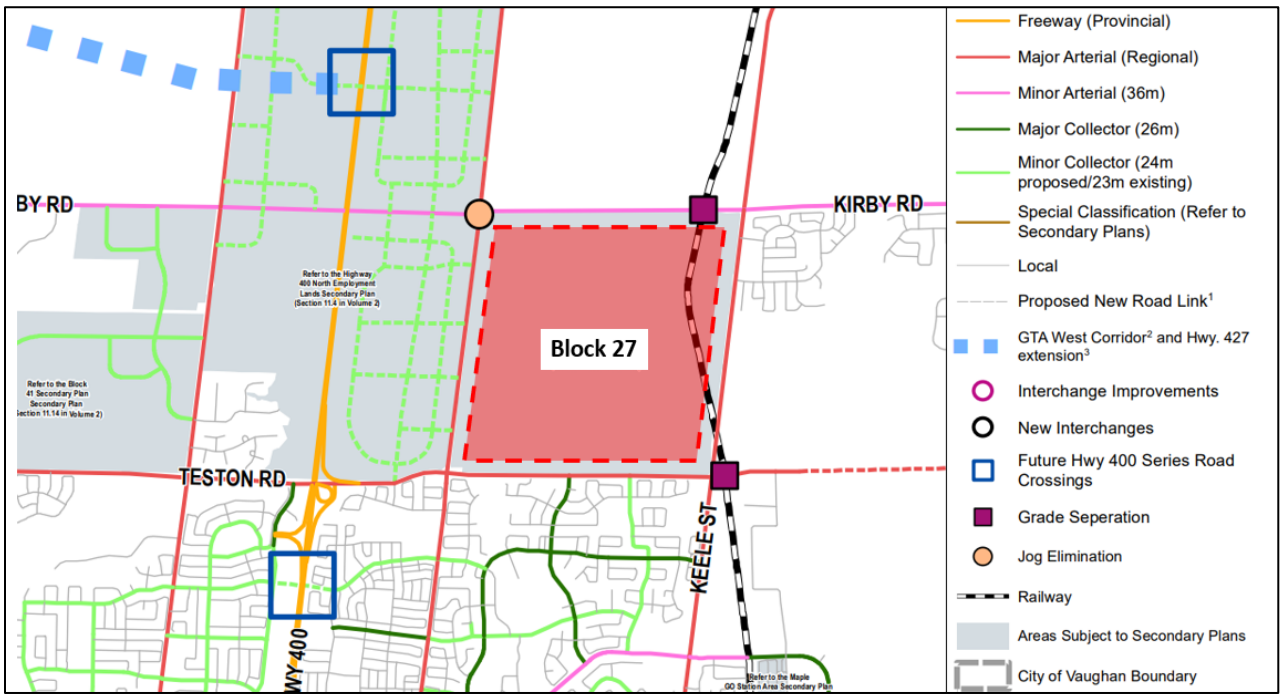
  Based on the findings of the Kirby Road Widening EA, an elimination of the jog at Jane Street and central realignment of the roadway is recommended to address the delay for drivers and safely accommodate road users. Furthermore, an underpass design (rail over road) was identified as the preferred solution for Kirby Road at the Barrie GO rail corridor crossing to remove rail conflicts between pedestrians/cyclists and mitigate vehicle queueing caused by increase GO Train service.

While there are no local roads within the study area, there are a number of local roads from existing residential neighbourhoods with connections to Teston Road and Keele Street:

- **Cranston Park Avenue** is a north-south major collector road connecting to Teston Road that operates with a two-lane cross section (one lane in each direction). Cranston Park Avenue operates between Teston Road in the north and McNaughton Road in the south. The roadway operates with a posted speed limit of 40 km/hr within the study area.
- **St. Joan of Arc Avenue** is a north-south minor collector road connecting to Teston Road that operates with a two-lane cross section (one lane in each direction). St. Joan of Arc Avenue operates between Teston Road in the north and McNaughton Road in the south. The roadway operates with a posted speed limit of 40 km/hr within the study area.
- **Peak Point Boulevard** is a local road connecting to Keele Street that operates in both an east-west and north-south direction with a two-lane cross section (one lane in each direction). Peak Point Boulevard operates between Keele Street in the west and Ravineview Drive in the north. The roadway operates with an assumed speed limit of 50 km/hr within the study area.
- **Vista Gate** is an east-west local road connecting to Keele Street that operates with a two-lane cross section (one lane in each direction). Vista gate operates between Keele Street in the west and Ravineview Drive in the east. The roadway operates with an assumed speed limit of 50 km/hr within the study area.

The study area road network is provided in **Figure 3-6** including provincial, regional, and municipal facilities.

Figure 3-6: Existing Road Network



Source: City of Vaughan Official Plan (City of Vaughan, 2022)

3.3.2 EXISTING TRANSIT NETWORK

The City of Vaughan is serviced by York Region Transit (YRT). Public transit network services are currently available in select areas where there is demand (i.e., select segments along Jane Street, Kirby Road, Keele Street, and the community located at the south-east corner of Keele Street & Kirby Road). As of November 2022, there are four local routes that travel along the bordering arterial roads of Keele Street, Teston Road, and Jane Street as well as the collector road of Cranston Park Avenue, including:

- Route 96 Keele - Yonge
- Route 107 Keele
- Route 26 Maple
- Route 20 Jane

These bus routes operate with headways ranging from 15 to 30 minutes during the morning and afternoon peak hours and will connect the new community area to destinations with the City, including Vaughan Mills Bus Terminal and Smart VMC Bus Terminal.

In addition to bus transit services provided by YRT, the study area is located in proximity to the following GO Transit routes:

- Barrie GO rail
- GO Transit Route 63

The Barrie GO corridor provides commuter rail service. The closest stop is located at Maple GO station, north of Major Mackenzie Drive at Keele Street. Further north of the study area is the King City GO station

located near King Street at Keele Street. The Barrie GO line offers two-way commuter rail service to and from Toronto all week with approximately 30-minute headways during peak periods and hourly off-peak service. GO Transit route 63 supplements train service during early morning and late evening hours. The bus service runs along Keele Street and Highway 400 and connects Rutherford, Maple, and King City GO stations to Union Station in the City of Toronto.

3.3.3 EXISTING CYCLING NETWORK

Cycling infrastructure is provided through paved shoulders or shared roadways along Jane Street, Keele Street, and Kirby Road. Multiple shared roadway routes are also provided in the block south of Block 27 along Cranston Park Avenue, St. Joan of Arc Avenue, and Melville Avenue/Drummond Drive. In addition, an in-boulevard multi-use path is provided on the south side of Teston Road. There are also two off-road multi-use trails located near the study area and are accessible at the intersections of Teston Road & Cranston Park Avenue, and Keele Street & Peak Point Boulevard.

3.3.4 EXISTING PEDESTRIAN NETWORK

Pedestrian facilities are limited to the few residential enclaves surrounding Block 27. The existing pedestrian network within the vicinity of Block 27 consists of sidewalks along both sides of Cranston Park Avenue, St. Joan of Arc Avenue, Peak Point Boulevard, Vista Gate, and Cityview Boulevard. Sidewalks are provided partially along one side of Jane Street and Teston Road, with the majority of the pedestrian facilities along Teston Road being a pathway. No sidewalks are currently provided along Keele Street or Kirby Road. Pedestrian crosswalks are available on all approaches with protected pedestrian phases at all signalized intersections in the study area.

3.3.5 EXISTING TRAFFIC OPERATIONS

Intersection capacity analysis was conducted for the study area under existing conditions. Detailed analysis results are summarized in LEA's Transportation Mobility Plan Study prepared for the Block 27 development.

The existing analysis results indicate that all signalized intersections operate within capacity and at acceptable LOS during the weekday AM and PM peak hours. The exception is the intersection of Keele Street & Teston Road which is operating with capacity constraints during the PM peak hour. Furthermore, the following individual movements are operating with V/C ratios of 0.85 or higher during the PM peak hour:

- Keele Street & Teston Road: eastbound left (V/C 0.99 LOS E), westbound through-right (V/C 0.87 LOS E), northbound left (V/C 0.98 LOS E)
- Keele Street & Kirby Road: eastbound left through-right (V/C 0.96 LOS F), westbound left through-right (V/C 0.90 LOS E)

All unsignalized intersections during the AM and PM peak hours are observed to operate within capacity and are generally experiencing an acceptable LOS.

Overall, the results of the existing conditions capacity analysis indicate that the study area road network is generally operating with residual capacity and at acceptable LOS, with only a small number of critical movements identified.

3.3.6 FUTURE TRAFFIC OPERATIONS

In developing the preferred design for the Block 27 road network, traffic modelling was conducted based on a 10-year planning horizon, assuming full build of the development to the year 2031 to ensure the future road network operates at acceptable levels of service.

The future analysis results indicate that development of Block 27 and adjacent areas add high volumes of traffic to the local network. However, planned widenings along Jane Street and Kirby Road, recommended lane configurations, and recommended signal optimizations and coordination will reduce the impact of congestion. A number of capacity constraints have been identified, mostly related to the portion of the network where Teston Road, Jane Street, the Highway 400 NB Off-Ramps, and Spine Road (Block 34E) are in close proximity to each other with high volumes. However, the collector street network of Block 27 performs well, both where the collector streets intersect with each other and where they intersect with regional roads.

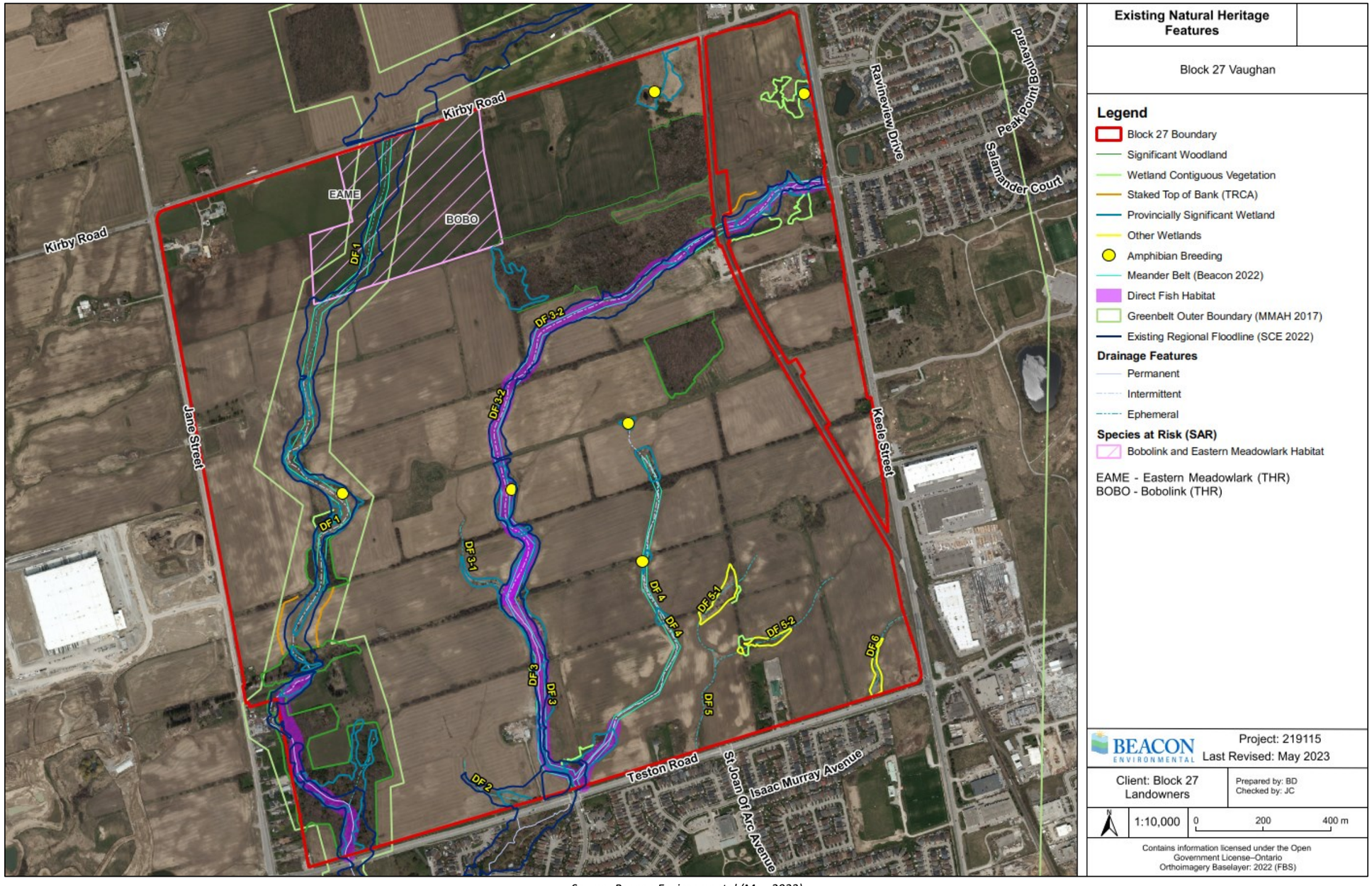
Details on future traffic operations including information on lane configurations and signalization required for each intersection is included within LEA's Transportation Mobility Plan Study and further summarized in **Section 8.5**.

3.4 NATURAL ENVIRONMENT

Natural heritage investigations were completed by Beacon Environmental Limited for the Master Environmental Servicing Plan (MESP) as part of the Block 27 development was also used to support the Block 27 MCEA study. The results of this investigation are documented in the Natural Heritage Report provided in **Appendix F**.

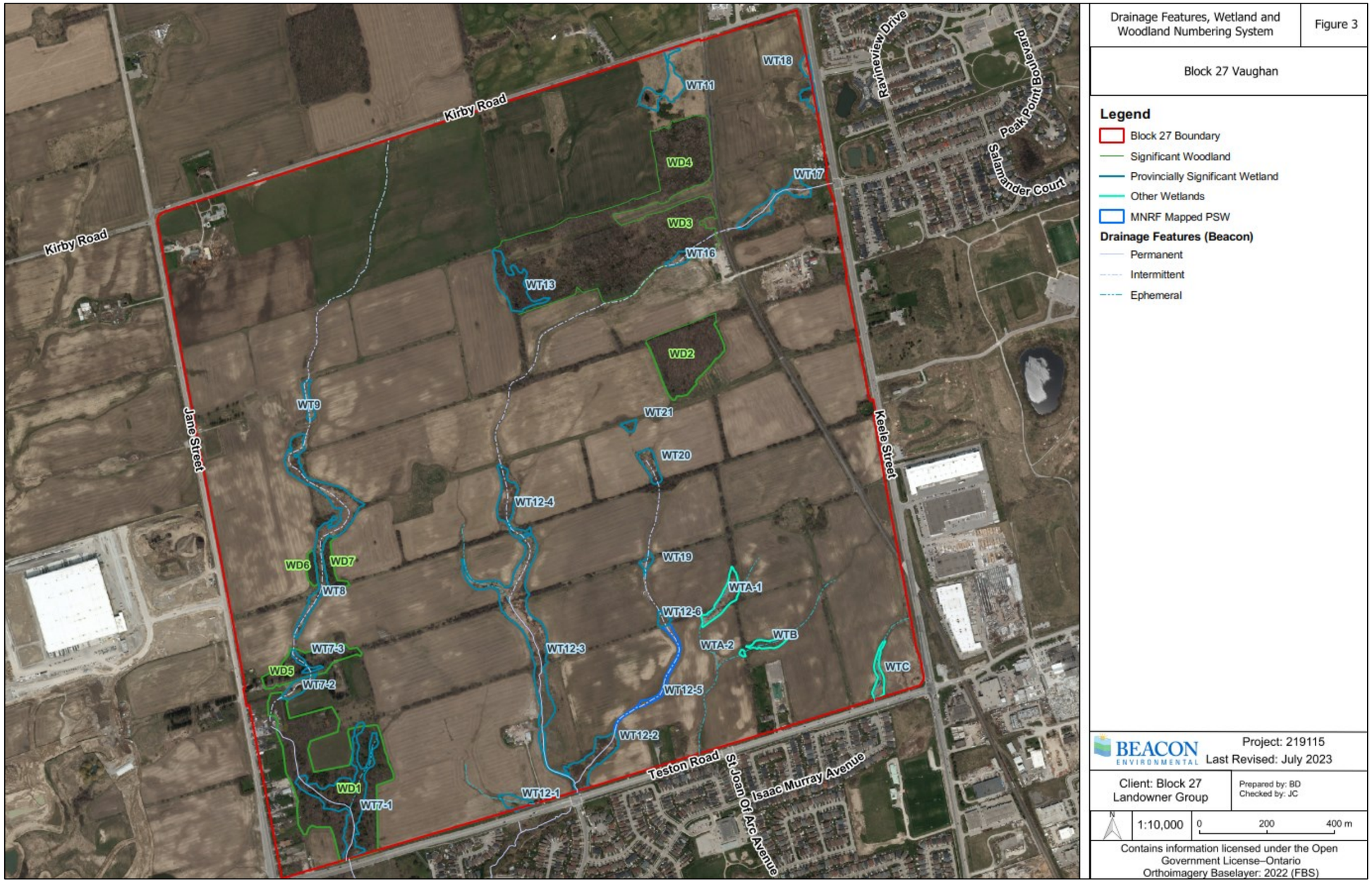
The existing natural environmental features map illustrating the key natural environmental features and constraints is provided in **Figure 3-7**. **Figure 3-8** includes the numbering system for the identified drainage features, wetlands, and woodlands consistent with nomenclature from the MESP. The following sections summarize the key natural environment features within Block 27 based on the existing natural environmental conditions documented as part of the NVNCTMP, Block 27 Secondary Plan, and the Block 27 MESP which is currently underway.

Figure 3-7: Existing Natural Heritage Features



Source: Beacon Environmental (May 2023)

Figure 3-8: Drainage Features, Wetland, and Woodland Numbering System



Source: Beacon Environmental (July 2023)

3.4.1 AQUATIC RESOURCES

3.4.1.1 Species at Risk

No aquatic species-at-risk (SAR) were observed within Block 27.

3.4.1.2 Headwater Drainage Features

The majority of Block 27 is located within the Upper West Don Subwatershed, part of the Don River Watershed, with a narrow strip of land along the west boundary of the block identified as part of the East Humber River Watershed. Six drainage features identified as Drainage Feature 1 to Drainage Feature 6 (DF1 to DF6) traverse the block and outlet southerly under at Teston Road at several culvert locations. **Figure 3-8** illustrates the drainage feature locations and sub-catchments.

In general, drainage features within the block have had extensive modifications in the past (e.g., channelization) to facilitate agricultural land use. The following sections summarize aquatic resource conditions for each drainage feature.

Drainage Feature 1 (DF1) of the Upper West Don River traverses the western boundary of Block 27. Capturing drainage from north of Kirby Road, the drainage feature flows southward through the block east of along Jane Street. The hydrologic regime of DF1 transitions from ephemeral within the upstream reaches of the feature, to intermittent flow mid-reaches, and permanent flow (with associated groundwater contributions) within the downstream reaches close to Teston Road. These downstream permanent reaches are situated within a confined valley setting, while intermittent and ephemeral reaches have been characterized as unconfined.

The upstream reaches of DF1 were generally characterized as undefined/poorly defined, actively farmed drainage features. Riparian vegetation in this area is mainly represented by grasses. Along the central, intermittent reaches, the drainage feature was characterized as intermittently defined, with pockets of wetland vegetation comprising the riparian communities. Transitioning downstream, the drainage feature gains definition; where defined, bankfull widths and depths ranged 1.3 to 1.5 m and 0.15 to 0.51 m, respectively. Channel morphology was not well-developed, but the development of run and pool features was noted, with substrate comprised of silt and sand sized materials. These intermittent reaches were characterized as providing indirect contributions to downstream fish habitat.

The lower reaches of DF1 (from approximately 650 m upstream of Teston Road) were characterized as providing fish habitat due to the more defined nature of the channel and presence of permanent flow due to groundwater inputs. The Don River Watershed Plan (TRCA 2009) identifies DF1 as an intermittent cool to warmwater system. Riparian vegetation consisted of wetland and forest communities and the channel is well shaded as it flows through the wooded areas. Bankfull widths and depths ranged from 2.2 to 2.6 m and 0.65 to 1.1 m, respectively. Bank materials consisted of clay silt and sand, while channel morphology consisted of riffle-pool sequences with substrate comprised of silt, sand, gravel, and cobble sized bed materials (refer to **Figure 3-9**). Channel form was influenced locally by the accumulation of instream wood debris.

Figure 3-9: Representative Photograph of Existing Conditions Along the Downstream Portion of Drainage Feature 1 (September 2019)

Drainage Feature 2 (DF2) is a minor (approximately 100 m in length), ephemeral headwater feature that originates as a collection of surface runoff from the surrounding agricultural fields along Teston Road (refer to **Figure 3-10**). Drainage from DF2 is conveyed south of Block 27 via an existing culvert at Teston Road. The upper reach of this tributary is undefined and actively farmed for most of the year. A small Reed Canary Grass Mineral Meadow Marsh community has been identified in association with attenuated drainage at the Teston Road culvert. This area within the wetland has been identified as the lower reach. The tributary was not observed to be flowing during 2010 field investigations, but flows were observed in April 2014.

Figure 3-10: Upstream View of Drainage Feature 2 from Teston Road (September 2019)

Drainage Feature 3 (DF3) The majority of DF3 (i.e., DF3-2) was characterized as an intermittent drainage feature. However, the downstream portion (i.e., DF3) is permanent (refer to **Figure 3-11**). The upstream portion of the feature receives stormwater from an existing residential stormwater facility east of Keele Street. The upstream limits of DF3-1 are undefined, but downstream the feature gains definition in localized areas. Where defined, bankfull widths were estimated to range from 0.6 to 2.5 m. In general, DF3-2 has been heavily modified historically to facilitate agricultural land use. A portion of the drainage feature

has been altered more recently and is currently subject to restoration. The tributary then flows south to join DF1 approximately 400 m downstream of the property.

An ephemeral headwater branch (DF3-1) confluences with DF3 mid-block. Near the confluence, the lower reach riparian communities are dominated by pockets of wetland vegetation within the larger agricultural fields. These communities extend downstream to Teston Road.

The upstream portion of DF3-1 is ephemeral, within an agricultural field. DF3-1 extends from the northern Subject Lands; however, the flow path is discontinuous, and portions of the feature are regularly ploughed through.

DF3 and most of DF3-2 has been characterized as providing fish habitat. The Don River Watershed Plan (TRCA 2009) identified DF3 as an intermittent cool to warmwater system.

Figure 3-11: Upstream View of Drainage Feature 3 Near Teston Road (September 2019)

Drainage Feature 4 (DF4) originates mid-block and confluences with DF3 immediately north of Teston Road. The drainage feature was characterized as a poorly-defined, actively farmed, intermittent feature along the majority of its length (refer to **Figure 3-12**). Only the downstream reach, approximately 250 m long, north of Teston Road was noted as a defined channel providing permanent flow. The extent of this permanent reach, which provides fish habitat, generally coincides with the presence of two small riparian wetland communities. Minimal flow was observed within this section during field investigations. The Don River Watershed Plan (TRCA 2009) identified DF4 as an intermittent cool to warmwater system.

Figure 3-12: Downstream View of Drainage Feature 4 - General Conditions (September 2021)

Drainage Feature 5 (DF5) in composed of two ephemeral branches which originate within two small pockets of wetland vegetation located in the southeast quadrant of Block 27. The branches confluence approximately 300 m upstream of the Teston Road and then convey surface drainage via a poorly- defined, agricultural swale (refer to **Figure 3-13**) towards an existing catch basin at Teston Road. DF5 is enclosed south of Teston Road and does not provide fish habitat.

Figure 3-13: Downstream View of Drainage Feature 5 - General Conditions (September 2021)

Drainage Feature 6 (DF6) is located in the southeast corner of Block 27 between Keele Street (at the rail line) and Teston Road. It flows south for approximately 300 m within the property, then exits the property via a culvert under Teston Road. South of Teston Road, the feature is enclosed.

The drainage feature was characterized as a poorly-defined ephemeral, wetland headwater feature that does not provide fish habitat (refer to **Figure 3-14**).

Figure 3-14: Upstream View of Drainage Feature 6 from Teston Road (September 2019)

3.4.1.3 Fish Community

DF1, DF3, and DF4 have been identified as intermittent cool to warmwater systems in the Don River Watershed Plan (TRCA 2009). Based on the electrofishing conducted by Beacon in August 2010 and by Natural Resource Solutions Inc. (NRSI) in May 2016 as part of the NVNCTMP, a total of six fish species were observed. All fish species observed are abundant and widespread in Ontario. A number of instream barriers to fish movement have been identified within DF1, DF, and DF4 (TRCA 2009). These barriers seasonally inhibit the movement of fish into the headwater reaches found upstream of Teston Road. **Figure 3-7** illustrates locations of direct fish habitat.

3.4.1.4 Terrestrial Resources

An L-ranking system (L1-L5) is used by the TRCA to identify the level of conservation concern for flora and fauna, with L1 being the highest concern and L5 being the lowest concern. Species within Block 27 were ranked L2-L5 based on the L-ranking system. Species ranked L2 are unable to withstand disturbance, generally occur in high-quality natural areas, and are probably rare in the TRCA jurisdiction. Species ranked L3 by TRCA are able to withstand minor disturbance and are generally secure in the natural matrix but are considered to be of regional concern. Species ranked L4 are able to withstand some disturbance and are generally secure in the rural matrix but may be of concern in urban areas. Finally, species ranked L5 are able to withstand high levels of disturbance and are generally secure throughout the TRCA jurisdiction, including the urban matrix. Species ranked L1-L3 are considered regional species of concern.

3.4.1.5 Vegetation Communities and Flora

Vegetation units identified within Block 27 are broadly categorized as forest, wetland, and semi-natural/cultural. Intensive agriculture represents more than 75% of Block 27 lands while forested communities and cultural woodlands, and wetlands represent less than 10%, and approximately 4%, respectively. The balance of lands is comprised of cultural meadows and thickets, hedgerows, and anthropogenic areas.

A total of 283 vascular plant species were identified within Block 27. Approximately 33% of the plant species are non-native to the area, which is usually indicative of higher levels of disturbance and a lower floristic quality. Aside from exotic species, the vast majority of native species within Block 27 are ranked L4 (approximately 15%) or L5 (approximately 40%) by TRCA.

Several plant species found within Block 27, especially within the southwestern mixed forest, organic swamp communities, and Red-Osier thicket swamp near Teston Road, are considered regionally rare and/or are ranked L3 or L2 by TRCA. No threatened, endangered, or species of special concern were found within Block 27.

3.4.1.6 Amphibians

A total of five anuran species were recorded in the study area, including Wood Frog, Spring Peeper, Gray Treefrog, Green Frog, and American Toad. The greatest abundance of breeding amphibians was recorded at the northeast corner of Block 27 near Kirby Road with full choruses of both Spring Peeper and Wood Frog, and distinguishable calls for breeding Gray Treefrog. Similarly, a wetland unit associated with the central portion of Block 27 provides breeding habitat for five different species of amphibians (Wood Frog, Gray Treefrog, Green Frog, Spring Peeper, and American Toad) with variable breeding productivity. To date, no SAR anurans have been noted in the study area.

3.4.1.7 Breeding Birds

The total number of species observed between 2010 and 2021 varied only slightly from 45 to 53 species of birds. The main habitat types for breeding birds in Block 27 include agricultural lands, woodlands, and riparian areas.

No species ranked as S1 through S3 (Critically Imperiled through Vulnerable) by the province were present during any of the breeding survey seasons. All breeding species observed were ranked as either S5 (Secure), S4 (Apparently Secure), SNA (Not applicable because the species is not a suitable target for conservation activities or SE (Exotic).

A total of 12 species were ranked as L3 (regional species of concern) by the TRCA over the survey years. These species were found within the agricultural areas, Northeast Woodlands, Southeast Woodlands, and West Riparian Corridor of DF1. These species include Brown Thrasher, Horned Lark, Field Sparrow, Vesper Sparrow, Grasshopper Sparrow, Bobolink, Eastern Meadowlark, Mourning Warbler, Chestnut-sided Warbler, Black-billed Cuckoo, Yellow-billed Cuckoo, and Alder Flycatcher.

Species protected by the Endangered Species Act (ESA) within Block 27 include Bobolink and Eastern Meadowlark. Bobolink and Eastern Meadowlark were observed in the agricultural areas within the pasture and hayfields located in the northwestern portion of Block 27. Species found within Block 27 that are listed as threatened and special concern under the ESA include Barn Swallow and Eastern Wood-Pewee respectively. Barn Swallow was observed within the northwestern portion of Block 27 and Eastern Wood-Pewee was observed in the Northeast and Southeast Woodlands of Block 27.

3.4.1.8 Bat Snag and Acoustic Monitoring Surveys

A habitat assessment was undertaken in woodland areas that could potentially be directly affected by the Block 27 proposed collector road network. A total of 444 snag trees were recorded within the area, of which 253 trees were considered habitable by Myotis species and 191 trees habitable by Tri-coloured Bat.

Subsequent to the bat habitat assessment, acoustic monitors were deployed in June 2021. Monitoring stations were established at 26 locations within the footprint of the limits of clearing associated with the

proposed road crossings, based on proximity to potential roost trees. The six bat species that were identified during the acoustic monitoring include Big Brown Bat, Silver Haired Bat, Eastern Red Bat, Hoary Bat, Northern Myotis, and Little Brown Myotis.

Northern Myotis and Little Brown Myotis are endangered and are subject to the ESA. However, the monitoring results suggests that the species are likely utilizing the forests for general foraging and/or flyover habitat rather than roosting habitat. Further information pertaining to bat surveys can be found in the Bat Habitat Assessment memorandum prepared by Beacon Environmental in 2022 as part of the MESP.

3.4.1.9 Terrestrial Mammals

The mammals of the settled landscapes of southern Ontario are mostly species that have benefited from agricultural expansion and other human activities. Since many of the sensitive species have already been extirpated, the remaining species are generally widespread and common, as were all the species observed in Block 27.

Four mammal species were encountered during field investigations: Eastern Gray Squirrel, White-tailed Deer, Eastern Cottontail, Coyote, and Eastern Chipmunk. These species are all ranked as S5 (secure) by MNR.

Bats that can be found roosting in most of the forested and swamp communities are discussed in the previous section.

3.4.1.10 Connectivity

Block 27 is a fragmented landscape which consists of primarily agricultural fields. Through seasonal field investigations and policy review, several features, including woodlands, wetlands, stream and valley corridors, fish habitat, wildlife habitat, and habitat of endangered or threatened species, have been identified which, taken together, make up a local Natural Heritage Network (NHN). The identified features will be further investigated through the MESP and Block Plan stage for direction on protection, mitigation, and/or compensation.

The NHN provides habitat opportunities for wildlife within the existing rural context and will continue to provide habitat opportunities in a future urban context, post-development. The NHN generally consists of three watercourse corridors connecting woodlands and wetlands and an isolated woodlot. Opportunities exist to improve connectivity within these corridors through habitat restoration and enhancement, particularly within those portions that are actively farmed.

3.4.1.11 Western Connectivity Corridor

The uppermost reach of DF1 in Block 27 has no associated wetland vegetation, and flows through active agricultural fields, where it is often cultivated through. It provides a surface water hydrological connection with the lower reaches which feature a wider riparian wetland and, as the hydrogeological analysis (Cole Engineering 2021) shows, are connected to the groundwater table. The intermittent and permanent reaches of the watercourse, riparian wetlands and the large mixed forest and swamp communities north of Teston Road are considered natural heritage features.

3.4.1.12 Central Connectivity Corridors

DF3 originates from a stormwater management (SWM) pond on the east side of Keele Street, south of Kirby Road. As flow enters Block 27, this intermittent tributary flows through a wooded corridor. Similar to DF1, the middle reaches of DF3 have no associated wetland or forest communities and are regularly ploughed through; however, it provides a hydrological and ecological linkage between upper and lower reaches. The

lower reach of DF3 is contained within a wide (i.e., 30-50 m) riparian wetland corridor, and like DF1, receives some seasonal groundwater inputs. DF4, an ill-defined swale originates approximately 0.8 km north of Teston Road, traverses south through agricultural fields and small marsh wetland communities, then flows into DF3, which exits the property through a culvert at Teston Road.

3.4.1.13 Designated Natural Heritage Features

The following sections provide a summary of the natural heritage features and areas within Block 27 that are considered significant according to the Greenbelt Plan, the York Region Official Plan, City of Vaughan Official Plan as well as the Natural Heritage Reference Manual (MNR 2010), the Ontario Wetland Evaluation System (OWES) Southern Manual, Significant Wildlife Habitat Technical Guidelines (MNR 2000), and Significant Wildlife Habitat Criteria Schedules for Ecoregion 6E (MNR 2015).

3.4.1.14 Significant Wetlands

The majority of the wetlands units in Block 27 are confined to the stream and valley corridors (DF 1, DF3, and DF4) and form the foundation of the NHN (see **Figure 3-7)**. Most of these wetlands were designated provincially significant in the Don River West Branch Headwater Provincially Significant Wetland Complex (PSW), including Units 7-21 as they are referred to in the MNR location map for the Don River West Branch Headwater PSW (MNR August 2017).

On December 22, 2022 the Ministry of Natural Resources (*formerly Ministry of Natural Resources and Forestry*) updated the Ontario Wetland Evaluation System (OWES) in support of Ontario's Bill 23, *More Homes Built Faster Act, 2022.* This update introduces new guidelines for the re-evaluation of wetlands and updates the mapping of assessed wetland boundaries as well as changes made to better recognize the professional opinion of wetland evaluators and the role of local decision makers (e.g., municipalities). At the time of preparing this Class EA, significant wetlands and associated boundaries were identified in accordance with policies prior to the OWES update which were used to support the development, evaluation, and selection of the preferred road designs. It is acknowledged that any alterations resulting from OWES policy updates, such as changes in buffer widths or wetland status, would not materially change the recommendations provided in the Block 27 MCEA.

3.4.1.15 Significant Woodlands

All staked woodlands within the Greenbelt Plan area meet the test of significance by virtue of their proximity to a PSW. The large deciduous forest occupying the southern portions of the Greenbelt Plan area are significant woodlands based on their size, proximity to a PSW and fish habitat, presence of groundwater discharge as well as occurrence of rare or uncommon plant species. Due to the proximity with other significant features, additional wooded areas along DF1 would also be considered significant woodland based on criteria from the Region of York's Official Plan and the City of Vaughan's Official Plan.

Outside of the Greenbelt Plan Area, there are several additional forest blocks located in the northeast portion of Block 27. These units would be considered as significant woodlands based on criteria from the Regional Municipality of York's Official Plan and the City of Vaughan's Official Plan.

Significant woodlands are located in the north-east and south-west quadrants of Block 27 and are illustrated in **Figure 3-7**.

3.4.1.16 Significant Valleylands and Stream Corridors

Valley and stream corridors are considered significant features by the City of Vaughan Official Plan. Within the Greenbelt Plan Area, DF1 is contained in a well-defined valley portion which meets the Greenbelt Plan

criteria for significant valley lands. Outside of the Greenbelt Plan Area, it was agreed between Beacon Environmental and TRCA that a distinctive valley landform exists only in a relatively small area upstream of the CNR along the upper reaches of DF3.

3.4.1.17 Significant Woodland and Wetland Habitat

Based on the MNR (2015) recommended Significant Wildlife Habitat (SWH) criteria for woodland and wetland amphibian breeding habitat in Ecoregion 6E, SWH includes wetlands where breeding populations of two or more of the listed frog/toad species, with at least 20 individuals (adults or eggs masses), or two or more of the listed frog/toad species with Call Level Codes of 3. When the 2015 criteria are applied to the different areas on Block 27 that supported breeding amphibians in 2014, 2018, 2020 and 2021, only wetland WT11 would have sufficient breeding productivity to be considered a SWH. The wetland itself and portions of the adjacent woodland (WD4) would be considered SWH and are protected as a PSW (see **Figure 3-8**).

3.4.1.18 Habitat of Endangered or Threatened Species

Based on the seasonal field investigations conducted, the following endangered or threatened species are located within Block 27:

- Bobolink – threatened;
- Eastern Meadowlark – threatened;
- Eastern Small-footed Myotis – endangered;
- Little Brown Myotis – endangered;
- Northern Myotis – endangered; and
- Tri-colored Bat – endangered.

These habitats include agricultural areas within the pasture and hayfields located in the northwestern portion of Block 27, northeast woodlands, southeast woodlands, and near the proposed Block 27 road crossings.

The presence of these species and their habitats does present a constraint to development, however there are provisions in the Endangered Species Act (2007) and its regulations to allow for habitat to be removed if other measures can be implemented to provide an overall benefit to the species. Through the regulations (Ont. Reg. 242/08), there are mechanisms by which this can be achieved, and these will be applied to the affected species.

3.4.2 NATURAL HERITAGE NETWORK

The VOP 2010 defines the NHN to include Core Features, Greenbelt Plan Area, Oak Ridges Moraine Conservation Area, Enhancement Areas, and Built-up Valleylands. Core Features consist of the following natural heritage components and their minimum vegetation protection zones: valley and stream corridors, wetlands, woodlands, significant wildlife habitat, habitat of endangered and threatened species, fish habitat, Environmentally Significant Areas and Areas of Natural and Scientific Interest, kettle lakes, seepage and springs, and sand barrens, savannahs, and tall grass prairies in the Greenbelt Plan and Oak Ridges Moraine Conservation Plan areas.

The Block 27 MESP addresses the extent of the NHN and all of its components. Not all of the NHN components noted above exist in Block 27. The Block 27 NHN contains valley and stream corridors, wetlands, woodlands, significant wildlife habitat, habitat of endangered and threatened species, fish habitat and seepage areas.

This ESR focuses on the natural features and natural hazards present in Block 27 as defined through the MESP and implications of the road alignments and designs to these components of the NHN.

3.5 HYDROGEOLOGY

A hydrogeological assessment was completed for the Block 27 lands by R. J. Burnside & Associates Limited in August 2022 to outline the site's existing hydrogeology and stratigraphy setting and support the development, evaluation, and selection of the preferred road designs in Phase 3. Full hydrogeological findings are provided in **Appendix G**.

Block 27 is located on the till plain on the south slope of the Oak Ridges Moraine and is characterized by gently rolling to undulating topography, with a general overall slope towards the southwest. The regional surficial geology mapping published by the Ontario Geological Survey (2003) shows that the majority of Block 27 is covered by clayey silt to silt till. Alluvium deposits, consisting of silt, sand and gravel, are mapped along the lower reaches of DF1 in the southwestern portion of Block 27. Bedrock beneath Block 27 consists of layered grey shale bedrock of the Georgian Bay Formation.

As part of a hydrogeological investigation completed by Cole Engineering, a series of cross-sections through Block 27 were prepared to illustrate the local stratigraphy. The cross-sections showed that extensive silt and sand layers underlie Block 27 which are overlain by deposits of silty clay till, interpreted to be the Halton till. The northern portion of Block 27 had thinner sand and silt layers compared to the southern and central portions which had thicker sand and silt layers. It is interpreted that these layers are hydraulically connected and form part of the Oak Ridges Aquifer Complex (ORAC). The full thickness of the ORAC was not penetrated by any on-site monitoring wells; however, based on a review of the regional data available from the ORMGP website, the ORAC is expected to be approximately 50 m in thickness in the vicinity of Block 27.

3.5.1 GROUNDWATER

Monitoring of groundwater levels was completed on a quarterly basis in 25 on-site monitoring wells from June 2019 to August 2021 by R.J. Burnside and on a bi-monthly basis between October 2010 and October 2012 by Cole Engineering as part of the Subwatershed Study (SWS). The findings of the groundwater monitoring indicate that the seasonally high groundwater levels vary with topography across Block 27. Groundwater is shallow in topographically lower areas along drainage features in Block 27, with above ground water levels noted along the lower reaches of DF1, DF3, and DF4 and the upper reaches of DF3-2. Conversely, groundwater is deeper in topographically higher areas of Block 27, with deep groundwater levels located in the northeastern portion. The groundwater level monitoring indicated that the southwestern portion of Block 27 is considered to have the greatest potential for groundwater discharge.

As part of the SWS, groundwater water samples were collected from six monitoring wells (MW) in September 2011 and November 2012 to assess the shallow groundwater quality. High sodium and chloride concentrations were reported for MW10-82d which is located close to Kirby Road and Keele Street and may be impacted by road salt usage along these roads. It is noted, however, that the shallow well at this location (MW10-82s) had much lower concentrations of sodium and chloride, suggesting that the impact is in the sand layer, which may be closer to surface upgradient of Block 27. Nitrate was detected at all water

sample locations, with the exception of MW10-76d, indicating the groundwater in the area has been affected by nitrate sources which may include agricultural practices. The highest concentrations were reported for MW10-78s which is located in the central portion of Block 27.

The majority of Block 27 is located within a Significant Groundwater Recharge Area (SGRA) as shown **Figure 3-15**. The findings from the hydrogeological study of Block 27 confirms that groundwater recharge areas (areas with downward flow gradients) are generally located in the topographically higher areas. The groundwater monitoring results show that the majority of the well nests have downward gradients. However, Block 27 is covered by a layer of relatively low hydraulic conductivity silty clay till, and as such, the actual amount of water that infiltrates and moves through the subsurface over most of the area is expected to be limited. Upward gradients and discharge conditions are found in the southwestern portion of Block 27. It is interpreted that groundwater discharge from this regional aquifer provides baseflow to these watercourses.

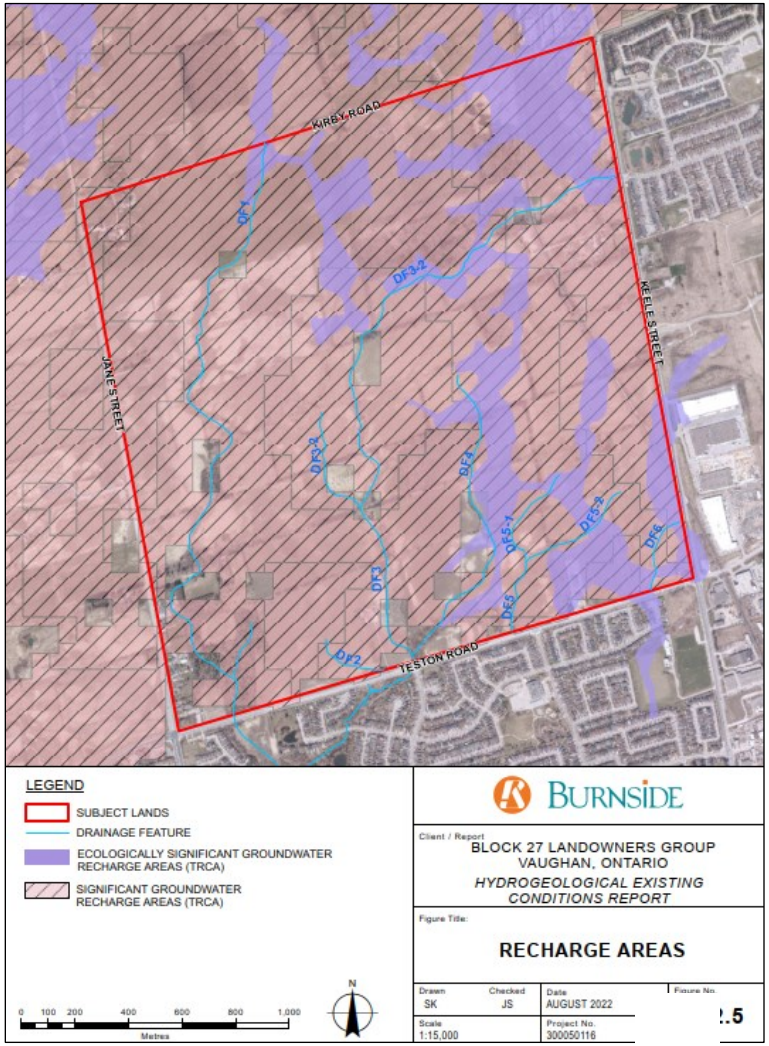
3.5.2 SOURCE WATER PROTECTION

Based on mapping obtained from secondary sources, Block 27 is located within a WHPA-Q for water quantity and significant groundwater recharge area. Water balance calculations will be completed as part of the development process and potential effects will be mitigated through the implementation of stormwater management plans and low impact development (LID) measures.

While the central portion of Block 27 are mapped as having high aquifer vulnerability, none of the restricted uses within Source Water Protection Policies are proposed in Block 27 with the exception of the application of road salt, however, the application of road salt will be managed by the municipality per York Region's Salt Management Plan and Guidance for Best Management Practices for Road Salt Usage Standards.

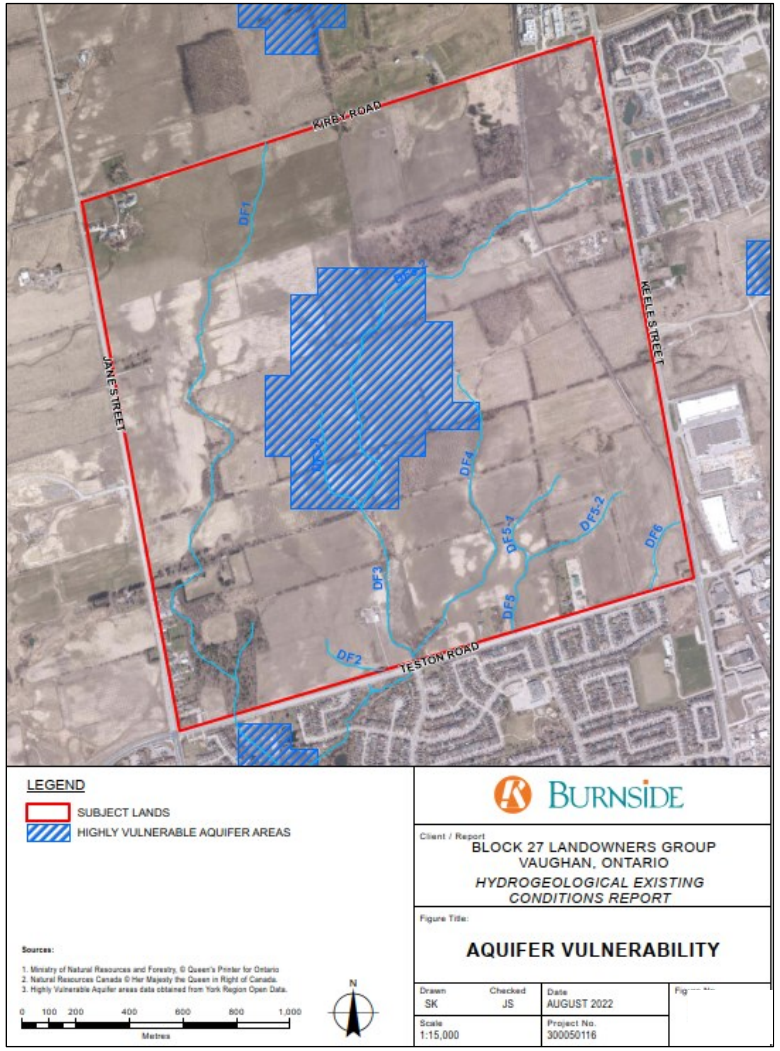
Mapping illustrating the area within Block 27 this is designated as a highly vulnerability aquifer area is **Figure 3-16**.

Figure 3-15: Source Water Protection Area



Source: R. J Burnside & Associates (August 2022)

Figure 3-16: Aquifer Vulnerability



Source: R. J Burnside & Associates (August 2022)

3.6 FLUVIAL GEOMORPHOLOGY

3.6.1 EXISTING FLUVIAL CHARACTERIZATION OF DRAINAGE FEATURES 1,3, AND 4

In order to confirm existing geomorphic conditions for the proposed NHN stream road crossings, scoped field investigations were undertaken on September 9, 2019 and September 1, 2021. Observations documented at each crossing included measurements of bankfull channel dimensions, along with a general description of watercourse characteristics including riparian vegetation, indicators of active erosion, and evidence of channel hardening.

The majority of the watercourse reaches of DF1 were characterized as poorly defined drainage feature within an unconfined valley setting (stream corridor). The reaches lacked riffle-pool morphology and Riparian vegetation consisted predominantly of grasses and herbaceous plants with some shrubs. Where a defined channel was present, feature width and depth measured between 0.35 m to 0.70 m and 0.15 to 0.35 m, respectively. Boundary materials were comprised of a mix of clay, silt, and sand. Existing channel modifications included informal crossing (CSP or CSP culvert). The reaches were dry at the time of assessment.

The watercourse reaches of DF3 were characterized as either poorly defined drainage feature, poorly defined, actively farmed drainage feature, or heavily modified, permanent feature situated within an unconfined valley setting (stream corridor). Majority of riparian vegetation consisted predominantly of grasses with some trees or shrubs. Where defined, majority of the bankfull widths and depths averaged 1.7 m to 2.1 m and 0.25 m to 0.25 m, respectively.

The watercourse reach of DF4 was characterized as poorly defined, actively farmed drainage feature situated within an unconfined valley setting (stream corridor). Where discernible, the feature width and depth averaged 0.8 m and 0.08 m, respectively. Where present, riparian vegetation consisted mainly of grasses; however, trees and shrubs were present within the hedgerow in the vicinity of the crossing location. The reach was dry at the time of assessment.

3.6.2 EROSION HAZARD - MEANDER BELT WIDTHS

The meander belt width is generally defined as the lateral extent that a meandering channel has historically occupied and will likely occupy in the future. According to the *Technical Guide – Rivers and Streams: Erosion Hazard Limit* document (MNR 2002), in the case of unconfined river systems, the meander belt width plus an erosion access allowance is defined to determine the watercourse erosion hazard limit. Following the TRCA (2004) *Belt Width Delineation Procedures* document, the meander belt was delineated for DF1, DF3, and DF4.

Meander belt limits for unconfined reaches of DF1 were initially delineated based on the lateral extent of the outermost meander bends along each reach over the available historic record and then reviewed to ensure that the dimension was also sufficient to capture areas of standing water or saturated soil that were evident on recent aerial imagery or that had been observed during the field investigation. In lieu of calculating an annual recession rate (100-year migration rate), a 20% factor of safety (10% either side) was then applied to each side of the meander belt to account for potential changes in hydrologic regime (peak flow and frequency) as a result of future land use change. The resultant recommended meander belt dimension for both unconfined reaches of DF1 was 25 m.

Given the historically modified and relatively straight nature of DF3 and DF4, an empirical modelling approach was employed for Reaches 3-1 and 4-1 referencing bankfull dimensions as estimated through the rapid field investigation. This approach applies power functions based on an average bankfull width (Wb) and cross-sectional area (A), following relations from Williams (1986 – Equations 1 and 2) and Ward (2001 – Equation 3):

Bw = ([18*A0.65]+Wb)*1.2 [Eq. 1]

Bw = ([4.3*Wb1.12]+Wb)*1.2 [Eq. 2]

Bw = ([6*Wb1.12]+Wb)*1.2 (feet converted to metres) [Eq. 3]

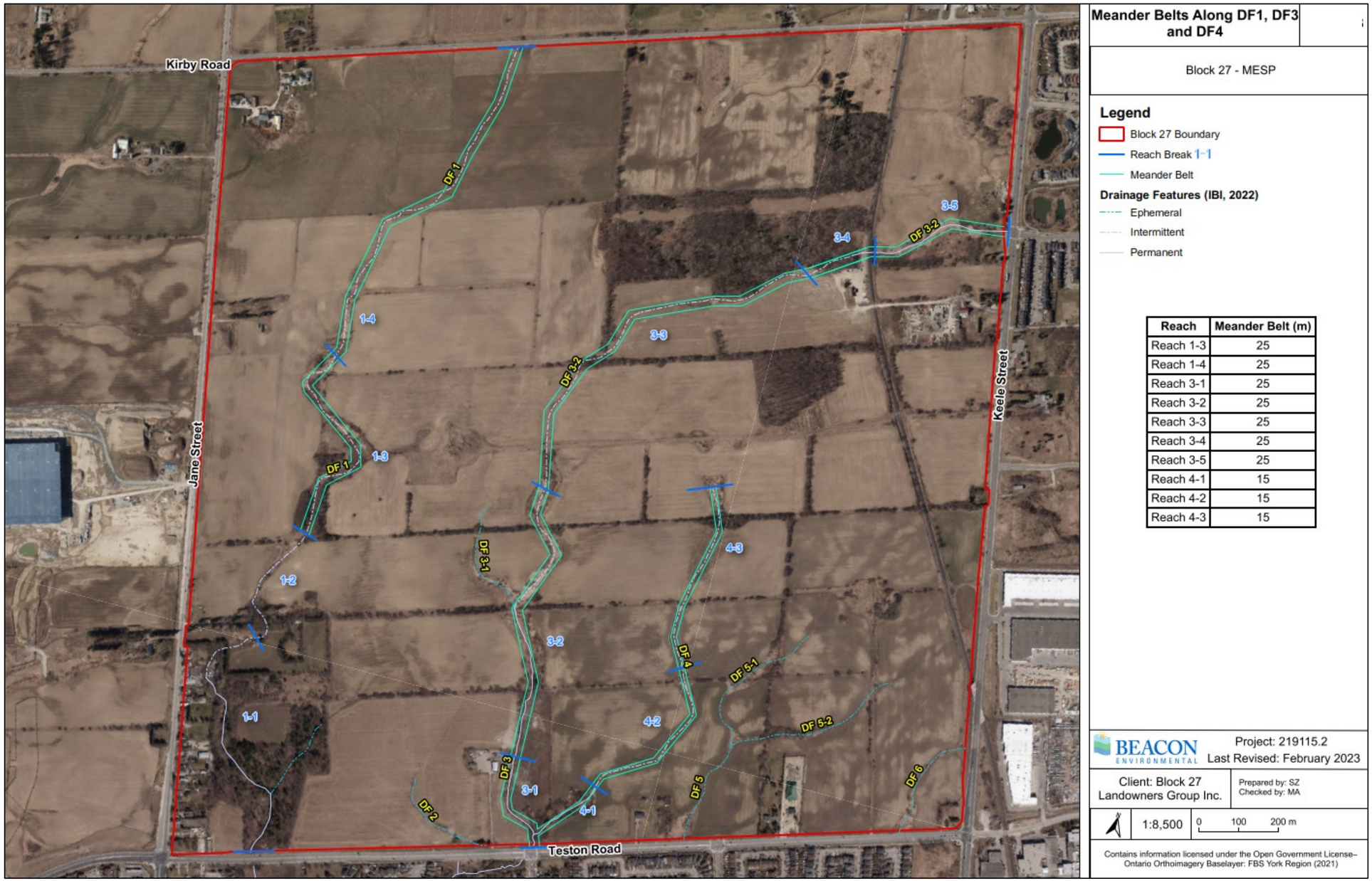
Modelling results were then reviewed within the context of field observations, recent aerial imagery, and topographic mapping to ensure that the dimensions captured areas of frequent floodplain inundation. As a result, a meander belt dimension of 25 m was recommended for Reach 3-1, and a dimension of 15 m was recommended for Reach 4-1. These dimensions incorporate a 20% factor of safety to account for potential changes in hydrologic regime (peak flow and frequency) as a result of future land use change.

Given the intermittently defined, historically modified nature of remaining upstream reaches along DF3 and DF4, a reference reach approach was applied using Reaches 3-1 and 4-1, respectively. This resulted in a recommended meander belt dimension of 25 m for Reaches 3-2, 3-3, 3-4 and 3-5, and 15 m for Reaches 4-2 and 4-3.

As shown on **Figure 3-17**, the recommended meander belt dimensions are:

- Drainage Feature 1 – 25m
- Drainage Feature 3 – 25m
- Drainage Feature 4 – 15m

Figure 3-17: Meander Belts Along DF1, DF3, and DF4



Source: Beacon Environmental (February 2023)

3.7 GEOTECHNICAL INVESTIGATIONS

Geotechnical investigations were completed by Soil Engineers Ltd. to determine the engineering properties of the disclosed soils for the design and construction of the proposed project. The field investigation was carried out in August and September of 2010 and consisted of drilling 75 boreholes to investigate the soil conditions.

Review of the borehole logs show that the majority of the boreholes encountered silty clay till at the surface, silt and sandy silt deposits at the surface in the northeast corner of Block 27 with sandier deposits (sand, silty sand, and sand and silt) encountered immediately west of Keele Street, and fine sand to silty sand at the surface along DF3-2 mid-block. The superficial sands and silts were found to be underlain by silty clay or silty clay till at each borehole location. Layers of sand and silt were encountered at various depths within the till deposits.

During the geotechnical investigation for Block 27, representative soil samples from various geological units encountered were collected and analyzed for grainsize distribution. These grainsize data and soil characteristics were used to provide a general estimate of hydraulic conductivity and infiltration potential of the sediments beneath the subject lands. A summary of the hydraulic conductivity estimated from the grainsize analyses, using the Hazen estimation method, is shown in **Table 3-1**.

Table 3-1: Summary of Hydraulic Conductivity

Soil Type	Interpreted Hydrostratigraphic Unit	Hydraulic Conductivity (cm/sec) Hazen Method	Potential Infiltration Rate (mm/hour)
Silty Clay Till	Halton Till	10^{-7}	<12
Sandy Silt Till	Halton Till	10^{-5} to 10^{-6}	12-30
Silt/Sandy Till	ORAC	10^{-4} to 10^{-6}	12-50
Silty Sand/Sand	ORAC	10^{-2} to 10^{-3}	75-150

Details of the geotechnical investigations are provided in **Appendix I**.

3.8 DRAINAGE AND STORMWATER MANAGEMENT

Existing drainage conditions as well as proposed drainage and stormwater management requirements for the collector roads have been addressed through analyses completed as part of the Block 27 MESP. The MESP work provides an integrated assessment of the collector road system along with development of the whole block. It addresses existing drainage conditions, SWM design criteria and a storm drainage concept to manage surface water quality and quantity in accordance with accepted practices.

The majority of Block 27 is located within the Upper West Don subwatershed, part of the Don River watershed, with a small portion in the northwestern corner of the block identified as part of the East Humber River Watershed (East Purpleville Creek). Collector roads cross three of the six drainage features present in the block. Runoff from all collector roads is proposed to drain to the Don River watershed and runoff from site plans abutting Jane Street will drain to the East Purpleville Creek.

Hydrologic and hydraulic assessments were completed within the block and in downstream areas to identify flood and erosion control criteria for the design of the proposed SWM facilities to ensure that the facilities address/mitigate potential erosion and water quantity impacts from the development of the Block

27 lands including all collector roads. Water quality and water balance requirements also form part of the SWM plan design.

With few exceptions, the major and minor drainage systems for the block are designed to direct surface runoff from collector roads to SWM facilities prior to discharge to drainage features within the Don River watershed. Ten SWM ponds are proposed for Block 27 to meet the required quantity, quality, and erosion requirements. The quantity and quality control for a small area of Street 5, close to Teston Road, will be provided by online storage and OGS treatment units since this area cannot be drained to any SWM ponds. LIDs to provide erosion control for this portion of Street 5 will be explored during future design phases. On-site storage is proposed for small catchments areas (< 5ha), and in an area that forms part of the potential Kirby GO -Transit Hub Centre.

The water budget analyses for the block indicates that best practices should also be implemented to achieve the required water balance goal of maintaining the pre-development annual infiltration volume for the site during the post-development condition. As part of the MESP analyses, low-impact development (LID) measures have been recommended to mitigate water balance deficiencies through promoting infiltration and evapotranspiration.

Through implementing the proposed SWM facilities and LID measures, the SWM criteria identified for the block, including the collector roads, will be met.

3.8.1 FLOODPLAIN ANALYSIS

Floodplain analyses were completed by Schaeffers & Associates Ltd. in February 2023 to assess the impact of Block 27 on the existing West Don River drainage features, determine the extent of the regulatory floodplains along DF1 and DF3, and support road crossing, DF3 channel realignment and SWM pond designs. This work was integrated with the MESP assessment of development of whole of Block 27 including the proposed collector road system.

As part of the floodplain analyses, existing and future conditions hydraulic models were prepared. Topographic information was obtained and field surveys were completed. The existing Don River Watershed TRCA hydraulic model (HEC-RAS) was utilized and hydraulic geometric information and the peak flows were updated based on the updated topographic information and updated hydrologic modelling. Updates to the model also included revisions to existing culvert data based on the latest survey data.

The future conditions model included uncontrolled future Regional Storm flows (reflecting the development of Block 27) to:

- Calculate the regulatory floodlines;
- Identify the hydraulic function of the proposed crossings to support the design of road crossing opening sizes; and
- Confirm conveyance functions and maintenance of riparian storage associated with the proposed channel realignment/restoration along approximately 250 m of DF3 upstream of new Street 5.

Further discussion on the proposed crossing designs and channel design are detailed in **Section 8.3.2.**

The future conditions regulatory floodlines along DF1 and DF3 including road crossings are presented in **Appendix J**, which contains supporting hydraulic information and model results.

3.9 CULTURAL HERITAGE RESOURCES

3.9.1 BUILT HERITAGE RESOURCES AND CULTURAL HERITAGE LANDSCAPES

A Cultural Heritage Resource Assessment (CHRA) was completed for Block 27 as part of the Block 27 Secondary Plan Study by ASI in 2015 and peer reviewed by Unterman McPhail Associates (UMcA) in 2023. The full CHRA and peer-reviewed cultural heritage report by UMcA can be found in **Appendix J**. From 2015 to spring 2023, Block 27 has witnessed little physical change based on available photography, to the cultural heritage landscapes identified in the CHRA (2015).

Nine cultural heritage landscapes (CHL) and 18 built heritage resources (BHR) were identified in the study area (**Figure 3-18**). Updated cultural heritage landscape mapping was also obtained from data presented from York Region's Teston Road Area Transportation Improvements Individual EA Public Open House #1 (York Region, July 2021) to confirm areas with cultural heritage potential (**Figure 3-19**). Notably, 11273 Jane Street (CHL1) and 11244 Keele Street (CHL7) are listed as a Property of Architectural and Historical Significance in the City of Vaughan's Register of Properties of Cultural Heritage Value. Based on input received from the City of Vaughan's Cultural Heritage department, it is further understood that the building on 11244 Keele Street has historic value due to its connection with William Thomas, a Township Councillor for a minimum of two sessions of municipal governance which connects the family and house to the local history of the settlement of Hope and the larger Township of Vaughan history. The house was also briefly the site of the Hope Post Office.

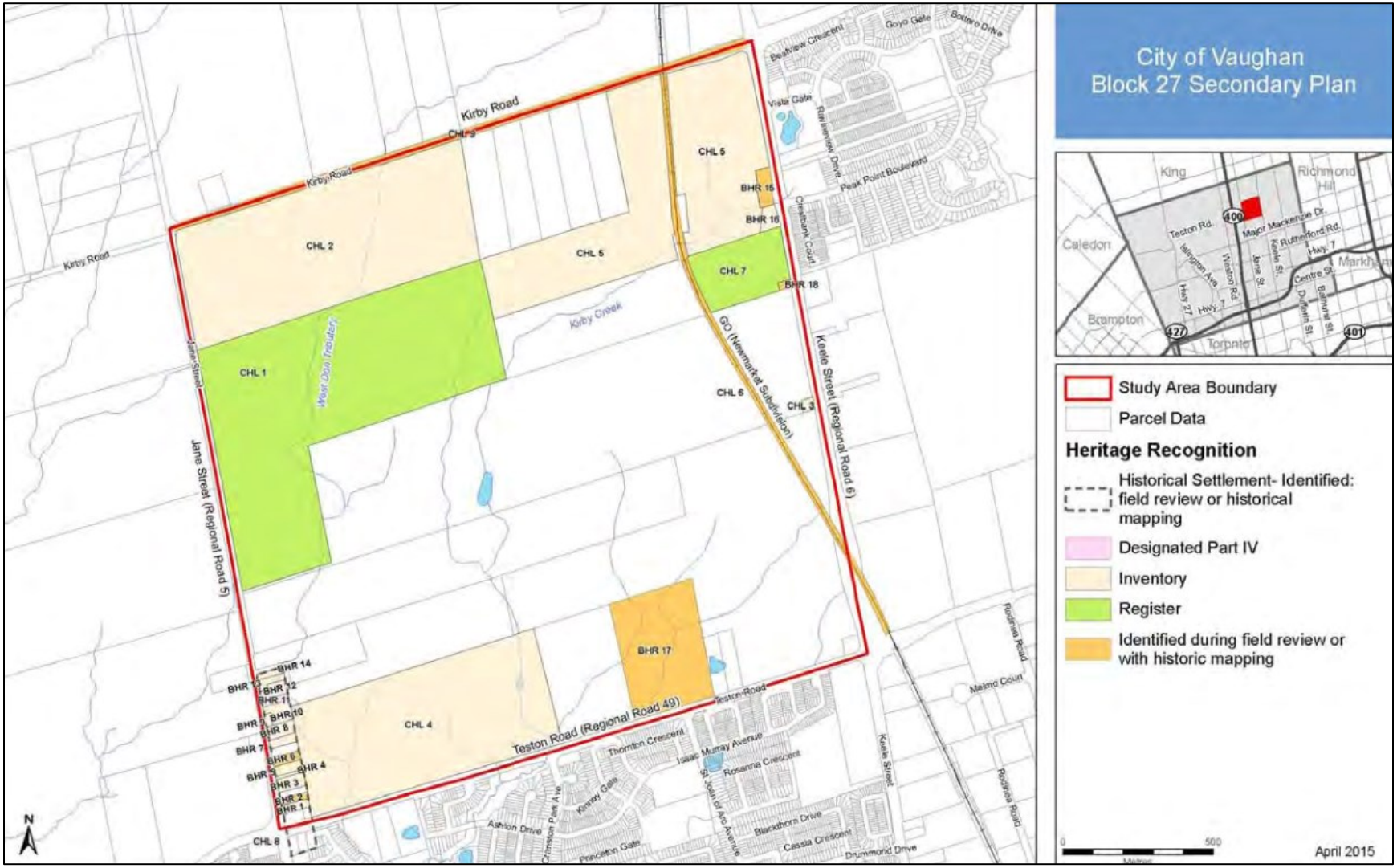
Based on historical research, field survey results, and applicable heritage evaluations, three cultural heritage landscapes (CHL 3, CHL 7, and CHL 8) retain historical, architectural, and/or contextual values and may be considered candidates for municipal designation under the Ontario Heritage Act and/or listing on the City of Vaughan's Listing of Property of Architectural and Historical Value. A total of six built heritage resources and cultural heritage landscapes (BHR 15, BHR 16, BHR 17, BHR 18, CHL 1, and CHL 2) were also evaluated as retaining historical, architectural and/or contextual values. However, based on field review, BHR 15, BHR 16, BHR 17, BHR 18, and CHL 2 were confirmed to not be strong candidates for conservation and integration into future land uses.

The assessment also identified CHL 6 and CHL 9 as having historic transportation routes that continue to retain elements that are evocative of their nineteenth century origins and functions as an original concession road or railway. CHL3 was identified as a pioneer cemetery and BHR 18 was identified as a former church property with post-1870 headstones that are extant on the cemetery structure associated with CHL 3, suggesting that the cemetery continued to be used after the construction of the new church.

Archival research and field surveys from the 2015 CHRA confirms that the Block 27 study area has an agricultural land use history that dates to the mid-nineteenth century. As indicated above, the results of historic research, field surveys, and applicable heritage evaluations confirms that several cultural heritage landscapes still extant in the landscape and are strong candidates for conservation and integration into future land uses in the Secondary Plan area and/or should be subject to heritage impact assessments during the Block Plan stage.

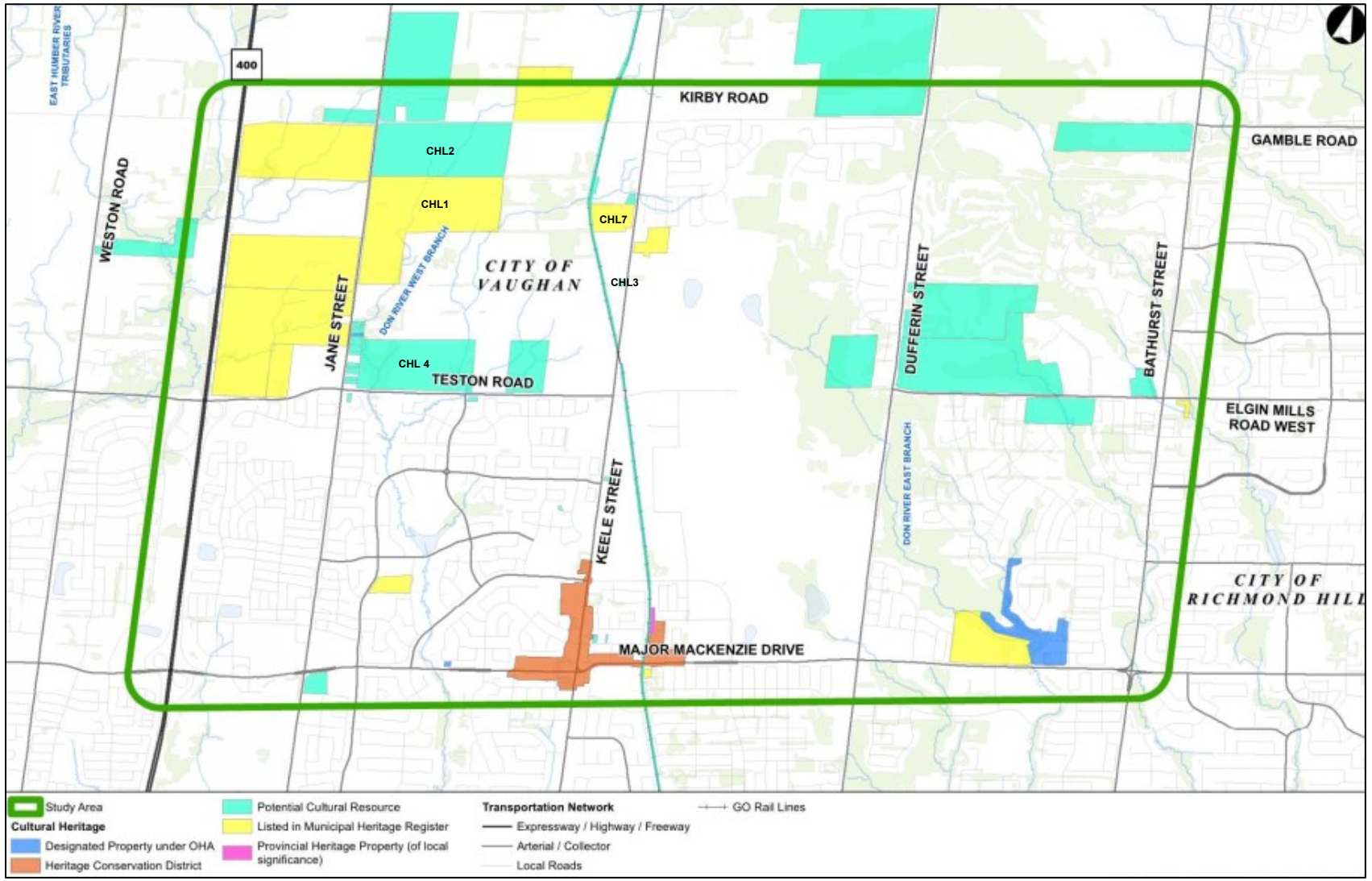
The above-noted cultural heritage landscapes were considered in the development of the Block 27 road network. The detailed designs prepared as part of Phase 3 were developed as to avoid impacting identified cultural heritage features within the Block 27 study area.

Figure 3-18: Block 27 Built Heritage Resources and Cultural Heritage Landscape Map



Source: CHRA Cultural Heritage Resources Mapping (ASI, April 2015)

Figure 3-19: Updated Cultural Heritage Mapping



Source: Teston Road Area Improvements IEA, Open House #1 (York Region, 2021)

3.9.2 ARCHAEOLOGY

A number of Stage 1 - 4 archaeological assessments were completed within Block 27 by the Block 27 property owners since 2010, and a Stage 1 archaeological assessment was completed in 2017 by ASI on behalf of the City of Vaughan as part of the NVNCTMP.

Based on the results of the Stage 1 archaeological assessment, Block 27 was determined to have potential for the presence of significant pre-contact or Euro-Canadian archaeological resources within the Secondary Plan Area.

Concession 4, Lot 26 is identified as having significant archaeological potential. Any alterations in this area must be preceded by further archaeological assessments to ensure the protection and retention of any documented site. The boundaries of the cemetery fronting Keele Street in Concession 4, Lot 28 and the former church property located in Concession 4, Lot 29 was also identified as an area of interest and will be evaluated through a Stage 3 Cemetery Investigation.

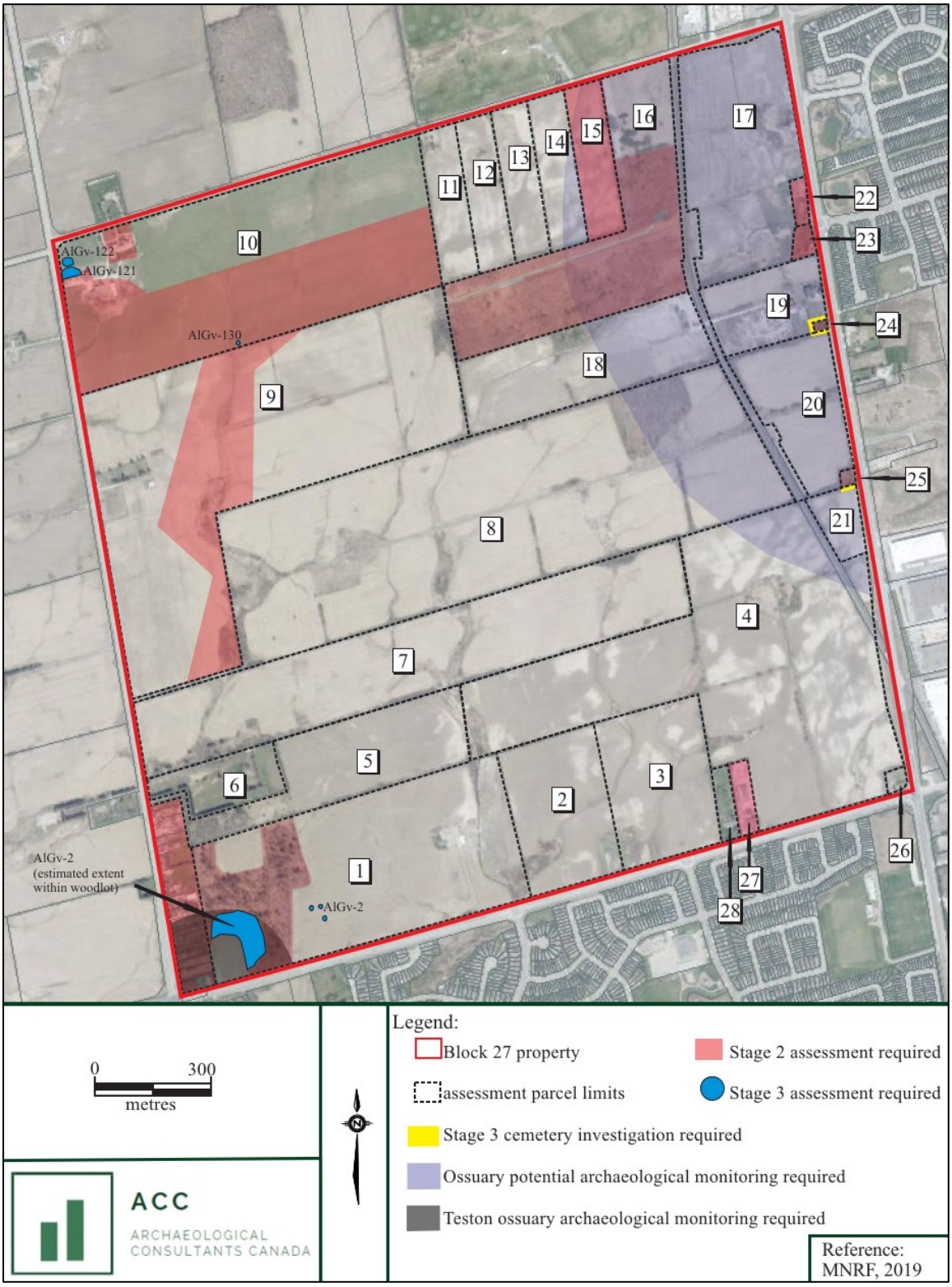
The Block 27 Landowners Group retained Archaeology Consultants of Canada (ACC) in 2021 to complete an archaeology gap analysis to identify the lands that require further archaeology assessment, and to compile the recommendations of all completed archaeological assessments (see **Appendix L**). Based on the gap analysis, approximately 85% of Block 27 has been cleared of archaeological potential, with the majority on non-participating landowner properties (**Figure 3-20**). Currently, four sites require Stage 3 assessment, including:

- AlGv-2 (The Teston Site & Potential Ossuary) (Following the Stage 3 assessment, a Stage 4 Excavation will be required. Of note, Stage 3-4 is only required for AlGv-2 should there be any risk to the site)
- AlGv-121 (Potential Euro-Canadian Homestead)
- AlGv-122 (Potential Euro-Canadian Homestead)
- AlGv-130 (Lithic scatter, unknown affiliation)

Two historic cemeteries with unknown historic borders also exist within Block 27, adjacent to Keele Street. Stage 3 Cemetery Investigations are required at both historic cemeteries, including a 10 m buffer area surrounding the cemeteries.

As part of commitments to future work , the City of Vaughan and Block 27 landowners will carry out Stage 2 archaeological assessments on previously unassessed properties with archaeological potential that are impacted by the recommended road network within Block 27 prior to the start of construction.

Figure 3-20: Outstanding Archaeological Constraints within Block 27



Source: Archaeological Review and Data Gap Analysis (Archeological Consultants Canada, December 2021)

4 REVIEW OF THE MCEA PHASES 1 AND 2

The NVNCTMP study followed Approach #1 of the Municipal Class EA guidelines (October 2000, as amended in 2007, 2011 and 2015) and established the needs and justification for proposed collector roads in Block 27, satisfying Phases 1 and 2 of the MCEA process. The resulting transportation network for Block 27 (as identified through the NVNCTMP), is presented in Schedule D of the Block 27 Secondary Plan and provides the basis for further detailed studies for the collector road system in accordance with Phases 3 and 4 of the Class EA. This section reviews and summarizes the recommendations identified in Phase 1: problems and/or opportunities statement and Phase 2: development of road network alternatives from the NVNCTMP.

4.1 PHASE 1: PROBLEMS AND/OR OPPORTUNITIES STATEMENT

Phase 1 of the MCEA process requires the identification of problems and opportunities. As part of the NVNCTMP, the review of existing conditions, feedback from technical agencies, stakeholders and the public provided the basis for the study problem and opportunity statement. The problems and/or opportunities statement established during Phase 1 of the North Vaughan New Communities is as follows:

> *The NVNCTMP study area is in need of capacity and operational improvements with regards to transportation network supply for all travel modes. The rural nature of the area, limited transit service and limited active transportation facilities have resulted in the overwhelming automobile dependency by local residents. In addition, several network gaps, sub-standard road cross-sections, and challenging vertical alignments have reduced connectivity, safety, and led to overburdened east-west and north-south continuous links such as Major Mackenzie Drive and Highway 400.*
>
> *Through the development of the New Communities and the Highway 400 North Employment Area, opportunities exist to build upon existing plans to provide better connectivity and continuity by bridging gaps, connecting to the provincial highway network, eliminating jogs, expanding transit service to the study area, improving cross-sections and slopes, and providing active transportation facilities to reduce the reliance on the automobile.*

The problems and/or opportunities statement indicates there is a lack of active transportation facilities and transit service within the study area due to the agricultural nature of the area, and geographical constraints which has resulted in overburdened existing continuous road, several network gaps, and undesirable road designs (e.g., sub-standard cross-sections, challenging vertical alignments). A review of the study area confirms the problems stated within the statement continues to be relevant within Block 27. The study area is within an agricultural setting with limited/poor pedestrian and cycling facilities along the four arterial roadways bounding Block 27. Transit service is also limited to Keele Street communities within the vicinity of the New Community Area (e.g., communities located in the south-east corner of Kirby Street/Keele Street, and south of Teston Road). The lack of active transportation facilities and transit options limit the modes of travel available to local residents and will result in a heavy reliance of automobile for transport.

The second part of the statement discusses the opportunities to improve the transportation network in the study area by improving connectivity and expanding transit service. Per the Block 27 Secondary Plan, the Block 27 New Community will be developed as a complete community focused on the Kirby GO Transit Hub and will be compact, vibrant, inclusive, healthy, sustainable and diverse, while being designed to have a net positive environmental outcome. The new community will also be linked by a connected multi-modal transportation system including off-road multi-use trails, sidewalks, walkways, and cycling facilities which

will improve connectivity for all modes of transportation within the local community, as well as improve transit service and connections to and from the Kirby GO station.

Based on the review of the Problems and/or Opportunities Statement established in the NVNCTMP, the problems and opportunities described in the statement continues to be relevant for the Block 27 Collector Roads EA.

4.2 PHASE 2: DEVELOPMENT AND EVALUATION OF ALTERNATIVE SOLUTIONS

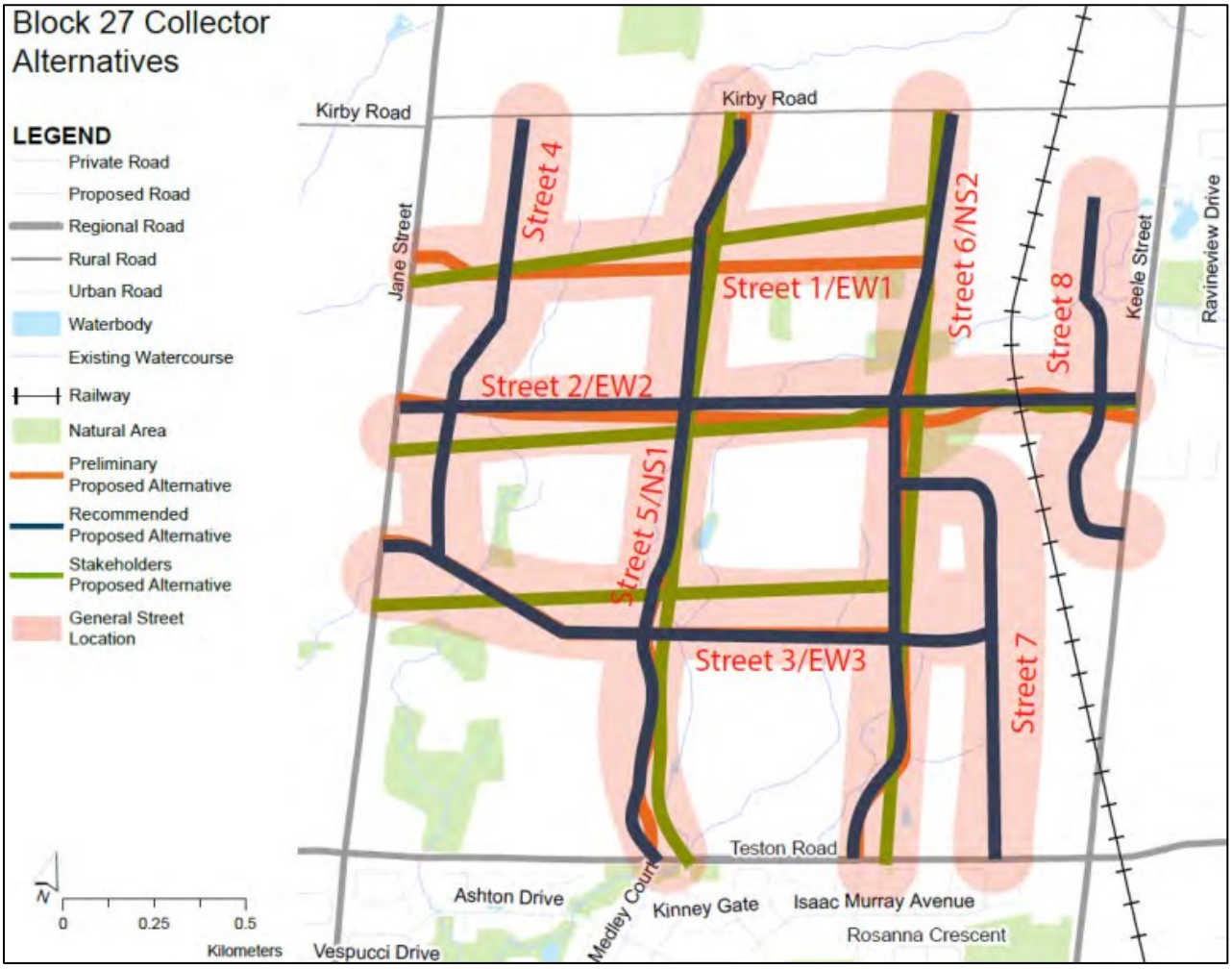
Phase 2 of the MCEA process involves the development and evaluation of alternative solutions to the established problems and/or opportunities, taking into consideration the existing environment and public and stakeholder input. As part of Phase 2, the NVNCTMP completed and documented the development of alternative network solutions and the evaluation of those alternatives to select a preferred network. For supporting documentation and details of the assessment, refer to Appendix A of the NVNCTMP.

4.2.1 TRANSPORTATION NETWORK ALTERNATIVES FROM THE NVNCTMP

Three distinct networks consisting of eight collector roads were developed and evaluated as part of the NVNCTMP to identify the preferred transportation network for Block 27 as shown in **Figure 4-1**. Because of the identified constraints to the street network, preliminary feasibility analysis identified only one east-west collector road to span the entire block from Jane Street to Keele Street. Similar constraints in the NHN system resulted in only two crossings that span the entire block from Kirby Road to Teston Road. The key differences between the transportation network alternatives are summarized in **Table 4-1**.

- **Alternative 1: Preliminary Proposed Alternative**: The first network alternative is a preliminary transportation network developed based on background information provided by the Block 27 Landowners group. This network was identified prior to the start of the Block 27 process and modified following further study and consultation with the City of Vaughan.
- **Alternative 2: Stakeholders Proposed Alternative**: The second network alternative was developed after April 2015 through a workshop with stakeholders' input.
- **Alternative 3: Recommended Proposed Alternative**: The third network alternative was developed in consideration of the 2016 York Region Transportation Master Plan update and an initial feasibility assessment in December 2015.

Figure 4-1: NVNCTMP: Block 27 Collector Road Network Alternative Solutions



Source: NVNCTMP (City of Vaughan, 2019)

Table 4-1: Comparison of Collector Roads for Block 27 Road Network Alternative Solutions

Street Name	Consistencies	Differences
Street 1 (EW1)	• Connection to Jane Street and Street 5 (NS1) • Located between Kirby Road and the TCPL • No Connection to Keele Street	• Alternative 1 connection to Jane Street is further north • Alternative 2 alignment to NS2 is further north • Alternative 3 provides connection to Street 4
Street 2 (EW2)	• Only east-west collector connecting Jane Street to Keele Street • Provides connections to Street 5 (NS1) and Street 6 (NS2)	• The alignment varies between all alternatives • Alternative 3 provides connections to Streets 4 and 8
Street 3 (EW3)	• Alternatives 1 and 3 have the same alignment	• Alternative 2 has a different alignment

Street Name	Consistencies	Differences
		• Alternative 3 provides connections to Streets 4 and 8
Street 4	• N/A	• Not identified in Alternatives 1 and 2
Street 5 (NS1)	• Provides connections to Kirby Road, Teston Road, Street 1 (EW1), Street 2 (EW2), and Street 3 (EW3)	• The alignment varies between all alternatives • Alternative 2 does not align with Cranston Park • Avenue south of Teston Road
Street 6 (NS2)	• Alternatives 1 and 3 have the same Alignment • Provides connection to Kirby Road, Teston Road, Street 1 (EW1), Street 2 (EW2), and Street 3 (EW3)	• Alternative 2 has a different alignment • Alternative 3 provides a connection to Street 7
Street 7	• N/A	• Not identified in Alternatives 1 and 2
Street 8	• N/A	• Not identified in Alternatives 1 and 2

4.2.2 EVALUATION CRITERIA FROM THE NVNCTMP

The NVNCTMP assessed the three transportation network alternatives using four main criteria, and each criterion was further divided into equally weighted sub-criteria categories aimed to provide a high level, qualitative evaluation of the three alternatives under consideration. The alternatives were evaluated against the following criteria:

- Transportation
- Natural Environment
- Socio-Economic Environment
- Cost and Implementation

Details of the criteria and the sub-criteria that were used to evaluate the three alternative solutions under consideration are provided in **Table 4-2**. It should be noted that the NVNCTMP weighted transportation network benefits more heavily given that the study seeks to determine the most optimal network solution for the broader transportation network, considering the study area as a whole. While the NVNCTMP utilized a weighted evaluation criteria approach, the Block 27 Collector Road MCEA weighted all criteria and sub-criteria equally.

Table 4-2: Evaluation Criteria from NVNCTMP

Evaluation Criteria	Weighting Factor	Sub Criteria
Transportation	●●●	• Network and system connectivity, mobility and accessibility • Active Transportation • Transit Capitalize on transit investment
Natural Environment	●●	• Natural Area • Environmentally Sensitive Areas

Evaluation Criteria	Weighting Factor	Sub Criteria
		• Habitat Areas • Surface Water, Groundwater Affects / Potential for Impacts
Socio-Economic Environment	●●	• Heritage Resources and Archaeological Features • Economic Growth • Active and Healthy Community
Cost and Implementation	●	• Capital Costs • Maintenance and Operational Costs

4.2.3 PREFERRED TRANSPORTATION NETWORK ALTERNATIVE FROM THE NVNCTMP

Based on the assessment of the alternatives, Alternative 3 was identified as the preferred solution because it provided the optimal road network for mobility, accessibility, active transportation, and transit, and supports employment areas and active and healthy communities. As identified in the NVNCTMP, Street 2, Street 5, and Street 8 were recommended to be designed as major collector roads requiring a 26 m ROW, protected for 4 travel lanes. Further consideration for potential transit vehicles connecting to the GO station was also recommended. The remaining streets identified in the preferred solution were recommended to be designed as minor collector roads requiring a 24 m ROW.

4.2.3.1 Detailing of the Preferred Transportation Network

As part of Phase 2, the preferred transportation network was refined in effort to mitigate environmental and natural heritage impacts. Based on environmental constraints and the preferred transportation network (Alternative 3), the following recommendations were considered and documented within the NVNCTMP:

- Realignment of Streets 1 and 2 to avoid the woodland in the east
- Realignment of the Street 6 connection between Streets 1 and 2 to avoid a woodland and significant wildlife habitat
- Realignment of Street 6 south of Street 2 to avoid a woodland and significant wildlife habitat
- Realignment of Street 3 to connect further north at Jane Street to avoid the crossings of watercourses
- Realignment of the Street 5 connection to Cranston Park Avenue
- Realignment of Street 6 to avoid crossing of seasonal environmental features

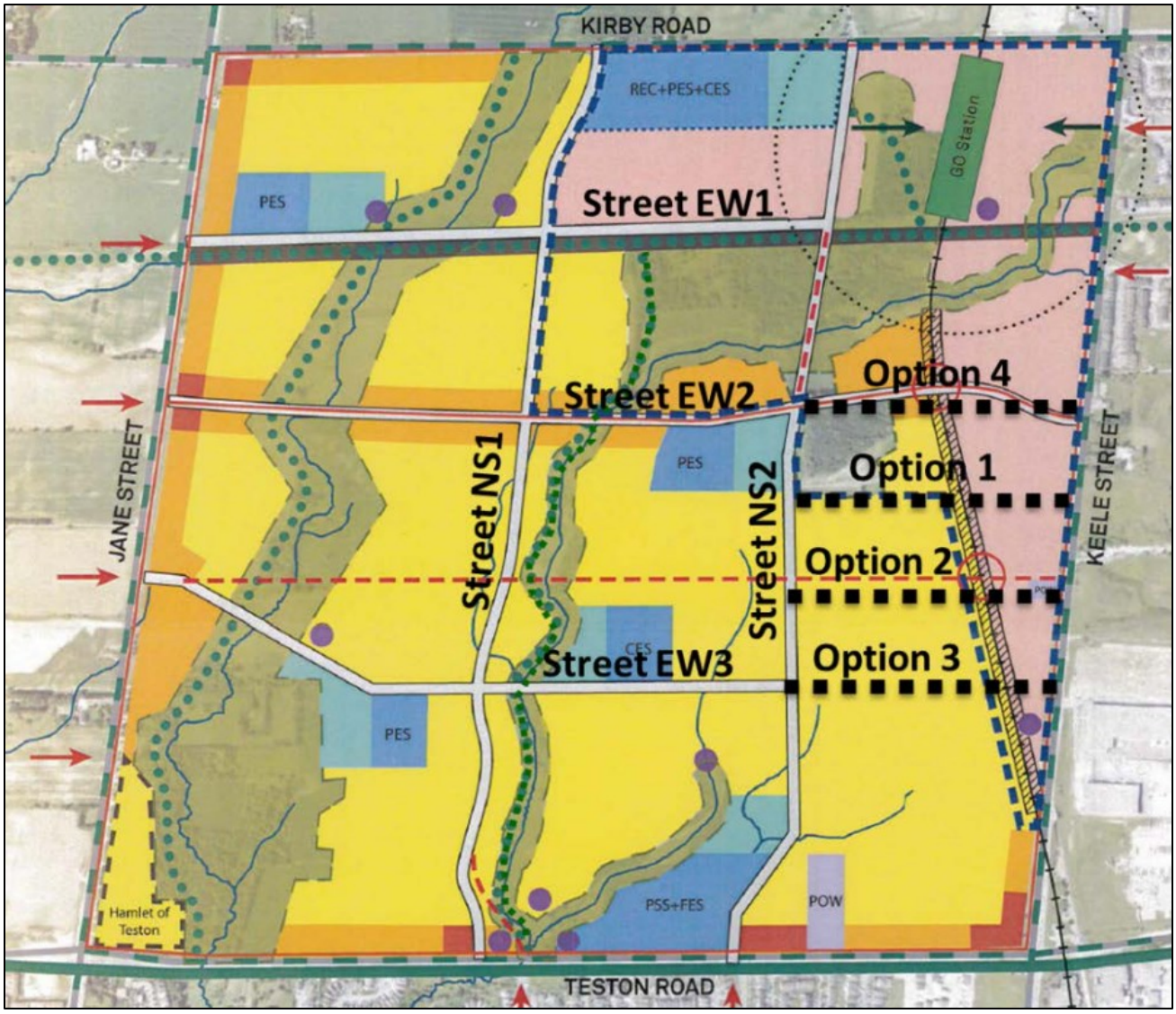
Additional analysis on specific elements of the preferred transportation network provides support for the need and justification for the identified transportation infrastructure to be carried forward for further study. Additional analysis was undertaken as part of the NVNCTMP for the Street 2 grade separation, Street 5 connection to Cranston Park Avenue at Teston Road, and for Street 6 which traverses the significant woodlot between Street 1 and Street 2 and are discussed in the following sections.

Street 2 Alignment and Grade Separation

As previously noted, preliminary feasibility analysis identifies only one east-west collector road spanning the entire block from Jane Street to Keele Street due to constraints of the street network. Similarly, the NHN constraints result in only two crossings that span the entire block from Kirby Road to Teston Road. The alternative networks identified in the following section consider these constraints to the network.

In developing the alignment of Street 2 (EW2), four location alternatives for an east-west road with grade separated rail crossing options were developed and evaluated in the NVNCTMP as shown in **Figure 4-2**.

Figure 4-2: NVNCTMP: Alternative Solutions for Street 2



Source: NVNCTMP (City of Vaughan, 2019)

- **Option 1:** Represents the approximate alignment of the Block 27 Secondary Plan Preliminary Land Use Concept. Both overpass (Option 1A) and underpass (Option 1B) alternatives were considered for Option 1.
- **Option 2:** Alignment is just south of the existing cemetery at Keele Street. Based on the topography of the area, this location was identified as potentially minimizing amount of fill/embankment

required to construct an overpass of the rail line. Only an overpass option was considered for Option 2.

- **Option 3:** Provides a direct connection to Street EW3, as well as consolidating an existing access point to office uses on the east side of Keele Street. Only an overpass option was considered for Option 3.
- **Option 4:** Represents the approximate alignment of the Block 27 Landowners Plan (Alternative 2). Both overpass (Option 4A) and underpass (Option 1B) alternatives were considered for Option 4 and an added alternative for an overpass at grade for 80 m west of Keele Street (Option 1C).

Each of the options were evaluated against the following criteria: structure/cut-fill length, maximum grade, and grade at Keele Street. Based on the evaluation, Option 4B (Underpass) was selected as the preferred alternative for Street 2 because it provides an optimal design that appears to minimize cut/fill length (quantity should be assessed through further study) and maximum grade. It was recommended that Option 4B be carried forward to provide east-west connectivity to the lands east of the railway tracks and Keele Street, subject to further study.

Street 5 Connection to Cranston Park Avenue

A road connection between Street 5 and Cranston Park Avenue was considered as part of the NVNCTMP and a number of benefits were identified for the connection:

- Connecting the existing neighbourhood south of Teston Road with the new Block 27 neighbourhood;
- Consolidating access points on Teston Road and improving traffic progression on the Regional Road;
- Extending existing transit service from Cranston Park Avenue into Block 27 and potentially feeding into the planned transit hub of Kirby GO Station; and
- Provide trail connection for the existing Bartley Smith Greenway Trail system, south of Teston Road, to extend into Block 27 and possibly connect to the proposed TransCanada Pipeline (TCPL) Trail system.

However, this connection poses a challenge due to the existing “Tributary A” culvert located directly across from Cranston Park Avenue. Preliminary assessment shows the issue may be addressed by diverting the watercourse.

Taking into consideration the potential environmental sensitivities and other possible changes, the NVNCTMP recommended that the alignment and connection of Street 5 with Cranston Park Avenue would be subject to a completion of an Environmental Assessment study.

Street 6 Crossing of the Natural Heritage Network

Street 6 traverses an environmentally significant area, which, based on field observations and data gathered, is part of a continuous system of terrestrial animal habitat. Although Street 6 crossing the NHN is included in the preferred collector network, the significant crossing across terrestrial wildlife habitat warrants a more detailed analysis and evaluation.

Two options were developed and evaluated to assess the impact on internal traffic for Street 6:

- Option 1: With the proposed Street 6 connection crossing the NHN
- Option 2: Without the Street 6 connection crossing the NHN

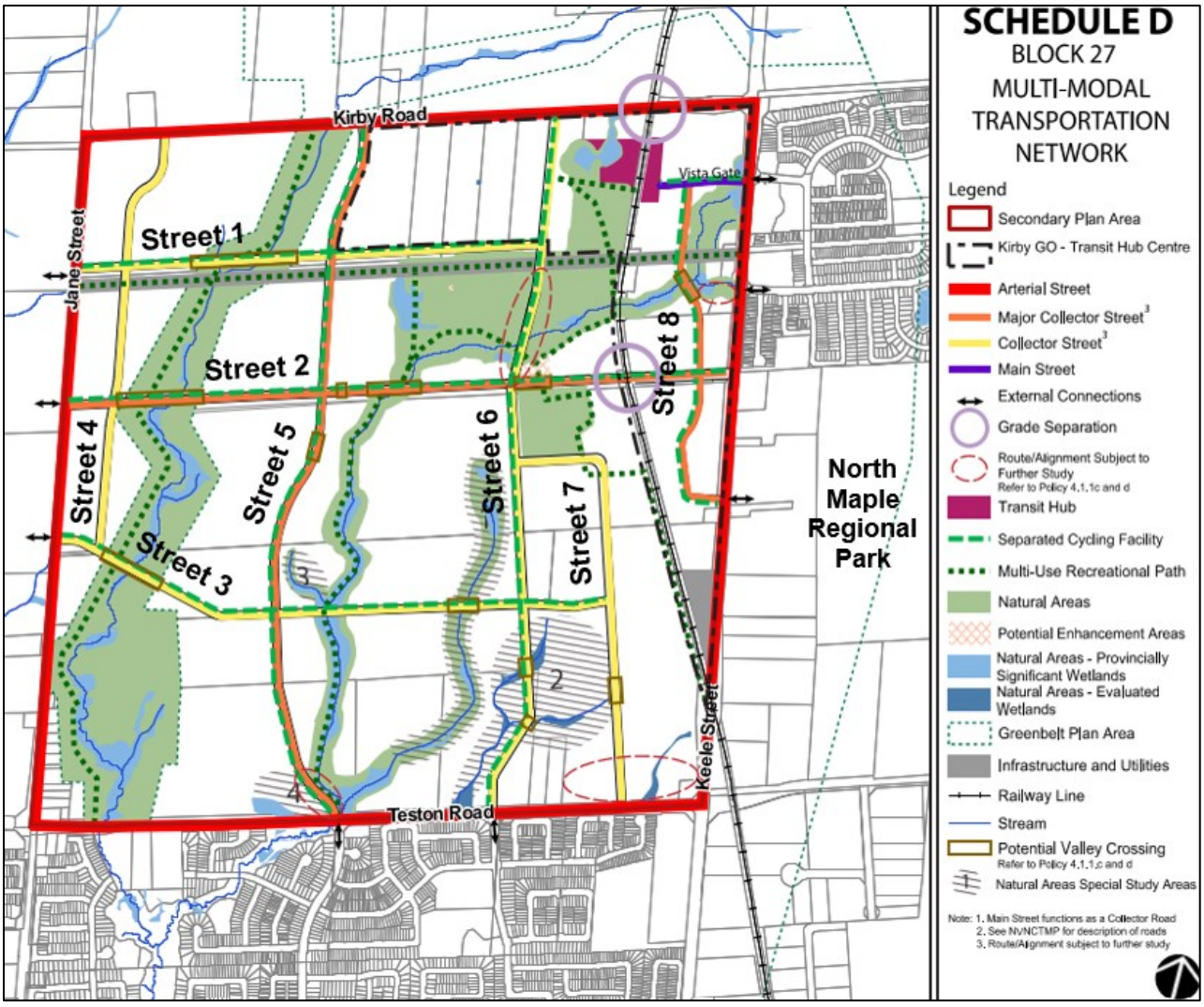
Based on the traffic projections in the background of the plots, there does not *appear* to be any significant differences with respect to traffic capacity internal to the block. However, with traffic on Street 5 approaching capacity without the Street 6 connection, it was identified that the City may need to implement the ultimate 4-lane cross-section for Street 5 in the short-term.

The NVNCTMP recognizes there are potential significant impacts to the natural heritage network and recommended that the design of Street 6 through the environmental area be modified to be context sensitive in the environmental area to minimize impacts.

4.2.3.1 Final Preferred Transportation Network (NVNCTMP)

Based on the evaluation of the three transportation network alternatives and additional analyses conducted for Street 2, Street 5, and Street 6, the NVNCTMP identified the final transportation network for Block 27 as illustrated in **Figure 4-3**. This transportation network was included within the Block 27 Secondary Plan as Schedule D.

Figure 4-3: NVNCTMP and Block 27 Secondary Plan Recommended Transportation Network



Source: Block 27 Secondary Plan (City of Vaughan, 2018)

5 DEVELOPMENT OF ALTERNATIVE DESIGN CONCEPTS

Phase 3 of the MCEA process involves the identification and evaluation of alternative design concepts to identify the preferred solution. As part of this Block 27 MCEA, alternative road alignments and cross-sections for the eight collector roads, consisting of three major collectors and five minor collectors were developed based on the NVNCTMP and Block 27 Secondary Plan recommended road network. Each alternative alignment was evaluated to document the environmental impacts, identify appropriate mitigation measures, and determine a preferred solution. The following sections discuss the development of alternative road alignments.

5.1 DEVELOPMENT OF ALTERNATIVE ROAD ALIGNMENTS

As previously noted, the NVNCTMP and Block 27 Secondary Plan recommended the transportation network solution for Block 27 (see **Figure 4-3**). As part of Phase 3 of this Class EA, alternative road alignments for each of the eight collector roads were developed based on the preferred transportation network identified in the NVNCTMP and Block 27 Secondary Plan. These alternative alignments were proposed for evaluation to potentially reduce environmental impacts identified through field investigations and enhance the overall road network.

5.1.1 DESIGN CRITERIA

After consultation with the study team and key stakeholders, the following design criteria were determined to be applicable for the Block 27 MCEA study. The main design criteria and constraints to the designs applied in the development of the alternative alignments were:

- Geometric constraints based on standards from the City (Engineering Design Criteria & Standard Drawings, 2020) and the Transportation Association of Canada (TAC) (Geometric Design Guide for Canadian Roads, 1999);
- Natural heritage features (as shown in **Figure 3-7**). Where impacts are unavoidable, the alignment should minimize impacts of the crossing on natural features and functions;
- Include wildlife passages based on appropriate openness ratios;
- Avoid impacts to existing structures where possible;
- The TransCanada Pipeline to their corridor requires that any road crossing have a minimum of 45-degree angle, and any bridge abutments be located at minimum of 7 m from the edge of the ROW;
- Maintain connectivity to existing transportation network;
- Maintain access for existing and proposed land uses; and
- Consider objective of crossing perpendicular to the valley and stream corridors, where possible.

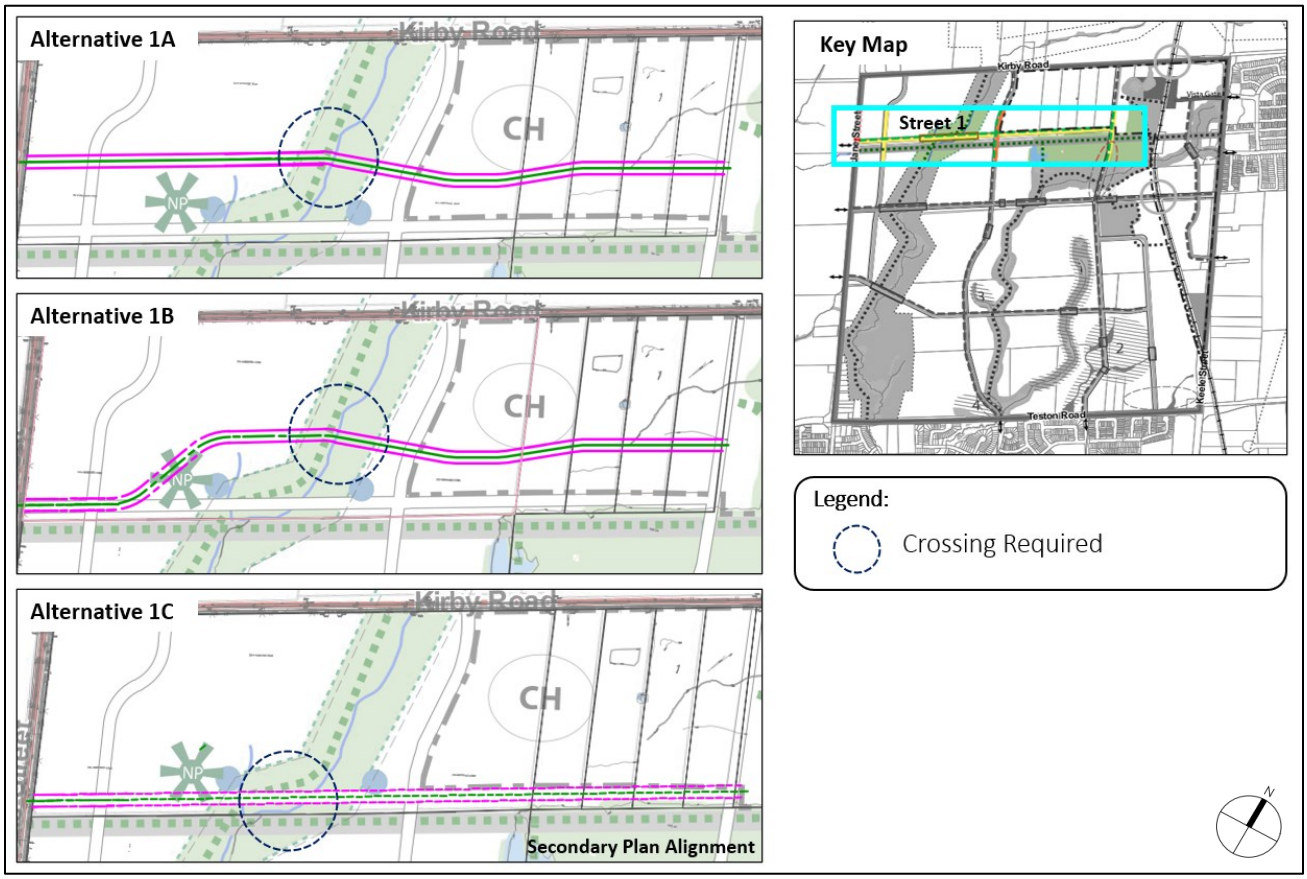
As additional road alignment alternatives were developed to refine the network identified in the NVNCTMP and Block 27 Secondary Plan, each alternative was compared against the original alignment established in principle by the Secondary Plan as a do-nothing or baseline condition, as described below.

5.1.2 STREET 1

Street 1 is an east-west minor collector road that extends from Jane Street to Street 6, with a crossing of the Greenbelt. Based on a review of the recommended road network from the NVNTMP, the original Street 1 crossing was located at a fairly wide section of the Greenbelt. Following a review of the existing environmental and constraints mapping, three alignments of Street 1 were explored to cross the Greenbelt at a narrower section and minimize impacts to the natural environment, while maintaining the intent and function of Street 1.

Alternatives 1A and 1B shift the roadway approximately 110 m north of the original NVNCTMP alignment to allow a crossing of the Greenbelt at a narrower section, at near perpendicular to the stream, and at different intersection locations along Jane Street. Alternative 1C follows the original NVNCTMP alignment as illustrated in **Figure 5-1**.

Figure 5-1: Street 1 Road Alignment Alternatives



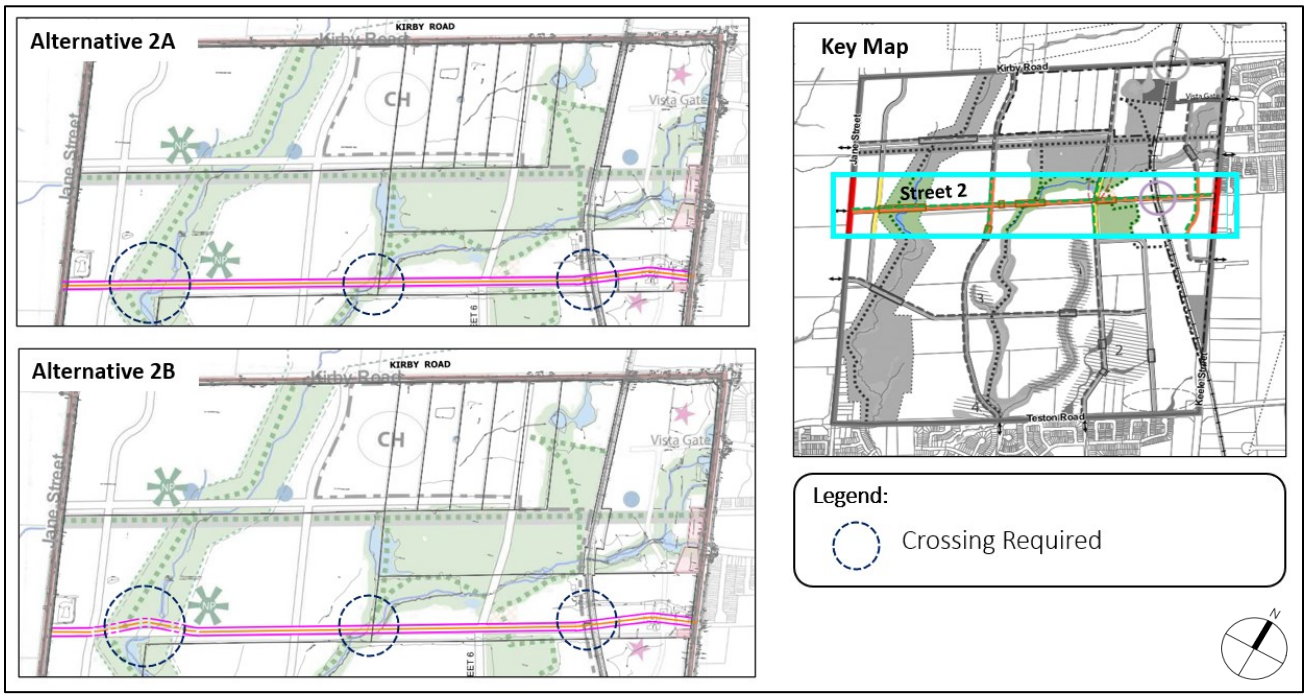
5.1.3 STREET 2

Street 2 is an east-west major collector that extends from Jane Street to Keele Street and is the only continuous east-west roadway that spans Block 27 due to railway constraints, proximity to Keele Street, and the need for grade separation at the rail corridor. While the option for no connection to Keele Street was considered as part of the NVNCTMP, it was determined that accesses at Teston Road and Kirby Road would be overburdened as a result.

Following a review of natural environmental constraints mapping, a refinement to Street 2 was proposed to minimize impacts to the Greenbelt. Furthermore, based on studies completed as part of the Block 27 MCEA, there are confirmed and potential built heritage resources and cultural heritage landscapes within Block 27, including a historical cemetery and church. As such, a refinement to Street 2 was also proposed to avoid direct impacts to confirmed built-cultural resources of significance.

The Street 2 alignment alternatives are illustrated in **Figure 5-2**. Alternative alignment 2A generally follows the original Street 2 alignment in the NVNCTMP. Alternative alignment 2B introduces a slight curve to the north at the Greenbelt crossing to move Street 2 to between two significant woodlots as opposed to running directly through the significant woodlot. Both alternatives exhibit a curve to the north, east of Keele Street to avoid direct impacts to built heritage resources and cultural heritage landscapes.

Figure 5-2: Street 2 Road Alignment Alternatives



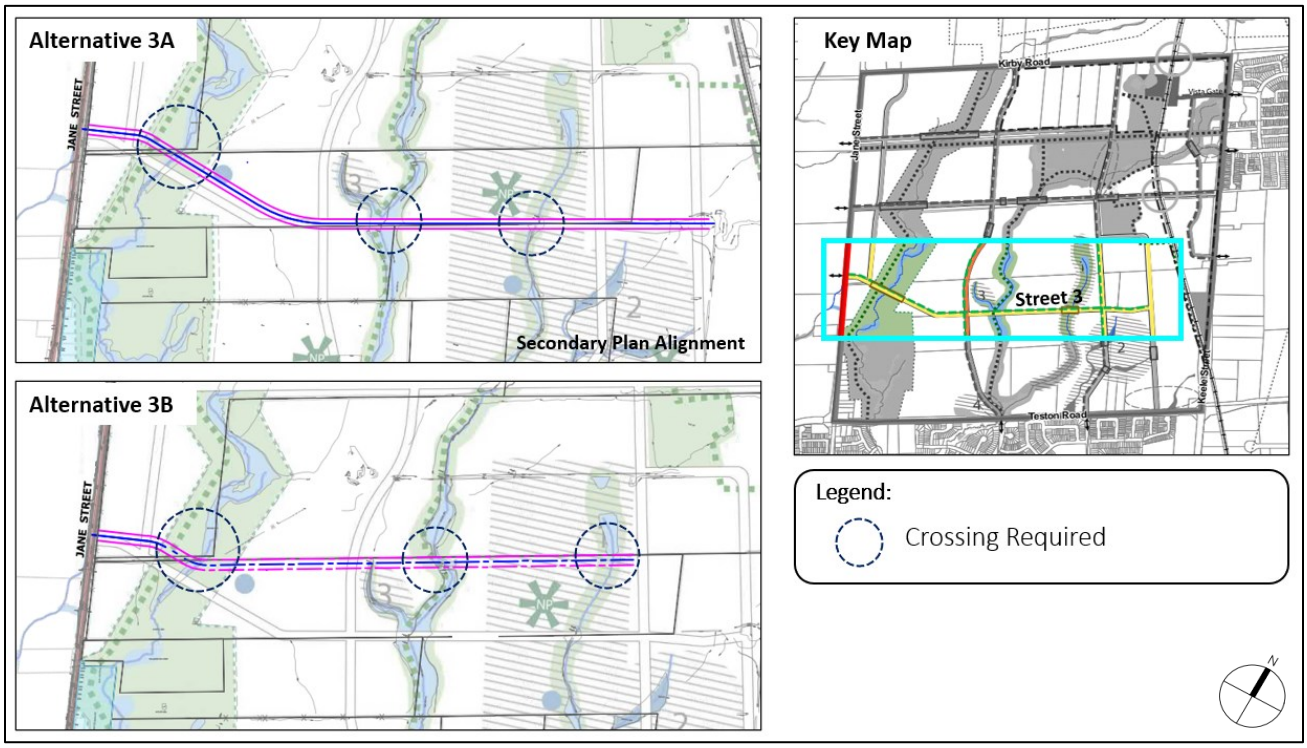
5.1.4 STREET 3 & STREET 7

Street 3 is an east-west minor collector road that extends between Jane Street to Street 7 and crosses the Greenbelt and two provincially significant wetland features. The location for Street 3 at Jane Street is fixed to allow for a direct connection to the road network planned under the Highway 400 North Employment Lands Secondary Plan and Block 34 East Block Plan. Due to Street 3's easterly connection to Street 7, the road alignment alternatives for Street 3 and Street 7 are discussed together in this section. Of note, the evaluation of the road alignment alternatives for Street 3 and Street 7 has been completed under separate evaluation tables; however, in consideration with each other.

Following a review of natural environmental constraints mapping, two road alignments were developed to minimize impacts to the Greenbelt and determine where and how Street 3 would cross the central drainage feature. The Street 3 alignment alternatives are illustrated in **Figure 5-3**. Alternative alignment 3A follows

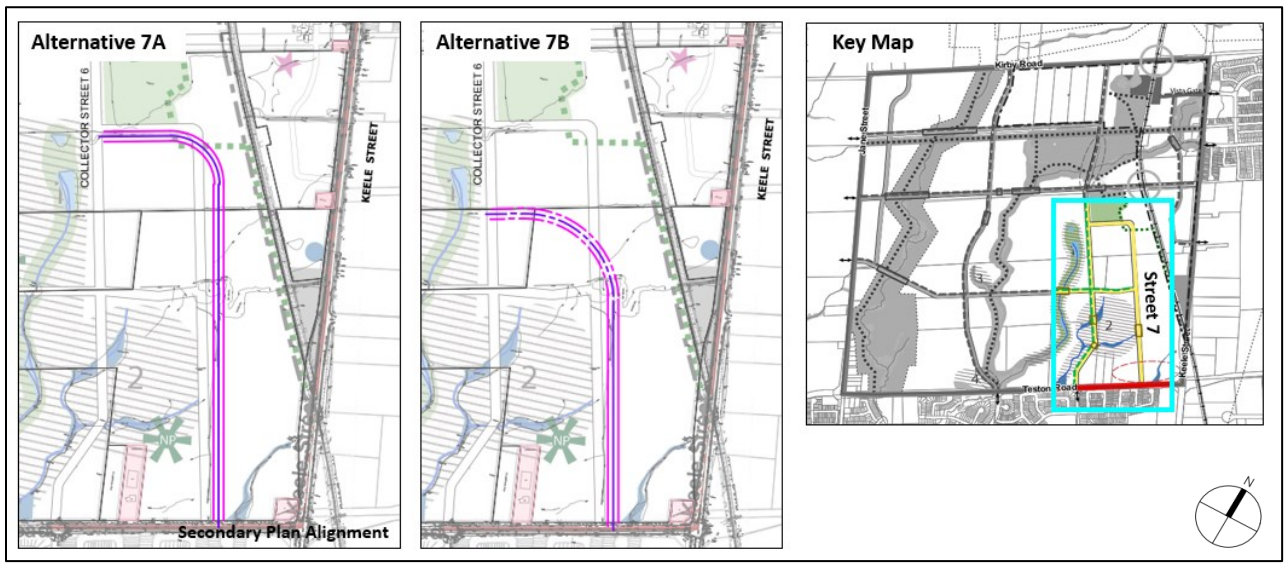
the original Street 3 alignment in the NVNCTMP. Alternative alignment 3B shifts the roadway approximately 200 m to the north to minimize impacts to the provincially significant wetlands.

Figure 5-3: Street 3 Road Alignment Alternatives



To accommodate the Street 3 alternative alignments, an additional road alignment to Street 7 (Alternative 7B) was proposed to ensure an efficient and operationally feasible connection with Street 3. Alternative alignment 7A generally follows the original Street 7 alignment in the NVNCTMP and connects with Street 6. Both Street 7 alternative alignments were refined and slightly shifted to the east to provide for gentler curves to intersect with Street 6 which provides better lotting for the Block. The Street 7 alignment alternatives are illustrated in **Figure 5-4**.

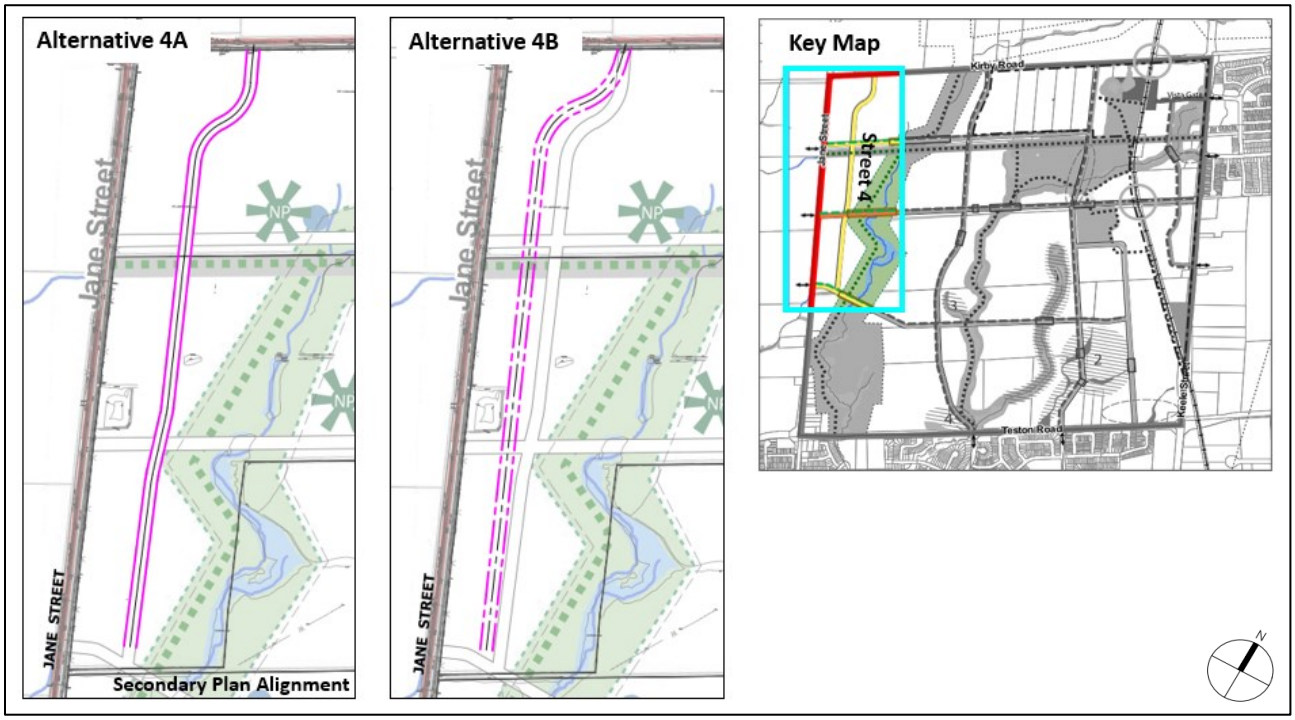
Figure 5-4: Street 7 Road Alignment Alternatives



5.1.5 STREET 4

Street 4 is a north-south road that extends from Kirby Road to Street 3. Alternative 4A follows the original Street 4 alignment in the NVNCTMP. An additional alignment of Street 4 was developed by shifting the NVNCTMP road alignment to the west to create a more efficient lotting pattern, allow for a better transition between the "Low-Rise Mixed Use" and "Low-Rise Residential" areas, and explore different intersection spacing distance from Jane Street. The Street 4 alignment alternatives are illustrated in **Figure 5-5**.

Figure 5-5: Street 4 Road Alignment Alternatives

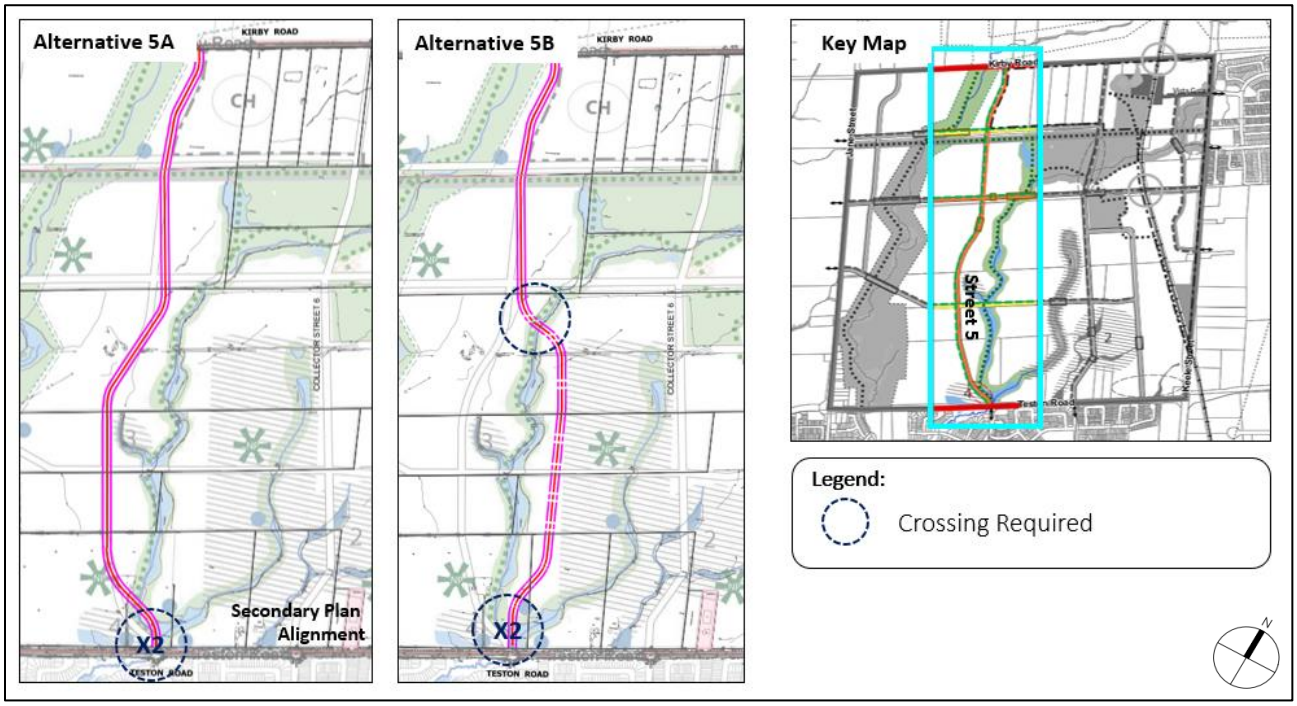


5.1.6 STREET 5

Street 5 is a north-south road spanning Block 27 and extends from Teston Road to Kirby Road. The NVNCTMP and Block 27 Secondary Plan recommended a direct connection of Street 5 to Cranston Park Avenue to provide direct connectivity to the existing community south despite the presence of a watercourse on the north side of Teston Road. The need for Street 5 is further emphasized given that there is only one other continuous north-south collector road, Street 6, proposed through the Block. As part of the NVNCTMP, the option for no connection to Cranston Park Drive was considered; however, it was determined that this would increase traffic volumes on Teston Road and reduce the efficiency of any potential transit service on Cranston Park Drive to extend north into Block 27. As such, the connection of Street 5 to Teston Road is fixed.

The NVNCTMP noted significant environmental sensitivities with providing a connection from Block 27 to Cranston Park Avenue due to the location of existing DF3. Alternative 5A follows the original Street 5 alignment in the NVNCTMP which requires a watercourse realignment. Given the fixed connection point to Cranston Park Avenue, the number of available road alignment alternatives were limited. However, an additional alignment of Street 5 was developed to assess the potential benefits of realigning Street 5 to the east of the DF3. The Street 5 alignment alternatives are illustrated in **Figure 5-6**.

Figure 5-6: Street 5 Road Alignment Alternatives



Note: X2 = two crossings required.

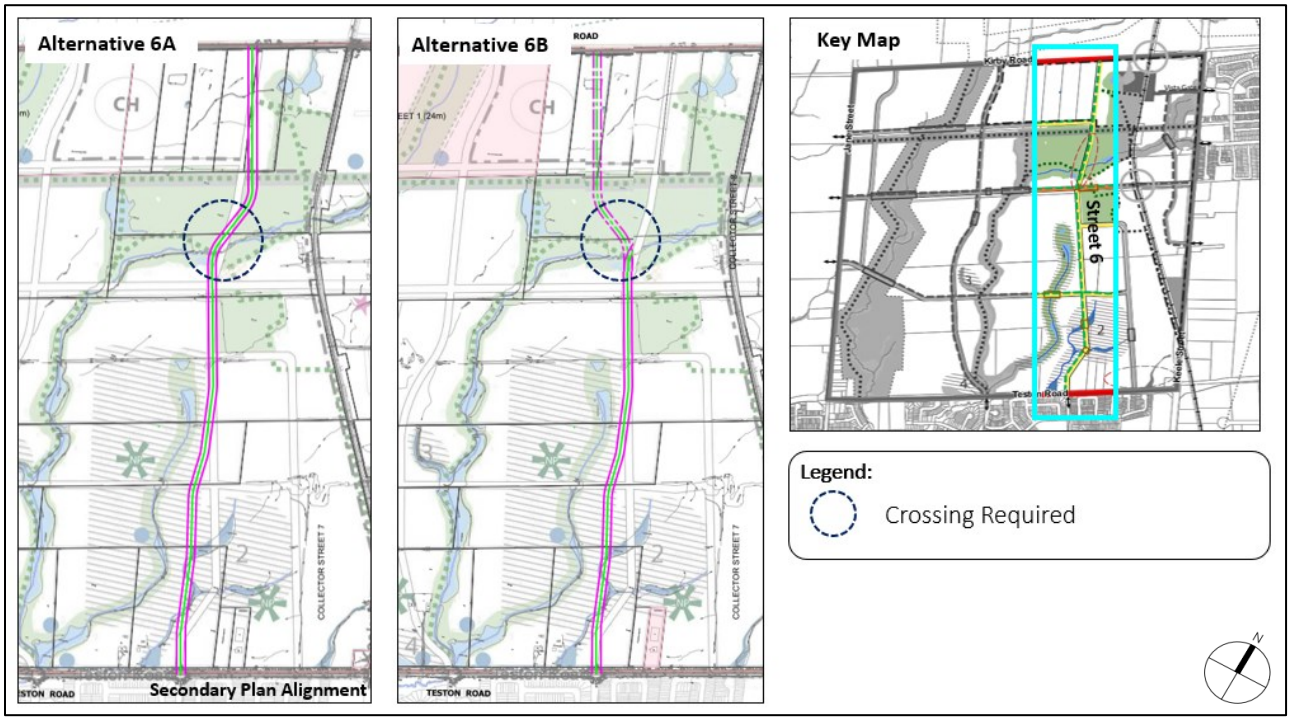
5.1.7 STREET 6

Street 6 is a north-south road spanning Block 27 that extends from Teston Road to Kirby Road. The NVNCTMP and Block 27 Secondary Plan recommended a direct connection of Street 6 to St. Joan of Arc Avenue, and as such, the southerly connection of Street 6 is fixed at Teston Road and alternatives did not consider intersection locations.

The original alignment of Street 6 between Teston Road and Street 2 was refined to minimize environmental impacts and provide better lotting for the Block (Alternative 6A). This alternative kept the original alignment curve to the east through the woodlot to connect to Kirby Road and included refinements to the alignment south of Street 2 and through the significant woodlot north of Street 2. An additional alignment of Street 6 was developed to assess the potential environmental benefits of realigning the roadway to the west (Alternative 6B) and to explore different intersection locations along Kirby Road. The Street 6 alignment alternatives are illustrated in **Figure 5-7**.

Both road alignment alternatives impact the northeast significant woodland in Block 27 which is also Eastern Wood Pewee habitat, a special concern species-at-risk (SAR). Following receiving comments from external agencies (i.e., TRCA, MNR), and Indigenous Communities with concerns with the proposed impacts to the significant woodlot north of Street 2, the Project Team further explored the need for the Street 6 road connection through the woodlot and potential mitigation measures. To minimize impacts to the significant woodlot, a further evaluation was completed for the section through the woodlot (i.e., the segment north of Street 2 and south of Street 1). A cross-section with a reduced right-of-way width was developed and evaluated against an alternative which replaces the proposed road with a multi-use trail. This secondary set of evaluations is discussed in **Section 7.2.3.1**.

Figure 5-7: Street 6 Road Alignment Alternatives



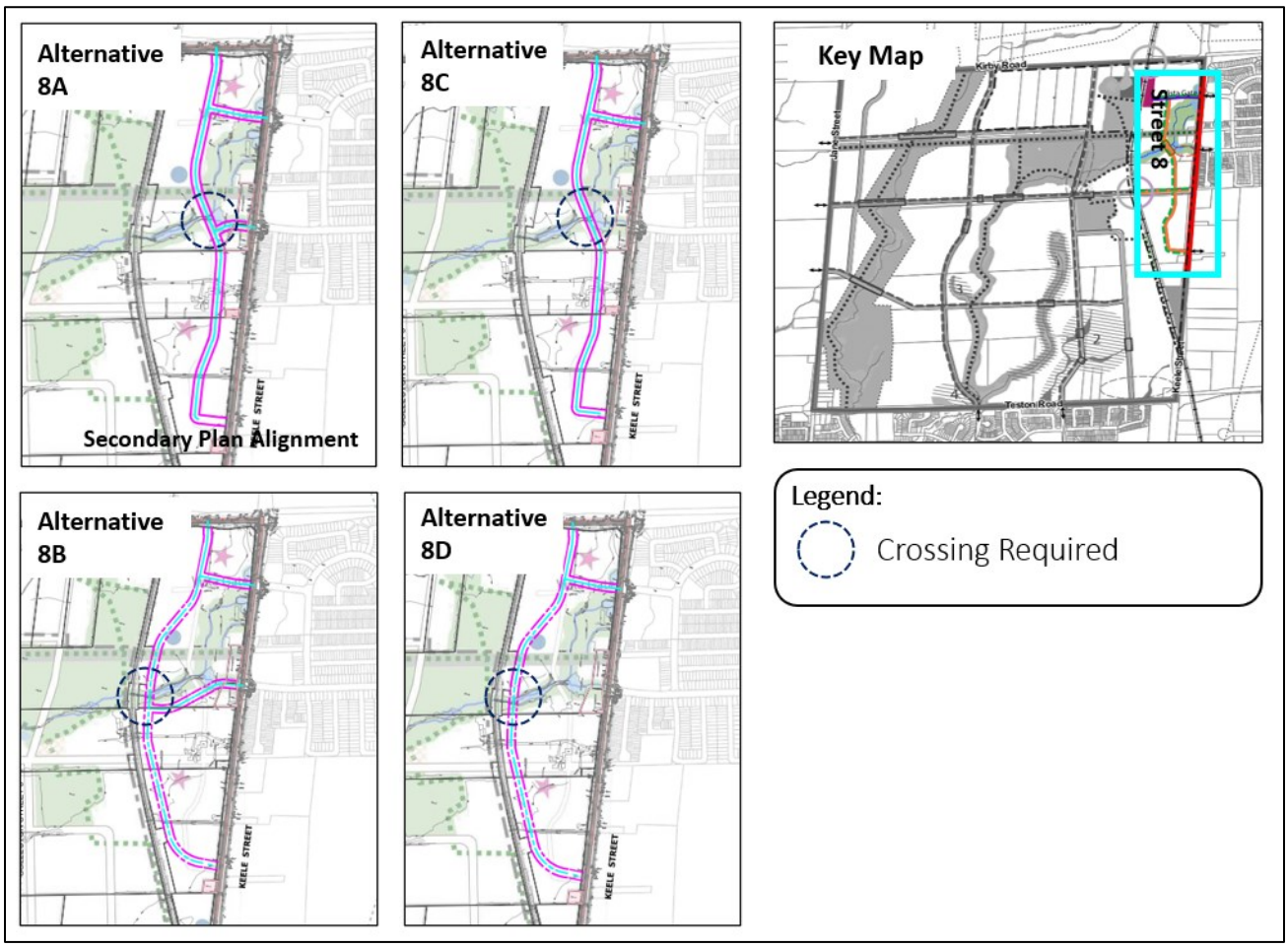
5.1.8 STREET 8

Street 8 is a north-south road serving the local precinct, mid-rise area, and the future Kirby GO Station, providing connectivity through Block 27 between the future Kirby GO Station and the North Maple Regional Park on the east side of Keele Street.

Based on the alignment recommendations of Street 2 and 8 within the NVNCTMP and Block 27 Secondary Plan, the recommended underpass of Street 2 with the rail corridor would result in Street 8 crossing Street 2 at a point where the slope is approximately 6.7%. This would result in a significant cross-fall for Street 8 given that the typical cross-fall within an intersection is kept under 2% but can go as high as 4% if required.

To address grading concerns, four alternative alignments for Street 8 were developed which included a number of alternatives related to the location of the road in relation to the rail corridor and potential additional connections to Keele Street. The Street 8 alignment alternatives are illustrated in **Figure 5-8**.

Figure 5-8: Street 8 Road Alignment Alternatives



6 EVALUATION AND SELECTION OF PREFERRED ALIGNMENTS

Based on the review of background studies completed for the NVNCTMP, Block 27 Secondary Plan, technical studies as part of the MESP, and discussions with landowners and other stakeholders (including municipal and provincial agencies, Indigenous and First Nations communities, and the public), a comparison of alternatives for each of the eight collector roads has been undertaken.

6.1 EVALUATION CRITERIA

To identify the preferred alternative for each of the eight collector roads, a series of evaluation criteria were developed based on the following broad categories:

- Transportation & Technical Considerations
- Natural Environment
- Socio-Economic Environment
- Cultural Environment
- Cost and Constructability

The evaluation criteria were developed considering the requirements of the MCEA planning and design process, existing background data review, experience with similar environmental assessments, and the overall professional experience of the study team. In addition, the criteria built upon the main categories that were considered in the NVNCTMP to ensure consistency with the previous planning work completed. The five categories of the evaluation criteria, detailed in the **Table 6-1**, were chosen to assist with the differentiation of the benefits and impacts of each of the alternative alignments being evaluated. For each of these criteria, detailed quantitative and qualitative measures were established depending on the nature of the specific criterion that could be reviewed for each option.

Table 6-1: Description of Categories of Evaluation Criteria

Evaluation Criteria	Details on Considerations	
Transportation & Technical Considerations	Traffic Network	• Road safety • Provides necessary road capacity for growth • Compliance with design standards • Community connectivity within Block 27 • Intersection connectivity with neighbouring Blocks and adjacent neighbourhoods • Foundation for designing safe, functional, and well-connected roadways that provide multiple mode choices
	Active Transportation	• Enhances public realm • Well-connected roadways that support active transportation • Provides multiple modes of transportation choices • Connectivity and accessibility to off-road trail network
	Transit	• Supports provision of transit (e.g., busses) • Provides well-connected roadways for all modes of transportation to and from the future Kirby GO transit hub

Evaluation Criteria	Details on Considerations
Natural Environment	• Consolidated data guided roadway alignment locations to minimize natural environmental impacts (e.g., fish and fish habitat, provincially significant wetlands (PSWs) or valley areas, Significant Wildlife Habitat, Areas of Natural and Scientific Interest (ANSI), wildlife, species at risk, wildlife linkages), and determine where there are opportunities for mitigation measures • Data sources: field research (where permission is granted), aerial photographs, secondary sources, and input from environmental agencies (e.g., TRCA, MNR, and MECP)
Socio-Economic Environment	• Property requirements, policy compliance, aesthetics (including existing and proposed land uses), and potential noise and air quality impacts • Data sources: Largely based on examining current municipal and provincial land use policy and plans, urban design policy, studies and reports completed as part of the NVNCTMP and Block 27 Secondary Plan, City of Vaughan Official Plan, and Greenbelt Plan, in addition to reviewing noise and air quality impact assessments
Cultural Environment	• Built heritage resources, cultural heritage landscape, and areas with potential for archaeological resources requiring additional assessment • Data sources: NVNCTMP, archaeological assessments completed by LOG, Cultural Heritage Resources Assessment (ASI, 2015)
Cost & Constructability	• Engineering feasibility, construction costs, capital costs, property acquisition, and operation and maintenance costs • Focused on determining if the implementation of alternatives would be financially feasible

A list and description of the selected evaluation criteria and respective measure for each category are provided in **Table 6-2**.

Table 6-2: Description of Evaluation Criteria and Measures

Evaluation Criteria		Description of the Criterion	Measure of Criterion
Transportation	Road Safety	Priority of road safety (pedestrians, cyclist and motor vehicle)	Does the alternative achieve/provide complete street principles, consider pedestrian/cyclist safety, and Vision Zero objectives considering all ages and abilities?
	Transit Serviceability	Ability to accommodate future transit infrastructure	Does the alternative facilitate transit services, including alternative adaptable options for changing options in transit service provision, such as automated vehicles or mobility-as-a-service?
	Potential to Support Active Transportation Modes	Ability to accommodate active transportation facilities	Does the alternative provide sufficient space to accommodate active transportation facilities? Are there opportunities to include enhanced safety features (e.g., separated, wider clearways) and comfortable for all users (e.g., slopes)
	Road Capacity	Ability to accommodate expected traffic needs	Does the alternative provide sufficient road capacity for the projected traffic needs?

Evaluation Criteria		Description of the Criterion	Measure of Criterion
		within acceptable levels of service	
	Design Standard Compliance	Ability to meet design standard (City and Regional Standards)	Does the alternative comply with City and Regional design standards? Does the alternative meet AODA standards? Does the alternative maintain the flexibility (for future implementation and adjacent studies) to accommodate future designs (e.g., Kirby GO, Kirby Road EA), emerging technologies and climate change initiatives?
	Community Connectivity	Ability to provide infrastructure needed for all users to connect to all desired areas within the community	Does the alternative provide enhanced connections to major destinations for all modes? Does the alternative contribute to flexibility of the network to allow for better access/service? Does the alternative align with fine-grained network of streets (local, collector, and arterial)?
	Develop/ Promote High Quality and Sustainable Public Realm	Ability to adequately provide space for active transportation users	Does the alternative provide for safe and continuous active transportation (walk, cycling) routes? Does the alternative provide opportunities for place-making or creating unique opportunities? Does this alternative allow for streetscape / street furniture to enhance user experience? Does the alternative support accessible network for all ages and abilities?
Natural Environment	Fish/Fish Habitat	Effects on and avoidance of identified fish habitat	Does the alternative have impact to fish or fish habitat? Are there mitigation opportunities to minimize the level of impact?
	Terrestrial vegetation and wildlife habitat	Effects on terrestrial vegetation and wildlife habitat	Does the alternative have impact on terrestrial vegetation and wildlife habitat? Are there mitigation opportunities to minimize the level of impact?
	Significant Woodlands	Effects on significant woodlands	Does the alternative have impacts to significant woodlots? Are there mitigation opportunities to minimize the level of impact?
	Designated natural heritage features and environmentally significant areas	Effects on designated natural heritage features and environmentally significant areas	Does the alternative have negative effects to designated natural heritage features and environmentally significant areas (e.g., ANSIs, Significant Woodland, Provincially Significant Woodland, Significant Wildlife Habitat)?

Evaluation Criteria		Description of the Criterion	Measure of Criterion
			What is the degree or level of impact to wildlife due to environmental fragmentation cause by the alternative? Are there mitigation opportunities to minimize the level of impact?
	Rare species, Species of Conservation Concern, and Species at Risk (SAR)	Effects on Rare Species, Species of Conservation Concern, Species at Risk (e.g., Endangered or Threatened), and SAR habitat	Does the alternative have impact to rare species, Species of Conservation Concern, Species at Risk (Endangered or Threatened), or their habitat? Are there mitigation opportunities to minimize the level of impact?
	Hydrogeology/ Groundwater	Effects on groundwater resources	Does the alternative have potential to affect the quality, quantity, or movement of groundwater resources? What is the potential for the alternative to have effects on the Wellhead Protection/Recharge Area? Does the alternative have potential to affect drinking water?
	Surface Water and Drainage	Effects on surface water and drainage	Does the alternative have potential to affect surface water quality and quantity? Does the alternative provide sufficient drainage?
	Floodplain	Effects on designated floodplains	How many metres of the floodplain is crossed by the alternative? Can the impacts be mitigated?
Socio-Economic Environment	Aesthetics	Adherence to urban design principles	Does the alternative encourage aesthetic and urban design principles?
	Policy Compliance	Conformity with Relevant Planning and Design Policy & Guidelines	Does the alternative meet the Province, City and Regional policy objectives?
	Existing and Proposed Land Use	Ability to accommodate existing and proposed future development	Does the alternative properly service existing and proposed land uses? What are the impacts to existing agricultural lands; especially those located in the Greenbelt?
	Noise Impact	Effect on noise and vibration sensitive receptors	Are there noise impacts of the alternative? Can they be mitigated?
	Air Quality Impact	Effects on air quality	Are there significant effects on air quality?
	Climate Change	Effects on climate change	How does the alternative impact climate change and how does climate change impact the alternatives? Does the alternative consider sufficient space to allow for carbon and stormwater storage to mitigate climate change?

Evaluation Criteria		Description of the Criterion	Measure of Criterion
Cultural Environment	Impact to Built Hertiage Resources and Cultural Heritage Landscapes	Potential for impacts / disruptions to potential and designated built heritage resources and cultural heritage landscapes	Does the alternative have impact to built heritage resources or cultural heritage landscapes? Can the impacts be mitigated? Are there opportunities to frame and celebrate heritage resources?
	Archaeological Resources	Potential for impact to archaeological resources	Does the alternative impact previously undisturbed lands with archaeological potential? Does this alternative impact Indigenous treaty and treaty rights?
Cost & Constructability	Engineering Feasibility and Construction Cost	Feasibility of alternative to construct; including preliminary construction costs	Is the alternative cost effective to build? What is the cost of compensation for impacts to the natural environment? Can the alternative be phased to offset initial costs and provide infrastructure in lock step with development? Is it possible to protect for future expansion and extension?
	Existing municipal infrastructure and utilities	Potential impacts on existing utilities and municipal infrastructure	Are there potential conflicts with existing utilities or challenges in relocation (temporary or permanent)? Would the alternative have an impact on existing municipal infrastructure?
	Capital	Potential capital costs	What are the capital costs associated with the proposed alternative? (relative scale-preferred to least preferred)
	Property Acquisition	Amount and type of property required	What are the property costs associated with the proposed alternative? (relative scale-preferred to least preferred) How many private properties will be impacted or need to be acquired to support the alternative?
	Operating Cost	Estimated cost of operations	What are operating costs of the proposed alternative? (relative scale)
	Maintenance Costs	Estimated cost of maintenance	What are the maintenance costs of the proposed alternative? (relative scale) How much effort is required for maintaining and operating the alternative?

6.2 EVALUATION OF ALTERNATIVES

Alternative design concepts for each alignment were evaluated against the criteria listed in **Table 6-2**. The evaluation process consisted of a qualitative evaluation for each of the alignments under consideration. The evaluation considered feedback from all stakeholders and was completed using professional judgement and the results of various environmental and technical studies conducted as part of the environmental

assessment process. Quantitative data from the studies were also used to substantiate the evaluation rationale where appropriate.

As previously noted, on December 22, 2022 the Ministry of Natural Resources updated the Ontario Wetland Evaluation System (OWES). This update introduces new guidelines for the re-evaluation of wetlands and updates the mapping of assessed wetland boundaries. At the time of preparing this Class EA, significant wetlands and associated boundaries were identified in accordance with policies prior to the OWES update which were used to support the development, evaluation, and selection of the preferred design. Given that the updated OWES policies would remove some wetland designations and/or minimize wetland boundaries, no significant impact is anticipated on the evaluation and selection of preferred road design based on policies prior to the OWES update.

Furthermore, it should be noted that adjustments to the ultimate preferred alignments and preliminary designs may be considered in response to changes in development plans or in consideration of more detailed field investigations during detailed design or the draft plan review/approval process. **Section 10** of this ESR identifies those elements of the design that may be adjusted during detailed design or the draft plan review/approval process.

The evaluation was conducted using a 5-point scale from least supportive (○) to most supportive (●) based on an equal weighting of the evaluation criteria. A criterion which involved a quantitative value (such as cost, areas of impact to natural, property, habitats, road capacity) was assigned scores based comparatively against the other alternatives. A qualitative criterion was assigned scores based on how well it met the measures. Following the evaluation of the alternative alignments against all the criteria for a given roadway, an overall preferred alternative alignment was identified as summarized below.

6.2.1 STREET 1

Table 6-3 provides a summary of the evaluation for Street 1 alternative alignments against the developed criteria. Full detailed evaluation tables are provided in **Appendix M.**

Table 6-3: Evaluation of Street 1 Alternative Alignments

Legend: ○ Least Benefits / Most Impacts → ● Most Benefits / Least Impacts

Evaluation Criteria		Alternative 1A	Alternative 1B	Alternative 1C	Comment/Rationale
					
Transportation					
Transit Serviceability	• Supports an effective future transit route	●	◕	◑	**Alternative 1A** is preferred from a transit serviceability perspective for the following reasons: • Roadway is part of a future transit route • Adjacent land uses are conducive for higher transit ridership (e.g., more points of interest)
Supports Active Transportation	• Encourages active transportation • Considers pedestrian/cyclist safety	◕	◕	◑	**Alternatives 1A and 1B** are preferred equally from an active transportation perspective for the following reasons: • Both alignments support better surrounding land uses which encourages active transportation users to utilize the road • The curves in both alignments would encourage lower vehicular speeds which enhances pedestrian/cyclist safety
Road Capacity	• Provides sufficient road capcaity for projected traffic needs	◕	◕	◕	**Alternatives 1A-1C** are preferred equally from a road capacity perspective because all alternatives provide sufficient road capacity for projected traffic needs
Design Standard Compliance	• Compliance with City and Regional design standards • Meets accessbility standards (AODA) • Flexibility to accommodate future designs (i.e., implementation of adjacent studies) • GHG emissions	◑	◕	◕	**Alternatives 1B and 1C** are preferred equally from a design standard compliance perspective for the following reasons: • Meets recommended intersection spacing to Kirby Road (300 m) • Connects to Jane Street at NVNCTMP location to connect with road from Block 34E
Community Connectivity	• Provides enhanced connections to major destinations for all modes • Contributes to flexibility of the network to allow for better access/services to community facilities (e.g., school, hub, park) • Aligns with fine-grained network of streets (local, collector, and arterial)	◕	◑	◔	**Alternative 1A** is preferred from a community connectivity perspective for the following reasons: • Higher area of developable lands adjacent to the road which supports higher transit ridership, encourages active transportation use, and enhances community connectivity • Supports a fine-grained road network
Overall Cateogry Ranking		◕	◑	◑	**Alternative 1A** is preferred from an overall Transportation perspective for the following reasons: • Supports better land uses surrounding Street 1 (i.e., avoids undevelopable lands due to TCE pipeline) thereby supporting a better/more utilized transit route and community connections • Supports a fine-grained road network
Natural Environment					
Fish/Fish Habitat	• Potential impacts to fish or fish habitat • Level of opportunity to mitigate/minize impact to fish or fish habitat	◑	◑	◑	**Alternatives 1A-1C** are preferred equally from a fish and fish habitat perspective because all alternatives do not negatively affect direct fish habitat. All have similar potential for negative effects on Drainage Feature 1 (DF1) that can be mitigated through appropriate crossing design
Vegetation, Wildlife, and Wildlife Habitat	• Impacts to vegetation • Impacts to wildlife and wildlife habitat • Potential impacts to wildlife due to environmental fragmentation	◔	◔	◔	**Alternatives 1A-1C** are preferred equally from a vegetation, wildlife, and wildlife habitat perspective

Evaluation Criteria		Alternative 1A	Alternative 1B	Alternative 1C	Comment/Rationale
					
	• Level of opportunity to mitigate/minize impacts to wildlife and wildlife habitat				
Designated Natural Heritage Features and Environmentally Sensitive Areas	• Impacts to Greenbelt • Impacts to Provincially Significant Wetlands (PSW) • Impacts to Significant Woodland • Impacts to Significant Wildlife Habitat (SWH) • Impacts to Greenbelt Plan Area	◑	◑	◔	**Alternatives 1A and 1B** are preferred equally from a natural heritage features and environmentally sensitive areas perspective for the following reasons: • No encroachment into woodland and PSW buffers • Smaller footprint within Greenbelt Plan area
Rare Species, Species of Conservation Concern, and Species at Risk (SAR)	• Impacts to rare species and their habitat • Impacts to Species of Conservation Concern and their habitat • Impact to Endangered or Threatened Species and their habitat	◑	◑	◕	**Alternative 1C** is preferred from a rare species, species of conservation concern, and endangered or threatened species perspective for the following reasons: • Lesser fragmentation on regulated SAR habitat
Overall Category Ranking		◑	◑	◔	**Alternatives 1A and 1B** are preferred equally from an overall Natural Environment perspective for the following reasons: • Avoids encroachment into woodland and PSW buffers • Smaller footprint within Greenbelt Plan area (0.5 ha less)
Hydrogeology and Drainage					
Hydrogeology / Ground Water	• Potential to affect the quality of groundwater resources • Potential to affect the quantity of groundwater resources • Potential to affect the movement of groundwater resources • Potential to affect Wellhead Protection/Recharge Area • Potential to affect drinking water	◑	◑	◑	**Alternatives 1A-1C** are preferred equally from a hydrogeology/ground water perspective because no significant impacts are anticipated for any of the alternatives and there is no preferred option
Surface Water and Drainage	• Potential to affect surface water quality and quantity • Provides sufficient drainage and treatment	◕	◑	◑	**Alternative 1A and 1B** are preferred from a subface water and drainage perspective for the following reasons: • The least impact on the quality and quantity of run-off
Floodplain	• Effects on designated floodplains (i.e., amount of floodplain crossed (metres)	◑	◑	○	**Alternatives 1A and 1B** are preferred equally from a floodplain perspective because the length of floodplain crossing is the same and no significant impact anticipated with appropriate sizing of culverts
Overall Category Ranking		◑	◑	◔	**Alternatives 1A and 1B** are preferred equally from an overall Hydrogeology/Drainage perspective for the following reasons: • Both alternatives have similar road lengths and therefore have similar impact on surface water quality and quantity of run-off • Requires a shorter floodplain crossing
Socio-Economic Environment					
Land Use Policy Compliance	• Conformity with provincial, regional, and municipal land use policy objectives	◔	◕	◔	**Alternative 1B** is preferred from a policy compliance perspective for the following reasons: • It allows for an efficient development pattern • It optimizes land in the urban area • It reduces its footprint in the Greenbelt Area, which protects natural heritage features including the Greenbelt area • Aligns with the collector road system to Block 34E per the NVNCTMP and Block 27 Secondary Plan to promote Block connectivity

Evaluation Criteria		Alternative 1A	Alternative 1B	Alternative 1C	Comment/Rationale
					
					• Although Alternatives 1A and 1B are consistent with and conform to the applicable planning policy framework, Alternative 1B is more consistent and in conformity
Future Land Uses	• Level of service to proposed land uses				**Alternative 1A** is preferred from a future land use perspective for the following reasons: • It allows for an efficient development pattern • It optimizes land in the urban area • It reduces tis footprint in the Greenbelt Area, which protects natural heritage features including the Greenbelt area • Although Alternatives 1A and 1B are consistent with and conform to the applicable planning policy framework, Alternative 1B is more consistent and in conformity
Non-Participating Property Impacts	• Number of impacted nonparticipating properties that would need to be acquired				**Alternative 1C** is preferred from a non-participating property impacts perspective because while all alternatives will impact one (1) participating landowner, impacts associated with Alternative 1C are the least disruptive to the non-participating landowner
Noise and Air Quality Impact	• Impacts on noise and vibration sensitive receptors • Impacts on air quality				**Alternative 1C** is preferred from a noise and air quality impact perspective for the following reasons: • Further away from the residential/farm property at 29 Kirby Rd. (non-participating)
Overall Category Ranking					**Alternative 1B** is preferred from an overall Socio-Economic Environment perspective for the following reasons: • Allows for an efficient development of urban land, which is consistent with and conforms to planning policy • Crosses Greenbelt at a narrower point creating a smaller footprint within the Greenbelt Area • Connects to Jane Street at the approved NVNCTMP location
Cultural Environment					
Built Heritage Resources and Cultural Heritage Landscapes	• Impact to built heritage resources or cultural heritage landscapes • Opportunities to frame and celebrate heritage resources				**Alternatives 1A-1C** are preferred equally from a built heritage resources and cultural heritage landscapes perspective because all alternatives avoid impacts to Built Heritage Resources (BHR), but will result in a disruption to a Cultural Heritage Landscape (CHL), however the CHL will be removed as a result of the overall development
Archaeological Resources	• Impacts to previously undisturbed lands with archeological potential				**Alternatives 1A and 1B** are preferred equally from an archeological resource perspective for the following reasons: • Avoidance of Site AlGv-130, however, a stage 2 archeological assessment will be required on Parcel 10
Overall Category Ranking					**Alternatives 1A and 1B** are preferred equally from an overall Cultural Environment perspective for the following reasons: • Avoids impacts to archeological Site AlGv-130
Cost & Constructability					
Engineering Feasibility and Construction Cost	• Ease of construction • Cost effectiveness to build • Cost of compensation for impacts to the natural environment				**Alternatives 1A and 1B** are preferred equally from an engineering feasibility and construction cost perspective for the following reasons: • Both alternatives have similar road lengths and the shortest crossing • Avoids minor encroachment into woodlot and PSW VPZ buffer

Evaluation Criteria		Alternative 1A	Alternative 1B	Alternative 1C	Comment/Rationale
					
Existing Municipal Infrastructure and Utilities	• Conflict with exiting utilities or challenges in relocating infrastructure (temporary or permanent) • Impacts one existing municipal infrastructure				**Alternatives 1A-1C** are preferred equally from an existing municipal infrastructure and utilities perspective because all alternatives will require the relocation of a utility pole
Capital Cost	• Scale of capital costs (relative scale-preferred to least preferred)				**Alternatives 1A and 1B** are preferred equally from a capital cost perspective for the following reasons: • Both alternatives have similar road lengths and the shortest crossing, which would result in the lowest capital cost
Property Cost	• Scale of non-participating property costs (relative scale-preferred to least preferred)				**Alternatives 1A and 1C** are preferred equally from property acquisition perspective for the following reasons: • Requires the least land from non-participating landowner
Operating and Maintenance Costs	• Operating and mainteance costs				**Alternative 1A** is preferred from an operating and maintenance cost perspective for the following reasons: • Lowest operational and maintenance costs
Overall Category Ranking					**Alternative 1A** is preferred from an overall Cost & Constructability perspective for the following reasons: • Shortest length of road (i.e., less pavement) and crossing which would result in lowest construction, operation, and maintenance costs • Requires the least land from non-participating landowner
Overall Preference by Category		Transportation Natural Environment Hydrogeology and Drainage Cultural Environment Cost & Constructability	Natural Environment Socio-Economic Environment Hydrogeology and Drainage Cultural Environment	-	**Alternative 1A was selected as the preferred Street 1 alternative**
Overall Evaluation					

6.2.1.1 Selection of Preferred Street 1 Alternative Alignment

Based on the evaluation table above, **Alternative 1A was selected as the preferred Street 1 alignment** for the following reasons:

- Better supports land uses surrounding the collector road by avoiding undevelopable lands due to the TransCanada Pipeline, thereby supporting a more utilized transit route and furthering community connections
- Supports a fine-grained road network
- Avoids encroachment into woodland and PSW buffers
- Exhibits a smaller footprint within the Greenbelt Plan area (i.e., 0.5 ha less)
- Comparatively has lesser impact on surface water quality and quantity of run-off
- Comparatively has the shortest length of road and crossing which would result in lower construction, operation, and maintenance costs
- Requires the least land from a non-participating landowner

6.2.2 STREET 2

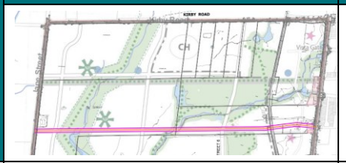
Table 6-4 provides a summary of the evaluation for Street 2 alternative alignments against the developed criteria. Full detailed evaluation tables are provided in **Appendix M.**

Table 6-4: Evaluation of Street 2 Alternative Alignments

Legend: ○ Least Benefits / Most Impacts → ● Most Benefits / Least Impacts

Evaluation Criteria		Alternative 2A	Alternative 2B	Comment/Rationale
				
Transportation				
Transit Serviceability	• Supports an effective future transit route	●	●	**Alternatives 2A and 2B** are preferred equally from a transit serviceability perspective because both alternatives are protected for four lanes which would accommodate transit
Supports Active Transportation	• Encourages active transportation • Considers pedestrian/cyclist safety	◕	◕	**Alternatives 2A and 2B** are preferred equally from an active transportation perspective because both alternatives provide safe space for active transportation users
Road Capacity	• Provides sufficient road capcaity for projected traffic needs	●	●	**Alternatives 2A and 2B** are preferred equally from a road capacity perspective because both alternatives will provide the same road capacity and will meet projected traffic needs for Block 27
Design Standard Compliance	• Compliance with City and Regional design standards • Meets accessbility standards (AODA) • Flexibility to accommodate future designs (i.e., implementation of adjacent studies) • GHG emissions	◕	◕	**Alternatives 2A and 2B** are preferred equally from a design standard compliance perspective because both alternatives meet all design standards and have the ability to accommodate future designs and emerging technologies
Community Connectivity	• Provides enhanced connections to major destinations for all modes • Contributes to flexibility of the network to allow for better access/services to community facilities (e.g., school, hub, park) • Aligns with fine-grained network of streets (local, collector, and arterial)	●	●	**Alternatives 2A and 2B** are preferred equally from a community connectivity perspective because both alternatives provide end-to-end connectivity across Block 27
Overall Cateogry Ranking		◕	◕	**Alternatives 2A and 2B** are preferred equally from an overall Transportation perspective for the following reasons: • Both alternatives meet capacity requirements and design standards • Provides the same level of community connectivity • Equally supports active transportation and transit serviceability
Natural Environment				
Fish/Fish Habitat	• Potential impacts to fish or fish habitat • Level of opportunity to mitigate/minize impact to fish or fish habitat	◑	◑	**Alternatives 2A and 2B** are preferred equally from a fish and fish habitat perspective
Vegetation, Wildlife, and Wildlife Habitat	• Impacts to vegetation • Impacts to wildlife and wildlife habitat • Potential impacts to wildlife due to environmental fragmentation • Level of opportunity to mitigate/minize impacts to wildlife and wildlife habitat	◔	◑	**Alternative 2B** is preferred from a vegetation, wildlife, and wildlife habitat perspective for the following reasons: • Minimizes impacts on wetland wildlife functions

Evaluation Criteria		Alternative 2A	Alternative 2B	Comment/Rationale
Designated Natural Heritage Features and Environmentally Sensitive Areas	• Impacts to Greenbelt • Impacts to Provincially Significant Wetlands (PSW) • Impacts to Significant Woodland • Impacts to Significant Wildlife Habitat (SWH) • Impacts to Greenbelt Plan Area			**Alternative 2B** is preferred from an environmental sensitive area perspective for the following reasons: • Minimizes encroachment into the PSW
Rare Species, Species of Conservation Concern, and Species at Risk (SAR)	• Impacts to rare species and their habitat • Impacts to Species of Conservation Concern and their habitat • Impact to Endangered or Threatened Species and their habitat			**Alternatives 2A and 2B** are preferred equally from a rare species, species of conservation concern, and endangered or threatened species perspective because no rare species or endangered and threatened species have been recorded within the footprint of both alternatives
Overall Category Ranking				**Alternative 2B** is preferred from an overall Natural Environment perspective for the following reasons: • Minimizes impacts on wetland wildlife functions • Minimizes encroachment into the PSW
Hydrogeology and Drainage				
Hydrogeology / Ground Water	• Potential to affect the quality of groundwater resources • Potential to affect the quantity of groundwater resources • Potential to affect the movement of groundwater resources • Potential to affect Wellhead Protection/Recharge Area • Potential to affect drinking water			**Alternatives 2A and 2B** are preferred equally from a hydrogeology/ground water perspective as there are no significant impacts anticipated
Surface Water and Drainage	• Potential to affect surface water quality and quantity • Provides sufficient drainage and treatment			**Alternatives 2A and 2B** are preferred equally from a subface water and drainage perspective because the impacts between the two alternatives are the same
Floodplain	• Effects on designated floodplains (i.e., amount of floodplain crossed (metres)			**Alternative 2B** is preferred from a floodplain perspective for the following reasons: • Shorter crossing • Avoids crossing and directly impacting the PSW
Overall Category Ranking				**Alternative 2B** is preferred from an overall Hydrogeology/Drainage perspective for the following reasons: • Crossing of Drainage Feature 1 is shorter than Alternative 2A • Avoids crossing the PSW (impacts wetland buffer)
Socio-Economic Environment				
Land Use Policy Compliance	• Conformity with provincial, regional, and municipal land use policy objectives			**Alternative 2B** is preferred from a policy compliance perspective for the following reasons: • It reduces its footprint in the Greenbelt Area, which minimizes impact to natural features in the Greenbelt area • Aligns with the collector road system to Block 34E per the NVNCTMP and Block 27 Secondary Plan to promote Block connectivity • Although Alternatives 2A and 2B are consistent with and conform to the applicable planning policy framework, Alternative 2B is more consistent and in conformity
Future Land Uses	• Level of service to proposed land uses			**Alternatives 2A and 2B** are preferred equally from a future land use perspective because both alternatives provide end to end east-west access across the whole development site
Non-Participating Property Impacts	• Number of impacted nonparticipating properties that would need to be acquired			**Alternatives 2A and 2B** are preferred equally from a non-participating property impacts perspective because both alternatives require the same number of impacts to non-participating property owners

Evaluation Criteria		Alternative 2A	Alternative 2B	Comment/Rationale
Noise and Air Quality Impact	• Impacts on noise and vibration sensitive receptors • Impacts on air quality			**Alternatives 2A and 2B** are preferred equally from a noise and air quality impact perspective because there are no non-participating properties areas/noise/air quality sensitive receptors within the vicinity of either alternative and there are no discernible differences between the two options
Overall Category Ranking				**Alternative 2B** is preferred from an overall Socio-Economic Environment perspective for the following reasons: • Reduces impacts to the Greenbelt, thereby conforming with the Greenbelt Plan • Although Alternatives 2A and 2B are consistent with and confirm to the applicable planning policy framework, Alternative 2B is more consistent and in conformity
Cultural Environment				
Built Heritage Resources and Cultural Heritage Landscapes	• Impact to built heritage resources or cultural heritage landscapes • Opportunities to frame and celebrate heritage resources			**Alternative 2A** is preferred from a built heritage resources and cultural heritage landscapes perspective for the following reasons: • On the west side of the roadway at Jane Street, the linear profile appears to be less disruptive to the original heritage context • Opportunities to support a commemorative heritage program
Archaeological Resources	• Impacts to previously undisturbed lands with archeological potential			**Alternatives 2A and 2B** are preferred equally from an archeological resources perspective because the scope of work from an archeological perspective is unchanged for both alignments
Overall Category Ranking				**Alternatives 2A and 2B** are preferred equally from an overall Cultural Environment perspective for the following reasons: • No built heritage resources will be lost • Scope of archeological work are the same for both alternatives
Cost & Constructability				
Engineering Feasibility and Construction Cost	• Ease of construction • Cost effectiveness to build • Cost of compensation for impacts to the natural environment			**Alternative 2B** is preferred from an engineering feasibility and construction cost perspective for the following reasons: • Shorter crossing length • Minimizes affects to the existing wetland
Existing Municipal Infrastructure and Utilities	• Conflict with exiting utilities or challenges in relocating infrastructure (temporary or permanent) • Impacts one existing municipal infrastructure			**Alternatives 2A and 2B** are preferred equally from an existing municipal infrastructure and utilities perspective because there are no significant differences between both alternatives
Capital Cost	• Scale of capital costs (relative scale-preferred to least preferred)			**Alternative 2B** is preferred from a capital cost perspective for the following reasons: • Shorter watercourse crossing
Property Cost	• Scale of non-participating property costs (relative scale-preferred to least preferred)			**Alternatives 2A and 2B** are preferred equally from property acquisition perspective because there are no significant differences between both alternatives
Operating and Maintenance Costs	• Operating and mainteance costs			**Alternative 2B** is preferred from an operating and maintenance cost perspective for the following reasons: • Shorter crossing length, therefore, lowest operating and maintenance costs
Overall Category Ranking				**Alternative 2B** is preferred from an overall Cost & Constructability perspective for the following reasons: • Shortest road and crossing lengths therefore, lowest construction, operation, and maintenance costs
Overall Preference by Category		Transportation Cultural Environment	Transportation Natural Environment Hydrogeology and Drainage Socio-Economic Environment Cultural Environment Cost & Constructability	**Alternative 2B was selected as the preferred Street 2 alternative**
Overall Evaluation				

6.2.2.1 Selection of Preferred Street 2 Alternative Alignment

Based on the evaluation table above, **Alternative 2B was selected as the preferred Street 2 alignment** for the following reasons:

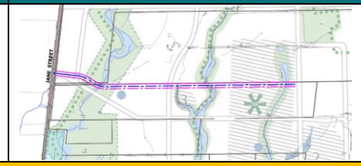
- Minimizes impacts on wetland wildlife functions
- Minimizes encroachment into the PSW
- Minimizes impacts to the Greenbelt, thereby conforming with the Greenbelt Plan
- Shorter crossing of DF1
- Consistent with and conforms to the applicable planning policy framework
- Requires a shorter watercourse crossing thereby increases the ease of construction and reduces capital, operating, and maintenance costs

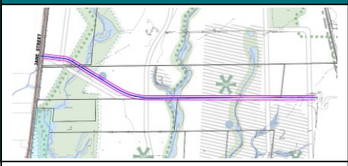
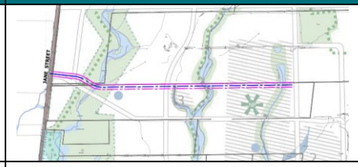
6.2.3 STREET 3

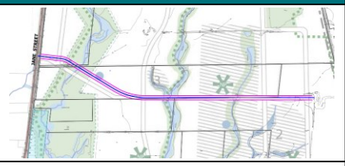
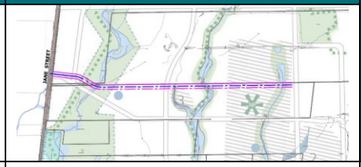
Table 6-5 provides a summary of the evaluation for Street 3 alternative alignments against the developed criteria. Full detailed evaluation tables are provided in **Appendix M**.

Table 6-5: Evaluation of Street 3 Alternative Alignments

Legend: ○ Least Benefits / Most Impacts → ◔ ◑ ◕ → ● Most Benefits / Least Impacts

Evaluation Criteria		Alternative 3A	Alternative 3B	Comment/Rationale
				
Transportation				
Transit Serviceability	• Supports an effective future transit route	●	●	**Alternatives 3A and 3B** are preferred equally from a transit serviceability perspective because both alternatives have the ability to accommodate future transit infrastructure
Supports Active Transportation	• Encourages active transportation • Considers pedestrian/cyclist safety	◑	◕	**Alternative 3B** is preferred from an active transportation perspective for the following reasons: • Traverses through less environmentally sensitive lands which increases the developable land/land uses adjacent to the road (increases points of interest) • Shortest road length
Road Capacity	• Provides sufficient road capcaity for projected traffic needs	●	●	**Alternatives 3A and 3B** are preferred equally from a road capacity perspective because both alternatives will provide the same road capacity and will meet projected traffic needs for Block 27
Design Standard Compliance	• Compliance with City and Regional design standards • Meets accessbility standards (AODA) • Flexibility to accommodate future designs (i.e., implementation of adjacent studies) • GHG emissions	◑	◑	**Alternatives 3A and 3B** are preferred equally from a design standard compliance perspective because both alternatives meet all design standards and have the ability to accommodate future designs and emerging technologies
Community Connectivity	• Provides enhanced connections to major destinations for all modes • Contributes to flexibility of the network to allow for better access/services to community facilities (e.g., school, hub, park) • Aligns with fine-grained network of streets (local, collector, and arterial)	◕	◕	**Alternatives 3A and 3B** are preferred equally from a community connectivity perspective for the following reasons: • Both alternatives would support transit, provide sufficient road capacity for future traffic, and adheres with design standards/guidelines • Alternatives 3A provides an additional intersection to Collector Street 6, however the alignment does not allow for an efficient grid-like road pattern • Alternative 3B allows for a more efficient grid-like road pattern, however, it has one less connection point along Collector Street 6 which decreases connectivity
Overall Cateogry Ranking		◑	◕	**Alternative 3B** is preferred from an overall Transportation perspective for the following reasons: • Traverses through less environmentally sensitive lands which increases the developable land/land uses adjacent to the road (increases points of interest for AT users) • Allows for a more efficient grid-like road pattern, which adheres to urban design principles
Natural Environment				
Fish/Fish Habitat	• Potential impacts to fish or fish habitat • Level of opportunity to mitigate/minize impact to fish or fish habitat	◑	◕	**Alternative 3B** is preferred from a fish and fish habitat perspective for the following reasons: • Watercourse crossing for Alternative 3B only occurs at the upstream end of DF3 fish habitat

Evaluation Criteria		Alternative 3A	Alternative 3B	Comment/Rationale
				
Vegetation, Wildlife, and Wildlife Habitat	• Impacts to vegetation • Impacts to wildlife and wildlife habitat • Potential impacts to wildlife due to environmental fragmentation • Level of opportunity to mitigate/minize impacts to wildlife and wildlife habitat			**Alternative 3B** is preferred from a vegetation, wildlife, and wildlife habitat perspective for the following reasons: • Requires 0.28ha less removal of PSW/woodland/wildlife habitat • Large PSW (3.0ha) along DF3 not fragmented
Designated Natural Heritage Features and Environmentally Sensitive Areas	• Impacts to Greenbelt • Impacts to Provincially Significant Wetlands (PSW) • Impacts to Significant Woodland • Impacts to Significant Wildlife Habitat (SWH) • Impacts to Greenbelt Plan Area			**Alternative 3B** is preferred from a designated natural heritage features and environmentally sensitive areas perspective for the following reasons: • Minimizes impacts to the PSW • Although Alternative 3B requires minor removals of significant woodland which is avoided with Alternative 3A, Alternative 3B was preferred because avoiding impacts to PSW and Greenbelt is considered more beneficial from an ecological perspective
Rare Species, Species of Conservation Concern, and Species at Risk (SAR)	• Impacts to rare species and their habitat • Impacts to Species of Conservation Concern and their habitat • Impact to Endangered or Threatened Species and their habitat			**Alternatives 3A and 3B** are preferred equally from a rare species, species of conservation concern, and endangered or threatened species perspective because there are no endangered or threatened species recorded within the footprint of either alternative
Overall Category Ranking				**Alternative 3B** is preferred from an overall Natural Environment perspective for the following reasons: • Minimizes encroachment into wetland designated PSW (requires 0.28ha less removal of PSW) • Avoids fragmentation of the large PSW (3.0ha) along DF3
Hydrogeology and Drainage				
Hydrogeology / Ground Water	• Potential to affect the quality of groundwater resources • Potential to affect the quantity of groundwater resources • Potential to affect the movement of groundwater resources • Potential to affect Wellhead Protection/Recharge Area • Potential to affect drinking water			**Alternatives 3A and 3B** are preferred equally from a hydrogeology/ground water perspective because no significant impact to water quality is anticipated with either alternative with BMPs in place for road salt management
Surface Water and Drainage	• Potential to affect surface water quality and quantity • Provides sufficient drainage and treatment			**Alternatives 3B** is preferred from a subface water and drainage perspective as it has the least impact on the quality and quantity of run-off
Floodplain	• Effects on designated floodplains (i.e., amount of floodplain crossed (metres)			**Alternatives 3A and 3B** are preferred equally from a floodplain perspective because both alternatives require three (3) crossings
Overall Category Ranking				**Alternatives 3A and 3B** are preferred equally from an overall Hydrogeology/Drainage perspective for the following reasons: • No significant impact to water quality is anticipated with either alternative with BMPs in place for road salt management • Quantity and quality control of run-off will be provided by SWM ponds for both alternatives • Same number of floodplain crossings will be required
Socio-Economic Environment				
Land Use Policy Compliance	• Conformity with provincial, regional, and municipal land use policy objectives			**Alternative 3B** is preferred from a policy compliance perspective for the following reasons: • Allows for an efficient road pattern, which is consistent with the PPS, Growth Plan, and Regional and Municipal Official Plans • Minimizes impacts to PSW and Greenbelt

Evaluation Criteria		Alternative 3A	Alternative 3B	Comment/Rationale
				
Future Land Uses	• Level of service to proposed land uses	◑	◑	**Alternatives 3A and 3B** are preferred equally from a future land use perspective because both alternatives provide access to all proposed land uses
Non-Participating Property Impacts	• Number of impacted nonparticipating properties that would need to be acquired	●	●	**Alternatives 3A and 3B** are preferred equally from a non-participating property impacts perspective because both alternatives remain on participating landowner properties
Noise and Air Quality Impact	• Impacts on noise and vibration sensitive receptors • Impacts on air quality	◑	◑	**Alternatives 3A and 3B** are preferred equally from a noise and air quality impact perspective because both alternatives are not within the vicinity of any non-participating properties
Overall Category Ranking		◑	◕	**Alternative 3B** is preferred from an overall Socio-Economic Environment perspective for the following reasons: • More consistent with the PPS, Growth Plan, and Regional and Municipal Official Plans compared to Alternative 3A • Minimizes impacts to PSW and Greenbelt and is more consistent with the Greenbelt Plan
Cultural Environment				
Built Heritage Resources and Cultural Heritage Landscapes	• Impact to built heritage resources or cultural heritage landscapes • Opportunities to frame and celebrate heritage resources	◕	◕	**Alternatives 3A and 3B** are preferred equally from a built heritage resources and cultural heritage landscapes perspective for the following reasons: • Both alternatives do not impact any other known cultural heritage landscapes • Impacts to CHL 1 were not considered because the CHL will be removed as a result of the development • Both alternatives can support a commemorative heritage program
Archaeological Resources	• Impacts to previously undisturbed lands with archeological potential	◑	◑	**Alternatives 3A and 3B** are preferred equally from an archeological resource perspective for the following reasons: • Both alignments originate in Parcel 9, and neither alignment intersect with areas that require further archeological assessment outside of Parcel 9 • No material difference between alignments • Indigenous Nations will be engaged for all fieldwork
Overall Category Ranking		◑	◑	**Alternatives 3A and 3B** are preferred equally from an overall Cultural Environment perspective for the following reasons: • No built heritage resources (BHR) are impacted with either alternative • Further Stage 2 archeological assessment will be required on Parcel 9 for both alternatives
Cost & Constructability				
Engineering Feasibility and Construction Cost	• Ease of construction • Cost effectiveness to build • Cost of compensation for impacts to the natural environment	◑	◕	**Alternative 3B** is preferred from an engineering feasibility and construction cost perspective for the following reasons: • Shorter road length, therefore lower construction costs • Less wetland encroachment, therefore less compensation is required
Existing Municipal Infrastructure and Utilities	• Conflict with exiting utilities or challenges in relocating infrastructure (temporary or permanent) • Impacts one existing municipal infrastructure	◑	◑	**Alternatives 3A and 3B** are preferred equally from an existing municipal infrastructure and utilities perspective because both alternatives require the same relocation of existing utilities along Jane Street
Capital Cost	• Scale of capital costs (relative scale-preferred to least preferred)	◑	◕	**Alternative 3B** is preferred from a capital cost perspective because of the lower cost due to shorter road length
Property Cost	• Scale of non-participating property costs (relative scale-preferred to least preferred)	●	●	**Alternatives 3A and 3B** are preferred equally from property acquisition perspective because non-participating landowner property is not required
Operating and Maintenance Costs	• Operating and mainteance costs	◑	◕	**Alternative 3B** is preferred from an operating and maintenance cost perspective as it is expected to have a lower operating and maintenance costs due to shorter road length

Evaluation Criteria	Alternative 3A	Alternative 3B	Comment/Rationale
Overall Category Ranking			**Alternative 3B** is preferred from an overall Cost & Constructability perspective for the following reasons: • Expected to have lower operating and maintenance costs due to shorter road length
Overall Preference by Category	Hydrogeology and Drainage Cultural Environment	Transportation Natural Environment Hydrogeology and Drainage Socio-Economic Environment Cultural Environment Cost & Constructability	**Alternative 3B was selected as the preferred Street 3 alternative**
Overall Evaluation			

6.2.3.1 Selection of Preferred Street 3 Alternative Alignment

Based on the evaluation table above, **Alternative 3B was selected as the preferred Street 3 alignment** for the following reasons:

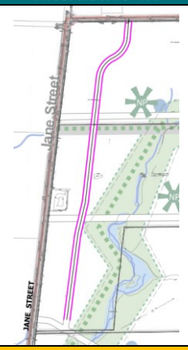
- Improves land use efficiency by allowing uniform building envelopes
- Minimize encroachment into wetland designated PSW (requires 0.28 ha less removal of PSW)
- Avoids fragmentation of the large PSW (3.0 ha) along DF3
- Shorter length of road results in less impacts on surface water quality and quantity
- More consistent with the PPS, Growth Plan, and Regional and Municipal Official Plans compared to Alternative 3A
- Further away from noise sensitive areas within the vicinity of the roadway which minimizes potential noise and air quality impacts
- Expected to have lower operating and maintenance costs due to shorter road length

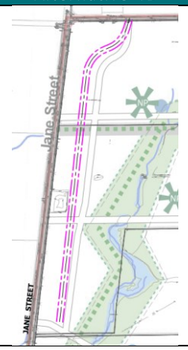
6.2.4 STREET 4

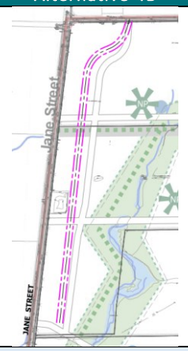
Table 6-6 provides a summary of the evaluation for Street 4 alternative alignments against the developed criteria. Full detailed evaluation tables are provided in **Appendix M.**

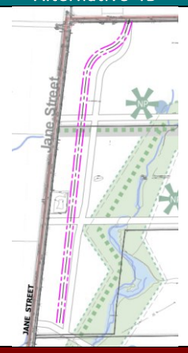
Table 6-6: Evaluation of Street 4 Alternative Alignments

Legend: ○ Least Benefits / Most Impacts → ◔ ◑ ◕ → ● Most Benefits / Least Impacts

Evaluation Criteria		Alternative 4A	Alternative 4B	Comment/Rationale
				
Transportation				
Transit Serviceability	• Supports an effective future transit route	◑	◑	**Alternatives 4A and 4B** will not be a future transit route, as such, a neutral ranking has been provided
Supports Active Transportation	• Encourages active transportation • Considers pedestrian/cyclist safety	◕	◕	**Alternative 4A and 4B** are preferred equally from an active transportation perspective for the following reasons: • Provides active transportation facilities for the proposed low-rise mixed-use and low-rise residential proposed within the vicinity of Collector Street 4
Road Capacity	• Provides sufficient road capcaity for projected traffic needs	●	◔	**Alternative 4A** is preferred from a road capacity perspective for the following reasons: • Provides sufficient road capacity and intersection spacing to avoid traffic queuing from Jane St. to Collector Streets 1, 2 and 3
Design Standard Compliance	• Compliance with City and Regional design standards • Meets accessbility standards (AODA) • Flexibility to accommodate future designs (i.e., implementation of adjacent studies) • GHG emissions	◑	◑	**Alternatives 4A and 4B** are equally preferred from a design standard compliance perspective for the following reasons: • Both alternatives do not comply with City's design standards; Alternative 4A does not meeting the City's design guideline to provide 20 m straight ROW beyond curves while Alternative 4B does not meet required intersection distances
Community Connectivity	• Provides enhanced connections to major destinations for all modes • Contributes to flexibility of the network to allow for better access/services to community facilities (e.g., school, hub, park) • Aligns with fine-grained network of streets (local, collector, and arterial)	◕	◕	**Alternatives 4A and 4B** are preferred equally from a community connectivity perspective because both alternatives provide the same connections for all modes of transportation
Overall Cateogry Ranking		◕	◑	**Alternative 4A** is preferred from an overall Transportation perspective for the following reasons: • Provides sufficient road capacity and intersection spacing to avoid traffic queuing from Jane St. to Collector Streets 1, 2 and 3
Natural Environment				
Fish/Fish Habitat	• Potential impacts to fish or fish habitat • Level of opportunity to mitigate/minize impact to fish or fish habitat	◑	◑	**Alternatives 4A and 4B** are preferred equally from a fish and fish habitat perspective because there are no fish and fish habitat within the vicinity of either Street 4 road alignments and there are no impacts

Evaluation Criteria		Alternative 4A	Alternative 4B	Comment/Rationale
				
Vegetation, Wildlife, and Wildlife Habitat	• Impacts to vegetation • Impacts to wildlife and wildlife habitat • Potential impacts to wildlife due to environmental fragmentation • Level of opportunity to mitigate/minize impacts to wildlife and wildlife habitat	◑	◑	**Alternatives 4A and 4B are** preferred equally from a vegetation, wildlife, and wildlife habitat perspective for the following reasons: • Impacts are limited to planted trees in anthropogenic areas • No major disturbance to wildlife movement anticipated due to proximity with Jane Street and absence of natural features in between Jane Street and Alternative 4B
Designated Natural Heritage Features and Environmentally Sensitive Areas	• Impacts to Greenbelt • Impacts to Provincially Significant Wetlands (PSW) • Impacts to Significant Woodland • Impacts to Significatn Wildlife Habitat (SWH) • Impacts to Greenbelt Plan Area	◑	◑	**Alternatives 4A and 4B are** preferred equally from a designated natural heritage features and environmentally sensitive areas perspective because there are no environmentally sensitive areas impacted by either alternative
Rare Species, Species of Conservation Concern, and Species at Risk (SAR)	• Impacts to rare species and their habitat • Impacts to Species of Conservation Concern and their habitat • Impact to Endangered or Threatened Species and their habitat	◑	◑	**Alternatives 4A and 4B are** preferred equally from a rare species, species of conservation concern, and endangered and threatened species perspective because there are no effects and difference between alternatives
Overall Category Ranking		◑	◑	**Alternatives 4A and 4B are** preferred equally from an overall Natural Environment perspective because there are no sensitive or protected natural environmental features impacted by either alternative
Hydrogeology and Drainage				
Hydrogeology / Ground Water	• Potential to affect the quality of groundwater resources • Potential to affect the quantity of groundwater resources • Potential to affect the movement of groundwater resources • Potential to affect Wellhead Protection/Recharge Area • Potential to affect drinking water	◑	◑	**Alternatives 4A and 4B are** preferred equally from a hydrogeology / ground water perspective because no significant impacts are anticipated for any of the alternatives
Surface Water and Drainage	• Potential to affect surface water quality and quantity • Provides sufficient drainage and treatment	◑	◑	**Alternatives 4A and 4B are** preferred equally from a subface water and drainage perspective as both the options are similar in length
Floodplain	• Effects on designated floodplains (i.e., amount of floodplain crossed (metres)	●	●	**Alternatives 4A and 4B are** preferred equally from a floodplain perspective as no floodplain encroachment is proposed in either of the options

Evaluation Criteria		Alternative 4A	Alternative 4B	Comment/Rationale
				
Overall Category Ranking				**Alternatives 4A and 4B** are preferred equally from an overall Hydrogeology / Drainage perspective for the following reasons: • No significant impacts are anticipated to quality or quantity of groundwater resources • Similar length of road between both the alternatives, therefore similar impact on surface water and drainage • No floodplain encroachment is proposed in either of the options
Socio-Economic Environment				
Land Use Policy Compliance	• Conformity with provincial, regional, and municipal land use policy objectives			**Alternative 4B** is preferred from a land use policy compliance perspective for the following reasons: • Provides road spacing which maximizes the development potential adjacent to the road which is consistent with the PPS and conforms to the Growth Plan, York Region Official Plan and Vaughan Official Plan
Future Land Uses	• Level of service to proposed land uses			**Alternatives 4A and 4B** are preferred equally from a future land use perspective as both alternatives will provide sufficient level of service to the proposed surrounding land uses.
Non-Participating Property Impacts	• Number of impacted nonparticipating properties that would need to be acquired			**Alternative 4A** is preferred from a non-participating property impact perspective because there is potential to avoid direct impacts to the existing residential and farm structures on the non-participating landowner property
Noise and Air Quality Impact	• Impacts on noise and vibration sensitive receptors • Impacts on air quality			**Alternative 4B** is preferred from a noise and air quality impact perspective because the road displaces the NSA and removes noise and air quality impacts
Overall Category Ranking				**Alternative 4B** is preferred from an overall Socio-Economic Environment perspective for the following reasons: • Allows for an efficient road pattern which optimizes the development on urban land
Cultural Environment				
Built Heritage Resources and Cultural Heritage Landscapes	• Impact to built heritage resources or cultural heritage landscapes • Opportunities to frame and celebrate heritage resources			**Alternative 4A** is preferred from a built heritage resources and cultural heritage landscapes perspective for the following reasons: • Avoid impacts to a BHR • Fewer identified impacts related to the displacement of built heritage landscapes and for CHL 1 and 2, however, CHLs are anticipated to be removed as a result of the development • Opportunities exist to support a commemorative heritage program.
Archaeological Resources	• Impacts to previously undisturbed lands with archeological potential			**Alternatives 4A and 4B** are preferred equally from an Archaeological Resources perspective for the following reasons: • Both alignments originate in Parcel 10 and neither alignment intersect with areas that require further archaeological assessment outside of parcel 10 • No material difference between alignments
Overall Category Ranking				**Alternative 4A** is preferred from an overall Cultural Environment perspective for the following reasons: • Avoid impacts to a build-heritage resource • Fewer identified impacts related to the displacement of built heritage resources and for CHL 1 and 2, however, CHLs are anticipated to be removed as a result of the development

Evaluation Criteria		Alternative 4A	Alternative 4B	Comment/Rationale
				
Cost & Constructability				
Engineering Feasibility and Construction Cost	• Ease of construction • Cost effectiveness to build • Cost of compensation for impacts to the natural environment	◑	◑	**Alternatives 4A and 4B** are preferred equally from an engineering feasibility and construction cost perspective because the road lengths are similar and there are no encroachments into sensitive natural areas
Existing Municipal Infrastructure and Utilities	• Conflict with exiting utilities or challenges in relocating infrastructure (temporary or permanent) • Impacts one existing municipal infrastructure	◑	◑	**Alternatives 4A and 4B** are preferred equally from an existing municipal infrastructure and utilities perspective because both alternatives require a TCE pipeline crossing and relocation of existing utilities along Kirby Road
Capital Cost	• Scale of capital costs (relative scale-preferred to least preferred)	◑	◑	**Alternatives 4A and 4B** are preferred equally from a capital cost perspective because capital costs are expected to same in both the alternatives
Property Cost	• Scale of non-participating property costs (relative scale-preferred to least preferred)	◕	◔	**Alternative 4A** is preferred from a property acquisition perspective because there is potential to avoid direct impacts to the existing residential and farm structures on the non-participating landowner property
Operating and Maintenance Costs	• Operating and mainteance costs	◑	◑	**Alternatives 4A and 4B** are preferred equally from an operating and maintenance costs perspective because operating and maintenance costs are expected to be the same in both alternatives.
Overall Category Ranking		◕	◑	**Alternative 4A** is preferred from an overall cost & constructability perspective for the following reasons: • Potentially avoids direct impacts to the existing residential building/structures on the non-participating landowner property
Overall Preference by Category		Transportation Natural Environment Hydrogeology and Drainage Cultural Environment Cost & Constructability	Natural Environment Hydrogeology and Drainage Socio-Economic Environment	**Alternative 4A was selected as the preferred Street 4 alternative**
Overall Evaluation		◕	◑	

6.2.4.1 Selection of Preferred Street 4 Alternative Alignment

Based on the evaluation table above, **Alternative 4A was selected as the preferred Street 4 alignment** for the following reasons:

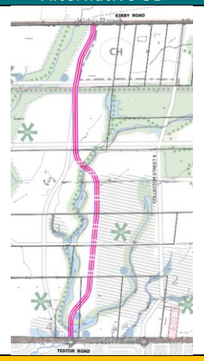
- Provides sufficient road capacity and intersection spacing to avoid traffic queueing from Jane Street to Streets 1, 2, and 3
- Avoids impacts to a built-heritage resources
- Lower costs since it potentially avoids direct impacts to the existing residential building/structures on the non-participating landowner property

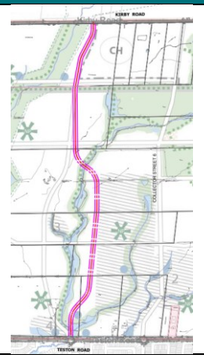
6.2.5 STREET 5

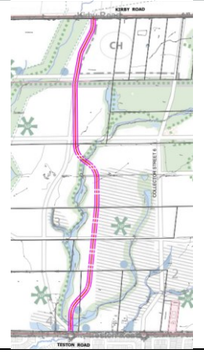
Table 6-7 provides a summary of the evaluation for Street 5 alternative alignments against the developed criteria. Full detailed evaluation tables are provided in **Appendix M.**

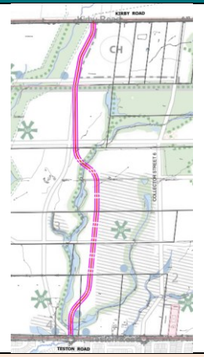
Table 6-7: Evaluation of Street 5 Alternative Alignments

Legend: ○ Least Benefits / Most Impacts → ◔ ◑ ◕ → ● Most Benefits / Least Impacts

Evaluation Criteria		Alternative 5A	Alternative 5B	Comment/Rationale
				
Transportation				
Transit Serviceability	• Support an effective future transit route	●	●	**Alternatives 5A and 5B** are preferred equally from a transit serviceability perspective because both alternatives can accommodate future transit infrastructure within the right-of-way, and the alignment supports adjacent land uses that are conducive for higher transit ridership
Supports Active Transportation	• Encourages active transportation • Considers pedestrian/cyclist safety	◕	◑	**Alternative 5A** is preferred from an active transportation perspective because it provides more evenly spaced road network (i.e., distances) between collector roads and provides a road network for AT users to access the land uses between the Greenbelt and DF-3 south of Street 2
Road Capacity	• Provide sufficient road capcaity for projected traffic needs	●	●	**Alternatives 5A and 5B** are preferred equally from a road capacity perspective because both alternatives will provide the same road capacity and will meet protected traffic needs for Block 27
Design Standard Compliance	• Compliance with City and Regional design standards • Meets accessbility standards (AODA) • Flexibility to accommodate future designs (i.e., implementation of adjacent studies) • GHG emissions	●	●	**Alternatives 5A and 5B** are preferred equally from a design standard compliance perspective because they both meet all design standards and have the ability to accommodate future designs and emerging technologies
Community Connectivity	• Provides enhanced connections to major destinations for all modes • Contributes to flexibility of the network to allow for better access/services to community facilities (e.g., school, hub, park) • Aligns with fine-grained network of streets (local, collector, and arterial)	●	◕	**Alternative 5A** is preferred for the following reasons: • Provides direct connections to two schools and a neighbourhood park • Provides better community connectivity
Overall Cateogry Ranking		●	◕	**Alternative 5A** is slightly preferred from an overall Transportation perspective for the following reasons: • Provides direct connections to two schools and a neighbourhood park • Provides better community connectivity
Natural Environment				
Fish/Fish Habitat	• Potential impacts to fish or fish habitat • Level of opportunity to mitigate/minize impact to fish or fish habitat	◑	◔	**Alternative 5A** is preferred from a fish and fish habitat perspective for the following reasons: • Has the least environmental effects • Alternative 5B would result in an additional watercourse crossing upstream of DF3

Evaluation Criteria		Alternative 5A	Alternative 5B	Comment/Rationale
				
Vegetation, Wildlife, and Wildlife Habitat	• Impacts to vegetation • Impacts to wildlife and wildlife habitat • Potential impacts to wildlife due to environmental fragmentation • Level of opportunity to mitigate/minize impacts to wildlife and wildlife habitat	◑	◔	**Alternative 5A** is preferred from a vegetation, wildlife, and wildlife habitat perspective for the following reasons: • Has less environmental effects • Alternative 5B would result in an additional crossing of DF3
Designated Natural Heritage Features and Environmentally Sensitive Areas	• Impacts to Greenbelt • Impacts to Provincially Significant Wetlands (PSW) • Impacts to Significant Woodland • Impacts to Significant Wildlife Habitat (SWH) • Impacts to Greenbelt Plan Area	◑	◑	**Alternatives 5A and 5B** are preferred equally from a designated natural heritage features and environmentally sensitive areas perspective for the following reasons: • Relatively similar impacts to PSW which would be compensated as part of realignment of DF 3 lower portion
Rare Species, Species of Conservation Concern, and Species at Risk (SAR)	• Impacts to rare species and thier habitat • Impacts to Species of Conservation Concern and their habitat • Impact to Endangered or Threatened Species and their habitat	◑	◑	**Alternatives 5A and 5B** are preferred equally from a rare species, species of conservation concern, and endangered or threatened species perspective because impacts are similar
Overall Category Ranking		◑	◔	**Alternative 5A** is preferred from an overall Natural Environment perspective for the following reasons: • Generally, has less environmental effects • Requires one less crossing of Drainage Feature DF3
Hydrogeology and Drainage				
Hydrogeology / Ground Water	• Potential to affect the quality of groundwater resources • Potential to affect the quantity of groundwater resources • Potential to affect the movement of groundwater resources • Potential to affect Wellhead Protection/Recharge Area • Potential to affect drinking water	◑	◑	**Alternatives 5A and 5B** are preferred equally from a hydrogeology/ground water perspective because no significant impacts are anticipated for any of the alternatives with appropriate BMPs measures in place
Surface Water and Drainage	• Potential to affect surface water quality and quantity • Provides sufficient drainage and treatment	◑	◑	**Alternatives 5A and 5B** are preferred equally from a surface water and drainage perspective because the road lengths for both alternatives are similar, as such, similar impact on surface water quality and quantity are anticipated

Evaluation Criteria		Alternative 5A	Alternative 5B	Comment/Rationale
				
Floodplain	• Effects on designated floodplains (i.e., amount of floodplain crossed (metres)			**Alternative 5A** is preferred from a floodplain perspective as it avoids the requirement for an additional floodplain crossing and associated impacts with the crossing
Overall Category Ranking				**Alternative 5A** is preferred from an overall Hydrogeology/Drainage perspective for the following reasons: • It avoids the requirement for an additional floodplain crossing and associated impacts with the crossing
Socio-Economic Environment				
Land Use Policy Compliance	• Conformity with provincial, regional, and municipal land use policy objectives			**Alternative 5A** is preferred from a policy compliance perspective because it allows for an efficient and well-designed road pattern that establishes good building footprints and adheres with provincial land use policies which encourages maximizing development potential
Future Land Uses	• Level of service to proposed land uses			**Alternatives 5A and 5B** are preferred equally from a non-participating property impacts perspective because both alternatives do not require impacts to non-participating properties
Non-Participating Property Impacts	• Number of impacted nonparticipating properties that would need to be acquired			**Alternatives 5A and 5B** are preferred equally from a future land use perspective because both alternatives provide sufficient level of service (LOS) to proposed land uses
Noise and Air Quality Impact	• Impacts on noise and vibration sensitive receptors • Impacts on air quality			**Alternatives 5A and 5B** are preferred equally from a noise and air quality impact perspective, for the following reasons: • There are no non-participating properties areas/noise sensitive areas within the vicinity the alternatives, as such, there are no anticipated noise impacts to NSAs
Overall Category Ranking				**Alternative 5A** is preferred from an overall Socio-Economic Environment perspective for the following reasons: • Allows for an efficient and well-designed road pattern that establishes good building footprints and adheres with provincial land use policies which encourages maximizing development potential
Cultural Environment				
Built Heritage Resources and Cultural Heritage Landscapes	• Impact to built heritage resources or cultural heritage landscapes • Opportunities to frame and celebrate heritage resources			**Alternatives 5A and 5B** are preferred equally from a built heritage esources and cultural heritage landscapes perspective for the following reasons: • Both alternatives have the same impacts on the cultural heritage environment and similar impacts on the contextual values in the CHLs • No built heritage resources are displaced • There are opportunities to support commemorative interpretation
Archaeological Resources	• Impacts to previously undisturbed lands with archeological potential			**Alternatives 5A and 5B** are preferred equally from an archaeological resources perspective for the following reasons: • Both alignments originate in Parcel 10 and neither alignment intersect with areas that require further archaeological assessment outside of parcel 10 • No material difference between alignments

Evaluation Criteria		Alternative 5A	Alternative 5B	Comment/Rationale
				
Overall Category Ranking		◑	◑	**Alternatives 5A and 5B** are preferred equally from an overall Cultural Environment perspective for the following reasons: • Both alternatives have the same impacts on the cultural heritage environment and similar impacts on the contextual values in the CHLs • Both alternatives will require further Stage 2 archaeological assessment on Parcel 10
Cost & Constructability				
Engineering Feasibility and Construction Cost	• Ease of construction • Cost effectiveness to build • Cost of compensation for impacts to the natural environment	◕	◑	**Alternative 5A** is preferred from an engineering feasibility and construction cost perspective for the following reasons: • Avoids the need for floodplain and watercourse crossings • Lower construction cost
Existing Municipal Infrastructure and Utilities	• Conflict with exiting utilities or challenges in relocating infrastructure (temporary or permanent) • Impacts one existing municipal infrastructure	◑	◑	**Alternatives 5A and 5B** are preferred equally from an existing municipal infrastructure and utilities perspective because both alternatives will require extension of culvert crossing south on Teston road, relocation of existing utilities and crossing of TCE pipeline and would result in similar impacts
Capital Cost	• Scale of capital costs (relative scale-preferred to least preferred)	●	◑	**Alternative 5A** is preferred from a capital cost perspective because capital costs are anticipated to be lower because it avoids the need for watercourse crossings
Property Cost	• Scale of non-participating property costs (relative scale-preferred to least preferred)	◑	◑	**Alternatives 5A and 5B** are preferred equally from a property acquisition perspective because both alternatives require the same length of road is proposed on non-participating landowner and would result in similar impacts
Operating and Maintenance Costs	• Operating and mainteance costs	◕	◑	**Alternative 5A** is preferred from an operating and maintenance costs perspective because it avoids the need for watercourse crossings, therefore lower operation and maintenance costs are anticipated to be required
Overall Category Ranking		◕	◑	**Alternative 5A** is preferred from an overall Cost & Constructability perspective because it avoids the need for floodplain and watercourse crossings, as such, lower construction, operation, and maintenance costs are anticipated to be required
Overall Preference by Category		Transportation Natural Environment Hydrogeology & Drainage Socio-Economic Environment Cultural Environment Cost & Constructability	Cultural Environment	**Alternative 5A was selected as the preferred Street 5 alternative**
Overall Evaluation		◕	◑	

6.2.5.1 Selection of Preferred Street 5 Alternative Alignment

Based on the evaluation table above, **Alternative 5A was selected as the preferred Street 5 alignment** for the following reasons:

- Provides better road spacing and community connectivity
- Provides direct connections to 2 schools and a neighbourhood park
- Allows for an efficient and well-designed road pattern that establishes good building footprints and adheres with provincial and land use policies
- Avoids the requirement for an additional floodplain crossing and associated impacts
- Comparatively has the least impacts to natural environment features
- Lowest construction, operation, and maintenance costs

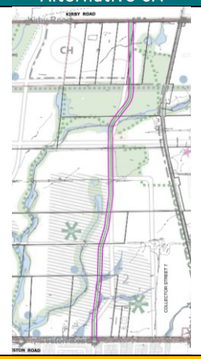
6.2.6 STREET 6

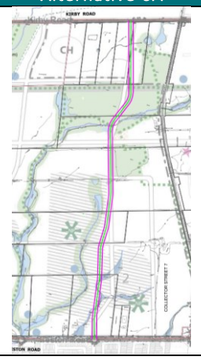
Table 6-8 provides a summary of the evaluation for Street 6 alternative alignments against the developed criteria. Full detailed evaluation tables are provided in **Appendix M.**

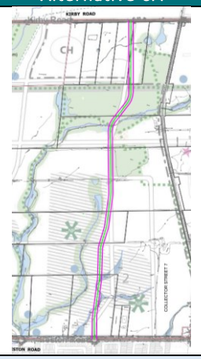
Of note, following comment received from regulatory agencies and Indigenous Communities, the road connection of Street 6 between Street 1 and Street 2 through the woodlot has been replaced with the multi-use path to minimize impacts to the significant woodlot (see **Section 7.2.3** for more details).

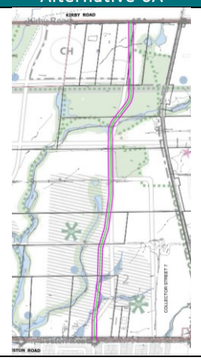
Table 6-8: Evaluation of Street 6 Alternative Alignments

Legend: Least Benefits / Most Impacts → Most Benefits / Least Impacts

Evaluation Criteria		Alternative 6A	Alternative 6B	Comment/Rationale
				
Transportation				
Transit Serviceability	• Supports an effective future transit route	◕	◑	**Alternative 6A** is preferred from a transit serviceability perspective because the alignment provides the recommended distance between signalized intersection
Supports Active Transportation	• Encourages active transportation • Considers pedestrian/cyclist safety	◑	◑	**Alternatives 6A and 6B** are preferred equally from an active transportation perspective because both alternatives provide safe facilities for active transportation users, however, enhanced safety features may not be able to be accommodated through the significant woodlot due to the reduced cross-section to minimize natural environmental impacts
Road Capacity	• Provides sufficient road capcaity for projected traffic needs	◑	◑	**Alternatives 6A and 6B** are preferred equally from a road capacity perspective because both alternatives provide sufficient road capacity for anticipated future traffic needs with similar constraints through the significant woodlot
Design Standard Compliance	• Compliance with City and Regional design standards • Meets accessbility standards (AODA) • Flexibility to accommodate future designs (i.e., implementation of adjacent studies) • GHG emissions	◕	◑	**Alternative 6A** is preferred from a design standard compliance perspective because it complies with City and Regional design standards whereas Alternative 6B does not meet the recommended distance between signalized intersections
Community Connectivity	• Provides enhanced connections to major destinations for all modes • Contributes to flexibility of the network to allow for better access/services to community facilities (e.g., school, hub, park) • Aligns with fine-grained network of streets (local, collector, and arterial)	◕	◕	**Alternatives 6A and 6B** are preferred equally from a community connectivity perspective because both alternatives provide end-to-end connectivity across Block 27 and connects with the existing neighbourhood to the south
Overall Cateogry Ranking		◕	◑	**Alternative 6A** is the preferred routes from a Transportation perspective for the following reasons: • Provides the recommended distance between signalized intersections which better accommodates transit and meet design standards
Natural Environment				
Fish/Fish Habitat	• Potential impacts to fish or fish habitat • Level of opportunity to mitigate/minize impact to fish or fish habitat	◑	◑	**Alternatives 6A and 6B** are preferred equally from a fish and fish habitat perspective because both alternatives have impact to fish habitat along DF3-2

Evaluation Criteria		Alternative 6A	Alternative 6B	Comment/Rationale
				
Vegetation, Wildlife, and Wildlife Habitat	• Impacts to vegetation • Impacts to wildlife and wildlife habitat • Potential impacts to wildlife due to environmental fragmentation • Level of opportunity to mitigate/minize impacts to wildlife and wildlife habitat			**Alternative 6A** is preferred slightly from a vegetation, wildlife, and wildlife habitat perspective because the alternative impacts a smaller number of trees with potential for bat roosting habitat
Designated Natural Heritage Features and Environmentally Sensitive Areas	• Impacts to Greenbelt • Impacts to Provincially Significant Wetlands (PSW) • Impacts to Significant Woodland • Impacts to Significant Wildlife Habitat (SWH) • Impacts to Greenbelt Plan Area			**Alternative 6A** is slightly preferred from a designated natural heritage features and environmentally sensitive areas perspective because although both alternatives will have major impacts to significant woodland, Alternative 6A requires less deciduous forest removal
Rare Species, Species of Conservation Concern, and Species at Risk (SAR)	• Impacts to rare species and their habitat • Impacts to Species of Conservation Concern and their habitat • Impact to Endangered or Threatened Species and their habitat			**Alternative 6A** is preferred from a rare species, species of conservation concern, and endangered or threatened species perspective because it avoids impacts to rare plant species
Overall Category Ranking				**Alternative 6A** is preferred from an overall Natural Environment perspective for the following reasons: • Results in fewer tree removals • Impacts a smaller number of trees with potential for bat roosting habitat • Requires less deciduous forest removal
Hydrogeology and Drainage				
Hydrogeology / Ground Water	• Potential to affect the quality of groundwater resources • Potential to affect the quantity of groundwater resources • Potential to affect the movement of groundwater resources • Potential to affect Wellhead Protection/Recharge Area • Potential to affect drinking water			**Alternatives 6A and 6B** are preferred equally from a hydrogeology/ground water perspective because significant impacts are not anticipated for any of the alternatives and there is no preferred option
Surface Water and Drainage	• Potential to affect surface water quality and quantity • Provides sufficient drainage and treatment			**Alternatives 6A and 6B** are preferred equally from a surface water and drainage perspective because both alternatives have a similar in length of road, therefore similar impacts to surface water and drainage are anticipated
Floodplain	• Effects on designated floodplains (i.e., amount of floodplain crossed (metres)			**Alternatives 6A and 6B** are preferred equally from a floodplain perspective because both alternatives are similar in road length and have same encroachment impacts, however, with appropriate sizing of the culvert the impact of the encroachments on the floodplain can be mitigated

Evaluation Criteria		Alternative 6A	Alternative 6B	Comment/Rationale
				
Overall Category Ranking		◑	◑	**Alternatives 6A and 6B** are preferred equally from an overall Hydrogeology/Drainage perspective for the following reasons: • Both alternatives are similar in road length resulting in similar impact on surface water and drainage • Similar floodplain encroachment is required • With appropriate sizing of the culvert the impact of the encroachments on the floodplain can be reduced
Socio-Economic Environment				
Land Use Policy Compliance	• Conformity with provincial, regional, and municipal land use policy objectives	◔	◔	**Alternatives 6A and 6B** are preferred equally from a policy compliance perspective because both alternatives conform with Provincial, Regional, and municipal policy objectives but do not comply with environmental policies to avoid impacts to significant woodlands
Future Land Uses	• Level of service to proposed land uses	●	◔	**Alternative 6A** is preferred from a future land use perspective because it brings road users closer to the Kirby GO station, and provides a better land use transition between the mid-rise mix-use and mid-rise residential zones
Non-Participating Property Impacts	• Number of impacted nonparticipating properties that would need to be acquired	●	●	**Alternative 6A and 6B** are preferred equally from an impacted non-participating properties perspective because both alternatives do not impact non-participating property owner property
Noise and Air Quality Impact	• Impacts on noise and vibration sensitive receptors • Impacts on air quality	◔	◔	**Alternatives 6A and 6B** are preferred equally from a noise and air quality impact perspective because both alternatives come in close proximity to a non-participating landowner which is a noise / air quality sensitive receptor (Cam Lo Vuong Buddhist Community Temple)
Overall Category Ranking		◕	◑	**Alternative 6A** is preferred from an overall Socio-Economic Environment perspective for the following reasons: • Provides a better level of service to proposed land uses because alignment brings road users closer to the Kirby GO station • Provides a better land use transition between the mid-rise mix-use and mid-rise residential zones
Cultural Environment				
Built Heritage Resources and Cultural Heritage Landscapes	• Impact to built heritage resources or cultural heritage landscapes • Opportunities to frame and celebrate heritage resources	◑	◑	**Alternatives 6A and 6B** are preferred equally from a built heritage resources and cultural heritage landscapes perspective for the following reasons: • No built heritage resources are lost for either alternative • Low impacts to cultural heritage landscape context, however, CHLs will be removed as part of the development • Can support a commemorative heritage program
Archaeological Resources	• Impacts to previously undisturbed lands with archeological potential	◑	◕	**Alternative 6B** is preferred from an Archaeological Resources perspective for the following reasons: • Significantly less archaeological and engagement effort since only one parcel will require Stage 2 survey • Avoids impacts within the Ossuary Model
Overall Category Ranking		◑	◕	**Alternative 6B** is preferred from an overall Cultural Environment perspective for the following reasons: • Significantly less archaeological and engagement effort since only one parcel will require Stage 2 survey • Avoids impacts within the Ossuary Model
Cost & Constructability				

Evaluation Criteria		Alternative 6A	Alternative 6B	Comment/Rationale
				
Engineering Feasibility and Construction Cost	• Ease of construction • Cost effectiveness to build • Cost of compensation for impacts to the natural environment	◑	◑	**Alternatives 6A and 6B** are preferred equally from an engineering feasibility and construction cost perspective because although both alternatives have similar road lengths with similar feasibility and construction
Existing Municipal Infrastructure and Utilities	• Conflict with exiting utilities or challenges in relocating infrastructure (temporary or permanent) • Impacts one existing municipal infrastructure	◑	◑	**Alternatives 6A and 6B** are preferred equally from a from an existing municipal infrastructure and utilities perspective because both alternatives require a TCE pipeline crossing and relocation of existing utilities along Teston Road
Capital Cost	• Scale of capital costs (relative scale-preferred to least preferred)	◑	◑	**Alternatives 6A and 6B** are preferred equally from a capital cost perspective because costs for road and crossing construction are expected to be similar for both the alternatives
Property Cost	• Scale of non-participating property costs (relative scale-preferred to least preferred)	●	●	**Alternatives 6A and 6B** are preferred equally from a from a non-participating property acquisition perspective because impacts to non-participating landowners is not required
Operating and Maintenance Costs	• Operating and mainteance costs	◑	◑	**Alternatives 6A and 6B** are preferred equally from a from an operating and maintenance costs perspective because costs are expected to be similar for both the alternatives
Overall Category Ranking		◑	◑	**Alternatives 6A and 6B** are preferred equally from an overall Cost & Constructability perspective for the following reasons: • Both alternatives have similar road length with similar feasibility and construction costs • Both alternatives require a TCE pipeline crossing and relocation of existing utilities along Teston Road • Operating and maintenance costs are expected to be the same due to similar road lengths
Overall Preference by Category		Transportation Natural Environment Hydrogeology & Drainage Socio-Economic Environment Cost & Constructability	Hydrogeology & Drainage Cultural Environment Cost & Constructability	**Alternative 6A was selected as the preferred Street 6 alternative**
Overall Evaluation		◔	◑	

6.2.6.1 Selection of Preferred Street 6 Alternative Alignment

Based on the evaluation table above, **Alternative 6A was selected as the preferred Street 6 alignment** for the following reasons:

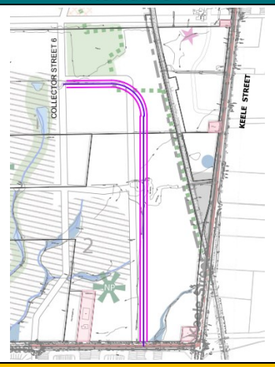
- Provides the recommended distance between signalized intersection
- Brings road users closer to proposed Kirby GO station
- Provides a better level of service to proposed land uses and urban design
- Least impacts to the significant woodlot
- Impacts fewer trees with potential for species-at-risk bat roosting
- Provides a better land use transition between the mid-rise mix-use and mid-rise residential zones

6.2.7 STREET 7

Table 6-10 provides a summary of the evaluation for Street 7 alternative alignments against the developed criteria. Full detailed evaluation tables are provided in **Appendix M.**

Table 6-9: Evaluation of Street 7 Alternative Alignments

Legend: ○ Least Benefits / Most Impacts → ◔ ◑ ◕ → ● Most Benefits / Least Impacts

Evaluation Criteria		Alternative 7A	Alternative 7B	Comment/Rationale
				
Transportation				
Transit Serviceability	• Supports an effective future transit route	●	●	**Alternatives 7A and 7B** are preferred equally from a transit serviceability perspective because both alternatives have the ability to accommodate future transit infrastructure
Supports Active Transportation	• Encourages active transportation • Considers pedestrian/cyclist safety	◕	◕	**Alternatives 7A and 7B** are preferred equally from an active transportation perspective because both alternatives support the provision of safe active transportation facilities for pedestrians and cyclist, and both may have challenges to some users due to slopes
Road Capacity	• Provides sufficient road capcaity for projected traffic needs	●	●	**Alternatives 7A and 7B** are preferred equally from a road capacity perspective because both alternatives provide sufficient road capacity for the projected traffic needs
Design Standard Compliance	• Compliance with City and Regional design standards • Meets accessbility standards (AODA) • Flexibility to accommodate future designs (i.e., implementation of adjacent studies) • GHG emissions	◕	◕	**Alternatives 7A and 7B** are preferred equally from a design standard compliance perspective because both alternatives meet all design standards and have the ability to accommodate future designs and emerging technologies
Community Connectivity	• Provides enhanced connections to major destinations for all modes • Contributes to flexibility of the network to allow for better access/services to community facilities (e.g., school, hub, park) • Aligns with fine-grained network of streets (local, collector, and arterial)	◕	◑	**Alternative 7A** is preferred from a community connectivity perspective because it supports the provision of an additional intersection along Collector Street 6
Overall Cateogry Ranking		◕	◕	**Alternatives 7A and 7B** are preferred equally from a Transportation perspective for the following reasons: • Both alternatives can accommodate transit infrastructure and support and encourages active transportation • Both alternatives provide sufficient road capacity and complies with city and regional design standards • Alternative 7A would provide additional intersection along Collector Street 6 which increases community connectivity and allows for an efficient grid-like road pattern • Although Alternative 7B creates as swooping curve that does not allow for an efficient grid-like pattern, the radius was increased to allow for intersection to be accommodated along the curve to improve connections

Evaluation Criteria		Alternative 7A	Alternative 7B	Comment/Rationale
				
Natural Environment				
Fish/Fish Habitat	• Potential impacts to fish or fish habitat • Level of opportunity to mitigate/minize impact to fish or fish habitat	◑	◑	**Alternatives 7A and 7B** are preferred equally from a fish and fish habitat perspective because there are no fish and fish habitat within the vicinity
Vegetation, Wildlife, and Wildlife Habitat	• Impacts to vegetation • Impacts to wildlife and wildlife habitat • Potential impacts to wildlife due to environmental fragmentation • Level of opportunity to mitigate/minize impacts to wildlife and wildlife habitat	◑	◕	**Alternative 7B** is preferred slightly from a vegetation, wildlife, and wildlife habitat perspective for the following reasons: • It minimizes disturbance to wildlife movement
Designated Natural Heritage Features and Environmentally Sensitive Areas	• Impacts to Greenbelt • Impacts to Provincially Significant Wetlands (PSW) • Impacts to Significant Woodland • Impacts to Significant Wildlife Habitat (SWH) • Impacts to Greenbelt Plan Area	◔	◑	**Alternative 7B** is preferred from a designated natural heritage features and environmentally sensitive areas perspective because of the following reasons: • It avoids encroachment into the woodland buffer
Rare Species, Species of Conservation Concern, and Species at Risk (SAR)	• Impacts to rare species and their habitat • Impacts to Species of Conservation Concern and their habitat • Impact to Endangered or Threatened Species and their habitat	◑	◑	**Alternatives 7A and 7B** are preferred equally from a rare species, species of conservation concern, and endangered or threatened Species perspective because there are no anticipated impacts for either alternative
Overall Category Ranking		◑	◕	**Alternative 7B** is slightly preferred from an overall Natural Environmental perspective for the following reason: • Minimizes disturbance to wildlife movement • Avoids encroachment into the significant woodland buffer
Hydrogeology and Drainage				
Hydrogeology / Ground Water	• Potential to affect the quality of groundwater resources • Potential to affect the quantity of groundwater resources • Potential to affect the movement of groundwater resources • Potential to affect Wellhead Protection/Recharge Area • Potential to affect drinking water	◑	◑	**Alternatives 7A and 7B** are preferred equally from a hydrogeology/ground water perspective because significant impacts are not anticipated for any of the alternatives
Surface Water and Drainage	• Potential to affect surface water quality and quantity • Provides sufficient drainage and treatment	◑	◑	**Alternatives 7A and 7B** are preferred equally from a surface water and drainage perspective because the roads are similar lengths which will result in similar impacts on surface water quality and quantity. The run-off will be drained via storm sewers and catch basins and treated in SWM facilities in both alternatives

Evaluation Criteria		Alternative 7A	Alternative 7B	Comment/Rationale
				
Floodplain	• Effects on designated floodplains (i.e., amount of floodplain crossed (metres)	●	●	**Alternatives 7A and 7B** are preferred equally from a floodplain perspective because either alternative avoids encroachment onto floodplain
Overall Category Ranking		◔	◔	**Alternatives 7A and 7B** are equally preferred from an overall Hydrogeology and Drainage perspective for the following reasons: • The shorter length of road results in less impact on surface water quality and quantity of run-off
Socio-Economic Environment				
Land Use Policy Compliance	• Conformity with provincial, regional, and municipal land use policy objectives	◑	●	**Alternative 7B** is preferred from a policy compliance perspective because it provides for an efficient development pattern that encourages aesthetic and adheres to urban design principles
Future Land Uses	• Level of service to proposed land uses	◔	◔	**Alternative 7A and 7B** are preferred equally from a future land use perspective because both alternatives provide sufficient level of service to proposed land uses
Non-Participating Property Impacts	• Number of impacted nonparticipating properties that would need to be acquired	●	●	**Alternative 7A and 7B** are preferred equally from an impact to non-participating property owner perspective because no impacts to non-participating landowner lands are required
Noise and Air Quality Impact	• Impacts on noise and vibration sensitive receptors • Impacts on air quality	◔	◔	**Alternatives 7A and 7B** are preferred equally from a noise impact perspective because both alternatives come within close proximity to one noise sensitive/air quality receptor (i.e., Cam Lo Vuong Buddhist Community Temple)
Overall Category Ranking		◑	◔	**Alternative 7B** is preferred from an overall Socio-Economic Environment perspective for the following reasons: • Provides for an efficient development pattern that encourages aesthetic and adheres to urban design principles
Cultural Environment				
Built Heritage Resources and Cultural Heritage Landscapes	• Impact to built heritage resources or cultural heritage landscapes • Opportunities to frame and celebrate heritage resources	◑	◑	**Alternatives 7A and 7B** are preferred equally from a built heritage resources and cultural heritage landscapes perspective for the following reasons: • No built heritage resources are displaced • Low impact to the identified or recognized cultural heritage landscape context • Can support a commemorative heritage program
Archaeological Resources	• Impacts to previously undisturbed lands with archeological potential	◑	●	**Alternative 7B** is preferred from an Archaeological Resources perspective for the following reasons: • No further archaeological assessment work is required • Alignment is not within the Ossuary Model and no stage 2 construction monitoring is required
Overall Category Ranking		◑	◔	**Alternative 7B** is preferred from an overall Cultural Environment perspective for the following reasons: • No further archaeological assessment work is required • Alignment is not within the Ossuary Model and no stage 2 construction monitoring is required

Evaluation Criteria		Alternative 7A	Alternative 7B	Comment/Rationale
				
Cost & Constructability				
Engineering Feasibility and Construction Cost	• Ease of construction • Cost effectiveness to build • Cost of compensation for impacts to the natural environment	◑	◕	**Alternative 7B** is preferred from an engineering feasibility and construction cost perspective for the following reasons: • Shorter road length • Avoids encroachments onto existing woodlot which avoids compensation requirements
Existing Municipal Infrastructure and Utilities	• Conflict with exiting utilities or challenges in relocating infrastructure (temporary or permanent) • Impacts one existing municipal infrastructure	◑	◑	**Alternatives 7A and 7B** are preferred equally from an existing municipal infrastructure and utilities perspective because both alternatives require relocation of existing utilities along Teston Road
Capital Cost	• Scale of capital costs (relative scale-preferred to least preferred)	◑	◑	**Alternatives 7A and 7B** are equally preferred from a capital cost perspective because difference in road length is minor and capital costs will be similar
Property Cost	• Scale of non-participating property costs (relative scale-preferred to least preferred)	●	●	**Alternatives 7A and 7B** are preferred equally from a property acquisition perspective because both alternatives do not require property from non-participating landowners
Operating and Maintenance Costs	• Operating and mainteance costs	◑	◑	**Alternatives 7A and 7B** are preferred from an operating and maintenance costs perspective because the length in road are similar cost differences for operating and maintenance is negligible
Overall Category Ranking		◑	◑	**Alternatives 7A and 7B** are preferred equally from an overall Cost & Constructability perspective for the following reasons: • Avoids impacts to wetlands which reduced cost of compensation
Overall Preference by Category		Transportation Hydrogeology & Drainage Cost & Constructability	Transportation Natural Environment Hydrogeology & Drainage Socio-Economic Environment Cultural Environment Cost & Constructability	
Overall Evaluation		◑	◕	**Alternative 7B was selected as the preferred Street 7 alternative**

6.2.7.1 Selection of Preferred Street 7 Alternative Alignment

Based on the evaluation table above, **Alternative 7B was selected as the preferred Street 7 alignment** for the following reasons:

- Minimizes disturbance to wildlife movement
- Avoids encroachment into the woodland buffer which also avoids compensation requirements
- Shorter length of road results in less impact on surface water quality and quantity run-off
- Provides for an efficient development pattern
- No further archaeological assessment work is required
- Alignment is not within the Ossuary Model and no stage 2 construction monitoring is required
- Shorter road length which results in lower capital, operating, and maintenance costs

6.2.8 STREET 8

Table 6-10 provides a summary of the evaluation for Street 8 alternative alignments against the developed criteria. Full detailed evaluation tables are provided in **Appendix M.**

Table 6-10: Evaluation of Street 8 Alternative Alignments

Legend: ○ Least Benefits / Most Impacts → ◔ ◑ ◕ ● Most Benefits / Least Impacts

Evaluation Criteria		Alternative 8A 	Alternative 8B 	Alternative 8C 	Alternative 8D 	Comment/Rationale
Transportation						
Transit Serviceability	• Supports an effective future transit route	◔	●	◔	●	**Alternatives 8B and 8D** are preferred equally from a transit serviceability perspective because both alternatives will accommodate future transit infrastructure, avoids requiring a steep cross-slope through the Street 2 and Street 8 intersection, and provides a connection to the future Kirby GO transit hub
Supports Active Transportation	• Encourages active transportation • Considers pedestrian/cyclist safety	◑	◕	◑	◕	**Alternatives 8B and 8D** are preferred equally from an active transportation perspective because both alternatives provide the comfortable active transportation facilities for pedestrians and cyclist (flatter slopes)
Road Capacity	• Provides sufficient road capcaity for projected traffic needs	○	◕	○	◕	**Alternatives 8B and 8D** are preferred equally from a road capacity perspective because the alternatives provide sufficient road capacity for the projected traffic needs
Design Standard Compliance	• Compliance with City and Regional design standards • Meets accessbility standards (AODA) • Flexibility to accommodate future designs (i.e., implementation of adjacent studies) • GHG emissions	◔	◕	◔	◕	**Alternatives 8B and 8D** are preferred equally from a design standard compliance perspective, because both alternatives meet all design standards, have the ability to accommodate future designs and emerging technologies, and provides the greatest flexibility for the future transit hub (i.e., more space)
Community Connectivity	• Provides enhanced connections to major destinations for all modes • Contributes to flexibility of the network to allow for better access/services to community facilities (e.g., school, hub, park) • Aligns with fine-grained network of streets (local, collector, and arterial)	◔	◕	◑	◑	**Alternative 8B** is preferred equally from a community connectivity perspective for the following reasons: • Provides an additional connection to Keele Street • Provides a direct connection to Peak Point Blvd
Overall Cateogry Ranking		◔	◕	◑	◑	**Alternative 8B** is preferred from an overall transportation perspective for the following reasons: • Avoids requiring a steep cross-slope through the Street 2 and Street 8 intersection • Flatter slope provided at the intersections is more comfortable for active transportation users, however, steeper slopes are required at peak point connection • Provides the Block with any additional third connection to Keele Street • Provides a direct connection to Peak Point Blvd
Natural Environment						
Fish/Fish Habitat	• Potential impacts to fish or fish habitat • Level of opportunity to mitigate/minize impact to fish or fish habitat	◑	◑	◑	◑	**Alternatives 8A-8D** are preferred equally from fish and fish habitat perspective because all alternatives have potential negative impacts and similar opportunities for mitigation

Evaluation Criteria		Alternative 8A	Alternative 8B	Alternative 8C	Alternative 8D	Comment/Rationale
						
Vegetation, Wildlife, and Wildlife Habitat	• Impacts to vegetation • Impacts to wildlife and wildlife habitat • Potential impacts to wildlife due to environmental fragmentation • Level of opportunity to mitigate/minize impacts to wildlife and wildlife habitat	◔	◔	◔	◑	**Alternative 8D** is preferred from a designated natural heritage features and environmentally sensitive areas perspective, for the following reasons: • It minimizes wetland habitat fragmentation • Avoids environmental impacts associated with providing road connection to Peak Point Blvd.
Designated Natural Heritage Features and Environmentally Sensitive Areas	• Impacts to Greenbelt • Impacts to Provincially Significant Wetlands (PSW) • Impacts to Significant Woodland • Impacts to Significant Wildlife Habitat (SWH) • Impacts to Greenbelt Plan Area	◔	◔	◔	◑	**Alternative 8D** is preferred from a designated natural heritage features and environmentally sensitive areas perspective has the least ecological effects for the following reasons: • Requires the least amount of PSW removal
Rare Species, Species of Conservation Concern, and Species at Risk (SAR)	• Impacts to rare species and their habitat • Impacts to Species of Conservation Concern and their habitat • Impact to Endangered or Threatened Species and their habitat	◑	◑	◑	◑	**Alternatives 8A-8D** are preferred equally from a rare species, species of conservation concern, and endangered or threatened perspective because there are none recorded within any of the alignment footprints
Overall Category Ranking		◔	◔	◔	◑	**Alternative 8D** is preferred from an overall Natural Environment perspective for the following reasons: • Minimizes wetland habitat fragmentation • Avoids environmental impacts associated with providing road connection to Peak Point Blvd. • Requires the least amount of PSW removal
Hydrogeology and Drainage						
Hydrogeology / Ground Water	• Potential to affect the quality of groundwater resources • Potential to affect the quantity of groundwater resources • Potential to affect the movement of groundwater resources • Potential to affect Wellhead Protection/Recharge Area • Potential to affect drinking water	◑	◑	◑	◑	**Alternatives 8A-8D** are preferred equally from a hydrogeology/ground water perspective because significant impacts are not anticipated for any of the alternatives
Surface Water and Drainage	• Potential to affect surface water quality and quantity • Provides sufficient drainage and treatment	◑	◔	◕	◕	**Alternatives 8C and 8D** are preferred equally from a surface water and drainage perspective for the following reasons: • Shorter road lengths, therefore less impact on surface water quality and quantity and similar impacts on surface water quality and quantity
Floodplain	• Effects on designated floodplains (i.e., amount of floodplain crossed (metres)	◕	◕	●	◕	**Alternative 8C** is preferred from a floodplain perspective for the following reasons: • Shortest floodplain crossing length • Avoids floodplain encroachment at the Peak Point Blvd. connection
Overall Category Ranking		◑	◔	●	◕	**Alternative 8C** is preferred from an overall Hydrogeology and Drainage perspective for the following reasons: • Shortest road length, therefore least impact on surface water quality and quantity • Shortest floodplain crossing length • Avoids floodplain encroachment at the Peak Point Blvd. connection

Evaluation Criteria		Alternative 8A	Alternative 8B	Alternative 8C	Alternative 8D	Comment/Rationale
Socio-Economic Environment						
Land Use Policy Compliance	• Conformity with provincial, regional, and municipal land use policy objectives	●	●	●	●	**Alternatives 8A-8D** are preferred equally from a policy compliance perspective because all alternatives conform with provincial, regional, and municipal policy objectives
Future Land Uses	• Level of service to proposed land uses	◑	◕	◑	◕	**Alternatives 8B and 8D** are preferred equally from a future land use perspective because both alternatives provide sufficient LOS to proposed land uses and can more easily accommodate driveways for properties north and south of Collector Street 2 on Keele Street
Non-Participating Property Impacts	• Number of impacted nonparticipating properties that would need to be acquired	◑	◑	●	●	**Alternative 8C and 8D** are preferred from a non-participating property impacts perspective because both alternatives do not require impacts to non-participating landowners
Noise and Air Quality Impact	• Impacts on noise and vibration sensitive receptors • Impacts on air quality	◑	◑	◑	◑	**Alternative 8A-8D** are preferred equally from a noise and air quality impact perspective because none of the alternatives are within close vicinity to any noise, vibration, or air quality sensitive receptors within Block 27
Overall Category Ranking		◑	◑	◕	●	**Alternative 8D** is preferred from an overall Socio-Economic Environment perspective for the following reasons: • Can more easily accommodate driveways for properties north and south of Collector Street 2 on Keele Street • Does not require impacts to non-participating landowners
Cultural Environment						
Built Heritage Resources and Cultural Heritage Landscapes	• Impact to built heritage resources or cultural heritage landscapes • Opportunities to frame and celebrate heritage resources	◔	◕	◔	◕	**Alternative 8D** is preferred from a built heritage resources and cultural heritage landscapes perspective for the following reasons: • Fewer direct impacts to cultural heritage landscapes • Adjacent rail corridor reduces potential effects from displacement or disruption
Archaeological Resources	• Impacts to previously undisturbed lands with archeological potential	◑	◑	◑	◕	**Alternative 8D** is preferred from an archeological resource perspective for the following reasons: • Least amount of additional archaeological assessment is required
Overall Category Ranking		◔	◑	◔	◕	**Alternative 8D** is preferred from an overall cultural environment perspective for the following reasons: • Fewer direct impacts to cultural heritage resources. • Adjacent rail corridor reduces potential effects from displacement or disruption • Least amount of additional archaeological assessment is required
Cost & Constructability						
Engineering Feasibility and Construction Cost	• Ease of construction • Cost effectiveness to build • Cost of compensation for impacts to the natural environment	◑	◔	◕	◑	**Alternatives 8C is** preferred from an engineering feasibility and construction cost perspective for the following reasons: • Shortest road length, therefore lowest construction costs are anticipated • Shortest floodplain crossing • Less earthworks and excavation
Existing Municipal Infrastructure and Utilities	• Conflict with exiting utilities or challenges in relocating infrastructure (temporary or permanent) • Impacts one existing municipal infrastructure	◑	◑	◑	◑	**Alternatives 8A-8D** are preferred equally from an existing municipal infrastructure and utilities perspective because all alternatives will require existing infrastructure to be relocated and requires crossing of TCE pipeline
Capital Cost	• Scale of capital costs (relative scale-preferred to least preferred)	◑	◔	●	◕	**Alternatives 8C is** preferred from a capital cost perspective for the following reasons: • Shortest length • Shortest floodplain crossing

Evaluation Criteria		Alternative 8A	Alternative 8B	Alternative 8C	Alternative 8D	Comment/Rationale
Property Cost	• Scale of non-participating property costs (relative scale-preferred to least preferred)					From a property acquisition perspective, **Alternatives 8C and 8D** are preferred for the following reasons: • No land requirement from non-participating landowners
Operating and Maintenance Costs	• Operating and mainteance costs					**Alternatives 8C is** preferred from an operating and maintenance costs perspective for the following reasons: • Shortest road length • Less pavement • Shortest crossing of floodplain
Overall Category Ranking						**Alternative 8C** is preferred from an overall cost & constructability perspective for the following reasons: • Shortest length of road, therefore lowest construction, operation, and maintenance costs • Avoids construction costs and complexities associated with a road connection to Peak Point Blvd., thereby reducing construction costs and complexities • Shortest floodplain crossing • Less earthworks and excavation • No land requirement from non-participating landowners
Overall Preference by Category			Transportation	Hydrogeology & Drainage Cost & Constructability	Natural Environment Socio-Economic Environment Cultural Environment	**Alternative 8D was selected as the preferred Street 8 alternative**
Overall Evaluation						

6.2.8.1 Selection of Preferred Street 8 Alternative Alignment

Based on the evaluation table above, **Alternative 8D was selected as the preferred Street 8 alignment** for the following reasons:

- Minimizes wetland habitat fragmentation
- Avoids environmental impacts associated with providing road connection to Peak Point Boulevard
- Requires the least amount of PSW removal
- Can more easily accommodate driveways for properties north and south of Street 2 on Keele Street
- Avoids impacts to non-participating landowner properties
- Fewer direct impacts to cultural heritage landscapes

7 DEVELOPMENT AND EVALUATION OF ALTERNATIVE DESIGN CONCEPTS (CROSS-SECTIONS)

7.1 DEVELOPMENT OF ALTERNATIVE CROSS-SECTIONS

This section outlines the development of cross-sections for both the major and minor collector roads. Through the NVNCTMP, it was recommended that Street 2, Street 5, and Street 8 be designed as major collector roads requiring a 26 m ROW width and be protected for 4 travel lanes. The remaining roads, Street 1, Street 3, Street 4, Street 6, and Street 7 are planned as minor collector roads with a 24 m ROW width. A summary of the road classification and design elements for each road as noted in the Block 27 Secondary Plan is provided in **Table 7-1**. These ROW widths and design elements were used to generate the major and minor collector road cross-sections.

Table 7-1: Summary of Road Classification and Design Elements

Street	Recommended Road Classification	Design Elements
Street 1	Minor Collector Road	• 24 m right-of-way width
Street 2	Major Collector Road	• 26 m right-of-way width • Protect for 4 travel lanes
Street 3	Minor Collector Road	• 24 m right-of-way width
Street 4	Minor Collector Road	• 24 m right-of-way width
Street 5	Major Collector Road	• 26 m right-of-way width • Protect for 4 travel lanes
Street 6	Minor Collector Road	• 24 m right-of-way width
Street 7	Minor Collector Road	• 24 m right-of-way width
Street 8	Major Collector Road	• 26 m right-of-way width • Protect for 4 travel lanes • Consideration for potential transit vehicles connecting to the GO Station

7.1.1 CROSS-SECTION DESIGN CRITERIA

Key design parameters were identified to establish typical cross-section alternatives which were based on a review of established guidelines and standards from York Region, the City of Vaughan, the Transportation Association of Canada, and Ontario Provincial Standard Drawings (OPSD). The cross-section alternatives were also developed in accordance with general guidelines for major and minor collector roads from the City of Vaughan Engineering Design Criteria and Standard Drawings (EDCSD) as outlined below.

Major Collector Roads

- Minimum right-of-way width of 26 m;
- Sidewalks and cycle facilities (side-by-side and/or a multi-use path (MUP)) provided on both sides;
- Transit service and related facilities are to be accommodated; and
- On-street parking can be accommodated in place of a travel lane.

Minor Collector Roads

- Minimum right-of-way width of 24 m;
- Sidewalks and cycling facilities are to be provided on both sides of the road; and
- Lay-by parking lanes are to be provided on one side of the road. Where lay-by parking lanes are not appropriate or feasible, a double row of trees is required.

The key design parameters used to inform the development of the cross-section alternatives are documented in **Table 7-2**.

Table 7-2: Key Design Parameters

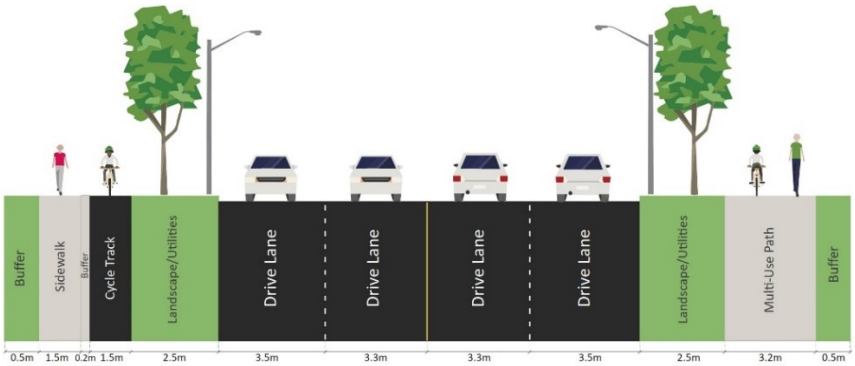
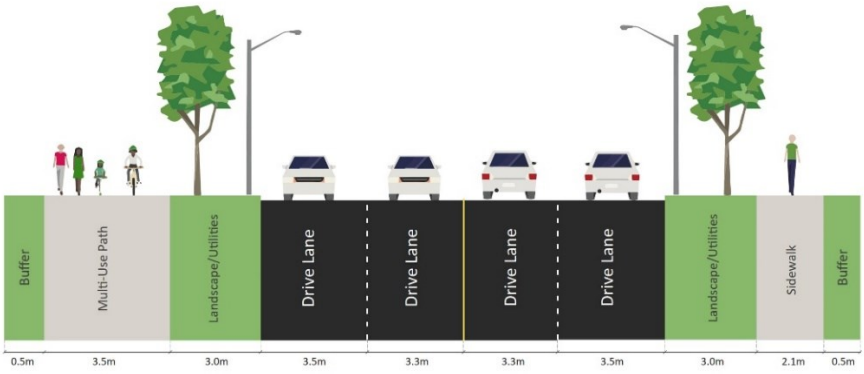
Road Design Parameters	Minimum Design Standards		Source
	Major Collector Road	Minor Collector Road	
Pavement Width	14 m	7.5 m - 10 m	City of Vaughan
Basic Travel Lane	3.5 m	3.75 m	City of Vaughan
On Street Parking	-	2.5 m	City of Vaughan
Curb and Gutter	0.2 m	0.2 m	OPSD 600.07
Landscape/utilities	2.3 m	2.3 m	City of Vaughan
Sidewalk	1.5 m	1.5 m	City of Vaughan
Cycling Facility (lane or track)	1.8 m	1.8 m	City of Vaughan
Multi-Use Path	3.0 m	3.0 m	City of Vaughan

Based on the key design parameters and after consultation with study team, several cross-section alternatives were generated for the major and minor collector roads, as described below.

7.1.2 MAJOR COLLECTOR CROSS-SECTION ALTERNATIVES

Three major collector cross-section alternatives were developed. Key differences between each alternative are in relation to how active transportation facilities are accommodated. Particularly, Alternative MA1 offers the options for facilities on both sides of the roadway (i.e., having the option for either bike lane or multi-use path). Alternative MA2 offers cycling facilities via a multi-use path on one side of the roadway and Alternative MA3 offers in boulevard buffered on-street cycling facilities on both sides of the roadway. **Table 7-3** summarizes the major collector cross-section alternatives and their associated design elements.

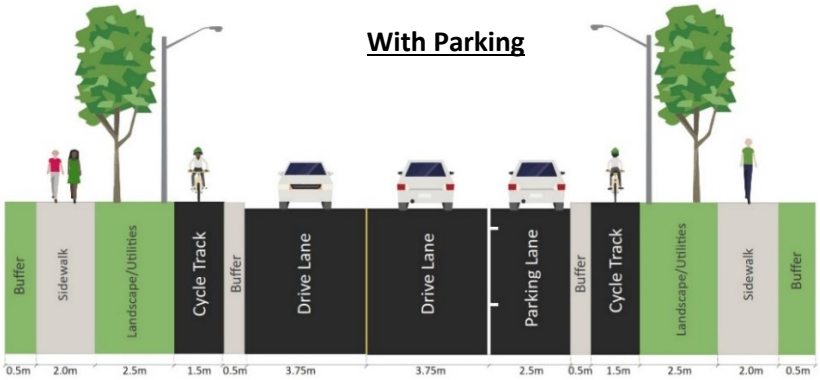
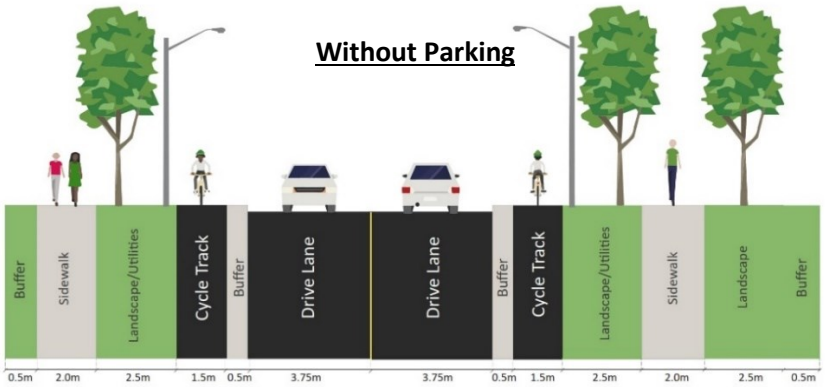
Table 7-3: Major Collector Cross-Section Alternatives (26 m)

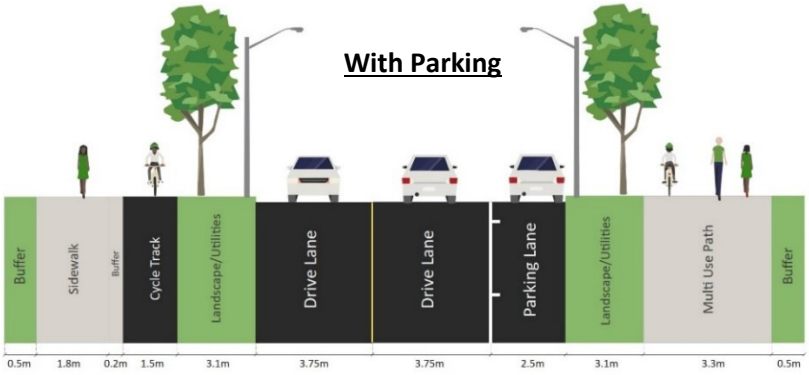
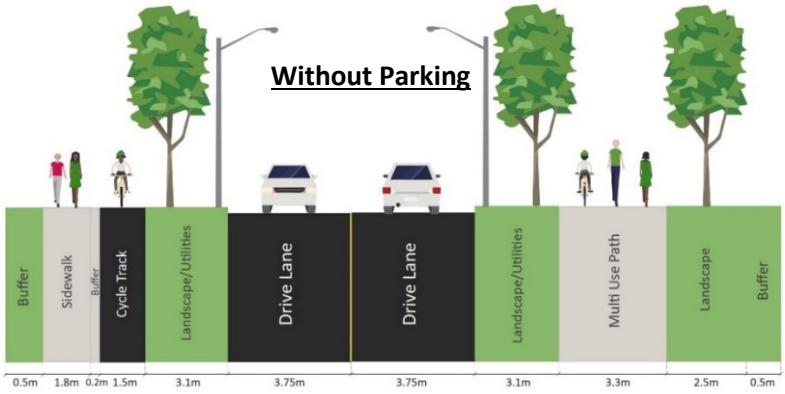
Major Collector Cross-Section Alternatives	Design Elements
Alternative MA1 (Side-by-Side Facilities or Multi-Use Paths*)	
 *This alternative provides flexibility to implement multi-use paths or side-by-side facilities. Both are illustrated as an example.	**Edge Buffers:** 0.5 m **Side-by-Side Facilities** • **Sidewalk:** 1.5 m • **Buffer:** 0.2 m • **Cycle Track:** 1.5 m **Multi-Use Path:** 3.2 m **Landscape/Utilities:** 2.5 m **Drive Lane:** 3.5 m **Through Lane:** 3.3 m
Alternative MA2 (Multi-Use Path & Sidewalk)	
	**Edge Buffers:** 0.5 m **Multi-Use Path:** 3.5 m **Sidewalk:** 2.1 m **Landscape/Utilities:** 3.0 m **Drive Lane:** 3.5 m **Through Lane:** 3.3 m
Alternative MA3 (Separated Facilities)	
	**Edge Buffers:** 0.5 m **Sidewalk:** 1.5 m **Landscape/Utilities:** 2.5 m **Cycle Track:** 1.5 m **Buffer:** 0.5 m **Drive Lane:** 3.3 m **Through Lane:** 3.3 m

7.1.3 MINOR COLLECTOR CROSS-SECTION ALTERNATIVES

Two minor collector cross-sections alternatives were developed. Alternative MI1 offers buffered on-street cycling facilities on both sides of the roadway while Alternative M12 offers in boulevard facilities through a multi-use path on one side of the roadway and cycle track on the other. It is anticipated that there are some areas along collector streets where a parking lane may not be suitable. As such, cross-sections with and without a parking lane have been developed. Specific location with and without parking along collector roads will be determined during the detailed design phase. **Table 7-4** details the minor collector cross-section alternatives and their associated design elements.

Table 7-4: Minor Collector Cross-Section Alternatives (24 m)

Minor Collector Cross-Section Alternatives	Design Elements
Alternative MI1 (Separated Facilities)	
With Parking  **Without Parking** 	**Edge Buffers:** 0.5 m **Sidewalk:** 2.0 m **Landscape/Utilities:** 2.5 m **Cycle Track:** 1.5 m **Buffer:** 0.5 m **Drive Lane:** 3.75 m **Parking Lane:** 2.5 m **No Parking Alternative:** • Parking lane is converted to a 2.5 m landscape facility (one side)

Minor Collector Cross-Section Alternatives	Design Elements
Alternative MA2 (side-by-Side Facilities/Multi-Use Path)	
With Parking  **Without Parking** 	**Edge Buffers:** 0.5 m **Side-by-Side Facilities** • **Sidewalk:** 1.8 m • **Buffer:** 0.2 m • **Cycle Track:** 1.5 m **Multi-Use Path:** 3.3 m **Landscape/Utilities:** 3.1 m **Drive Lane:** 3.75 m **Parking Lane:** 2.5 m **No Parking Alternative:** • Parking lane is converted to a 2.5 m landscape facility (one side)

7.2 EVALUATION AND SELECTION OF RECOMMENDED CROSS-SECTIONS

Each cross-section alternative was evaluated to determine the appropriate cross-section design for each collector road. The evaluation was based on the following broad and sub-categories:

- Transportation
  - Active transportation and road safety
  - Transit serviceability
  - Road capacity
  - Design standard compliance
  - Community connectivity
  - High quality and sustainable public realm

- Socio-economic environment
  - Surrounding land uses
  - Climate change

- Cost and constructability
  - Engineering feasibility, capital, operational, and maintenance cost

These categories were chosen to assist with the differentiation of the benefits of each of the alternative cross-section being evaluated. Similar to the evaluation and selection of the preferred road alignments, the evaluation for the preferred cross-sections were conducted using a 5-point scale from least supportive (○) to most supportive (●) based on an equal weighting of the criteria. Following the evaluation of the alternative cross-sections against the identified criteria, an overall preferred alternative was identified for each roadway. **Table 7-5** and **Table 7-6** summarizes the evaluation of alternative cross-sections for major and minor collector roads, respectively. Detailed evaluation of alternative cross-sections for each collector roadway is provided in **Appendix M.**

Table 7-5: Evaluation of Major Collector Cross-Section Alternatives

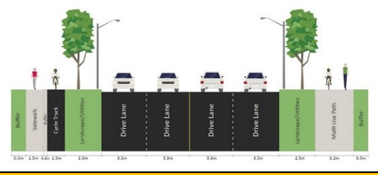
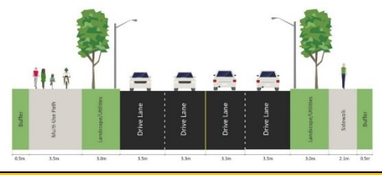
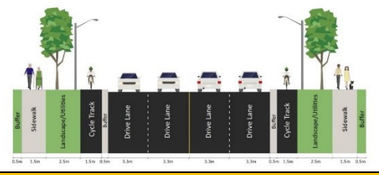
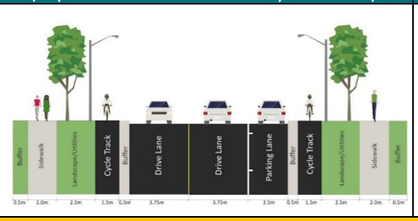
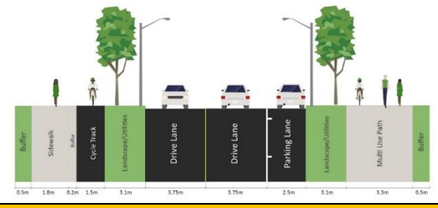
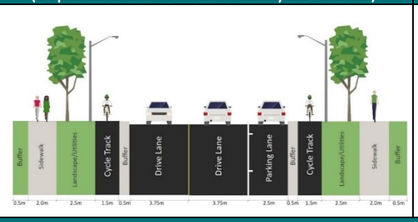
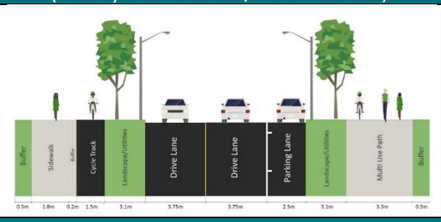
Street	Alternative MA1 (Side-by-Side Facilities/Multi-Use Path)	Alternative MA2 (Multi-Use Path - Single Sided)	Alternative MA3 (Separated Uni-Directional Cycle Tracks)	Comment/Rationale
				
Transportation				
Street 2 Street 5 Street 8				**Alternative MA1** is the preferred cross-sections for all major collector roadways from an overall Transportation perspective for the following reasons: • Achieve complete street principles and provides adequate infrastructure for all road users and meets City of Vaughan current and proposed future design standards • Pedestrians and cyclists are separated from vehicular traffic • Accommodates transit vehicles to enhance connectivity to adjacent blocks and within the block and supports Block 27 as a transit-oriented community • Provides flexibility to connect with other cycling/active transportation facilities on connecting roadways • Provides wider facility widths which meet the City's anticipated future required facility widths
Socio-Economic Environment				
Street 2 Street 5 Street 8				**Alternative MA1** is preferred for all major collector roadways from an overall Socio-Economic Environment perspective for the following reasons: • Conforms with City of Vaughan land-use policy objectives and Block 27 Secondary Plan (Transit Orientated Community), providing both active transportation and transit supportive infrastructure • Pedestrian and cycling facilities on both sides provides access both sides of the roadway • Provides for street trees which improves aesthetics • Moderate imperviousness, moderate chance to address climate change • Moderate landscape width, resulting in moderate opportunity to implement LIDs and trees to address climate change
Engineering Feasibility, Capital, Operational, and Maintenance Cost				
Street 2 Street 5 Street 8				**All Alternatives** are equally preferred for all major collector roadways from an overall Cost & Constructability perspective for the following reasons: • Construction of roadway with uni-directional cycling facilities/MUP/side-by-side facilities are standard within the City of Vaughan and construction is not anticipated to be complex • Capital, operational, and maintenance costs are anticipated to be similar
Overall Evaluation				
Street 2 Street 5 Street 8				**Alternative MA1 was identified as the preferred cross-section for Street 2, Street 5, and Street 8**

Table 7-6: Evaluation of Minor Cross-Section Alternatives

Street	Alternative MI1 (Separated Uni-Directional Cycle Tracks)	Alternative MI2 (Side-by-Side Facilities/Multi-Use Path)	Comment/Rationale
			
Transportation			
Street 1 Street 3 Street 7	◔	◔	**Alternative MI1** is the preferred cross-section for majority of the minor collector roads from an overall Transportation perspective for the following reasons: • Achieves complete street principles and provides sufficient infrastructure for all road users which meet the City's standards • Provides safe conditions and is compatible with the land uses along Street 1, Street 3, Street 4, and Street 7 • Separated buffered pedestrian and cyclists facilities • Meets the recommended facility widths in the City of Vaughan's 2020 Design Standards and are AODA compliant • Achieves Vision Zero objectives by providing separated buffered pedestrian and cyclist facilities • Alternative provides greater separation between pedestrian and cycling facilities which minimizes risk for collisions and may be preferred for children and seniors • Uni-directional cyclist tracks provide flexibility to connect with other cycle facilities on connecting roadways
Street 4	◔	◑	
Street 6	◔	◔	**Alternative MI1 and MI2** are equally preferred for Street 6 from an overall Transportation perspective for the following reasons: • Both alternatives achieve complete street principles and provides sufficient infrastructure for all road users which meet the City's standards and are AODA compliant • Both alternatives achieve Vision Zero objectives by providing off-street separated and buffered facilities for both pedestrians and cyclists which enhances safety • Both alternatives provide flexibility to connect with other cycle facilities on connecting roadways and trails • Both alternatives will require a mixing zone during the transition of AT facilities to the proposed trail along Collector Street 6 and "Super Trail" but will allow smooth transitions (note: Special design considerations may be required for the transition at the next Detailed Design)
Socio-Economic Environment			
Street 1 Street 3 Street 4 Street 7	◔	◑	**Alternative MI1** is the preferred cross-section from a Socio-Economic Environment perspective for the following reasons: • Conforms with City of Vaughan land-use policy objectives • City of Vaughan prefers the implementation of uni-directional cycle tracks across Vaughan • Provides active transportation facilities on both side of the road supports the low-rise mixed-uses on both sides of the road • Uni-directional cycle facilities are favorable given the surrounding residential land-uses • Provides a large landscape width for street trees which improves aesthetics • Moderate imperviousness with moderate ability to address climate change
Street 6	◔	◔	**Alternatives MI1 and MI2** are equally preferred cross-sections from a Socio-Economic Environment perspective for the following reasons: • Both alternatives conform with City of Vaughan land-use policy objectives • Both alternatives provide active transportation facilities on both side of the road supports the low-rise mixed-uses on both sides of the road • Both alternatives will support a smooth transition from Collector Street 6 onto the proposed trail along Collector Street 6 and 'Super Trail' proposed along the TC pipeline • Both alternatives provide moderate imperviousness with moderate ability to address climate change
Engineering Feasibility, Capital, Operational, and Maintenance Cost			
Street 1 Street 3 Street 4 Street 6 Street 7	◑	◑	**Alternatives C1-MI1 and C1-MI2** are equally preferred cross-sections from an overall cost & constructability perspective for the following reasons: • Construction of roadway with uni-directional cycling facility or MUP/side-by-side facilities are standard within the City of Vaughan and complications are not anticipated • Construction, operating and maintenance costs are anticipated to be similar

Street	Alternative MI1 (Separated Uni-Directional Cycle Tracks)	Alternative MI2 (Side-by-Side Facilities/Multi-Use Path)	Comment/Rationale
			
Overall Evaluation			
Street 1 Street 3 Street 4 Street 7			Alternative MI1 was identified as the preferred cross-section for Street 1, Street 3, Street 4, and Street 7
Street 6			Alternative MI1 and MI2 was identified as the equally preferred for Street 6

7.2.1 SELECTION OF PREFERRED MAJOR COLLECTOR CROSS-SECTION

Based on the evaluation of alternative major collector cross-sections, side-by-side facilities or multi-use paths (**Alternative MA1**) was selected as the preferred cross-sections for all major collector roads, as shown in **Figure 7-1**, for the following reasons:

- Achieves complete street principles and provides sufficient infrastructure for all road users
- Provides flexibility to connect with all other active transportation facilities on connecting roadways and proposed trails (e.g., Vaughan Super Trail)
- Road width accommodates transit vehicles to enhance connectivity to adjacent blocks
- Provides wider facility widths and safer conditions for surrounding land uses (e.g., low-rise residential, low/mid-rise residential, mid-rise mixed-use, schools, Kirby GO Transit Hub)
- Conforms with City of Vaughan land use policy objectives, providing both active transportation and transit-supportive infrastructure
- Meets recommended facility widths per the City's Design Standards (2020) and AODA
- Active transportation facilities are separated from vehicular traffic and provided on both sides of the roadway which provides convenient access to/from adjacent land use

7.2.2 SELECTION OF PREFERRED MINOR COLLECTOR CROSS-SECTION

Based on the evaluation of alternative minor collector cross-sections, separated facilities **(Alternative MI1)** was selected as the preferred cross-section for all minor collector roads, as shown in **Figure 7-2**, for the following reasons:

- Achieves complete street principles and provides sufficient infrastructure for all road users
- Meets the recommended facility widths in the City of Vaughan's 2020 Design Standards and are AODA compliant
- Separated pedestrian and cycling facilities which minimizes risk for collisions
- Flexibility to connect with other cycling facilities on connecting roadways and proposed trails (e.g., Vaughan Super Trail)
- Conforms to policy objectives by providing for a multi-modal transportation system including pedestrian and cycling facilities
- Active transportation facilities on both sides of the road which provides convenient access to/from adjacent land uses
- City of Vaughan prefers the implementation of uni-directional cycle tracks across the City
- Provides safer conditions for surrounding land uses (e.g., low/mid-rise residential, mid-rise mixed-use, community hub)

Upon selecting the preferred minor collector cross-section, a modified cross-section was developed to provide flexibility to connect the Block's natural green systems and proposed trails (e.g., the City of Vaughan's Super Trail). This cross-section reduces the landscaping and buffer area of the preferred minor cross-section to accommodate a 3.2 m multi-use path while maintaining cycle tracks on both sides of the roadway (see **Figure 7-3**). A multi-use path is recommended along portions of Street 6, Street 1, Street 3, and Street 7 to create a continuous and safe connection from future recreational trails within the Block. This is further discussed in **Section 7.2.3** below.

Figure 7-1: Preferred 26 m Major Collector Cross-Section (Alternative MA1 - Side-by-Side Facilities or Multi-Use Paths)

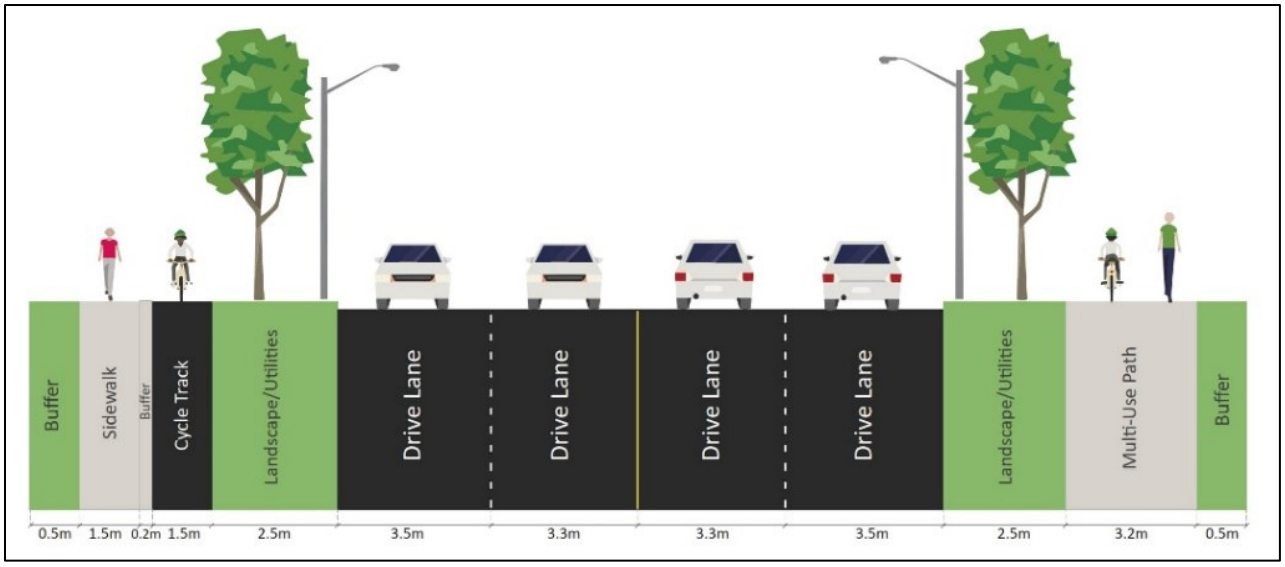


Figure 7-2: Preferred 24 m Minor Collector Cross-Section (Alternative MI1 - Separated Facilities)

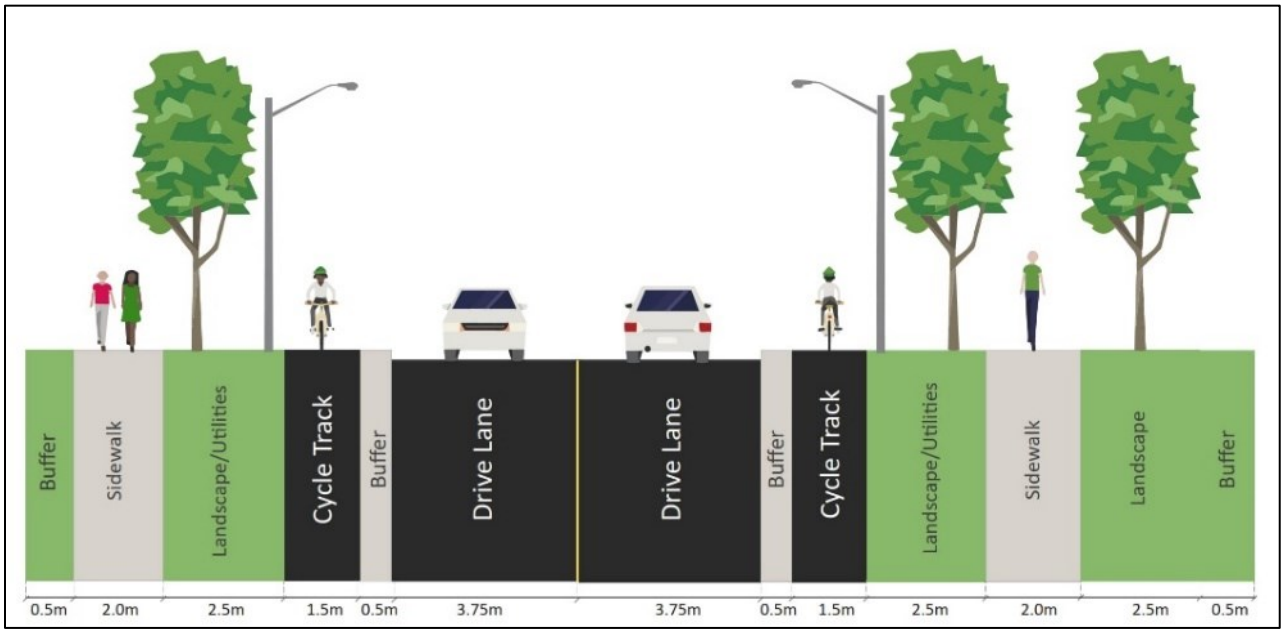
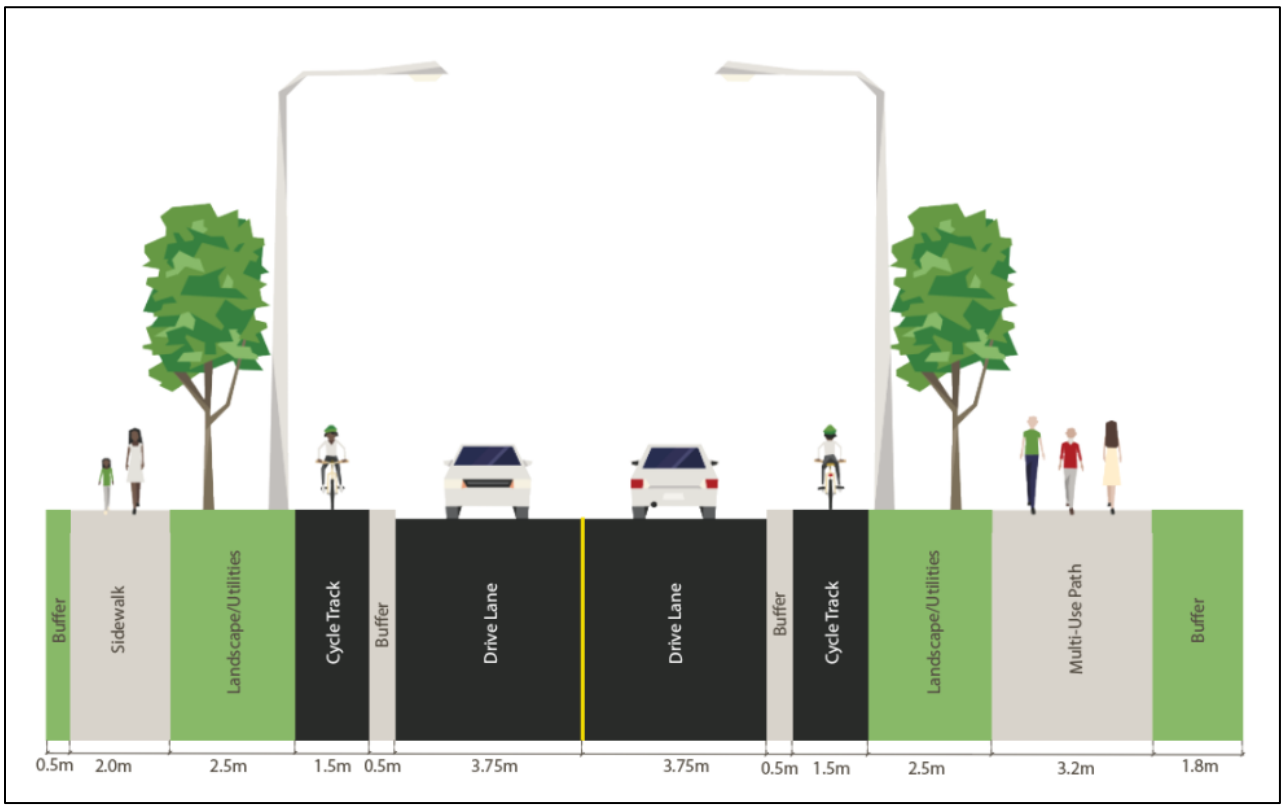


Figure 7-3: Preferred 24 m Minor Collector Cross-Section (Separated Facilities + MUP)



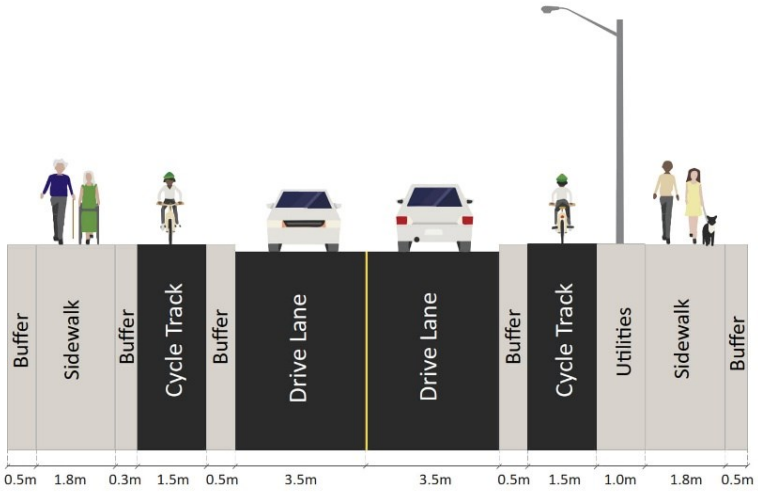
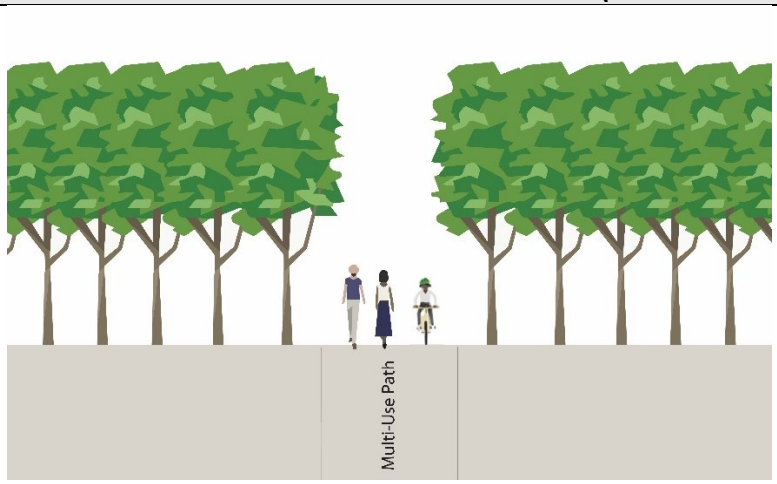
7.2.3 SIGNIFICANT WOODLOT CROSSING

7.2.3.1 Cross-Section Alternatives

It is recognized that both alternatives for Street 6 traverse through an environmentally significant woodlot and the largest natural core area in Block 27. However, in response to concerns received from external agencies (i.e., TRCA, MNR) and Indigenous Communities on the proposed impacts to the significant woodlot to connect Street 6 to Kirby Road, further assessment was completed to determine whether a connection to Kirby Road is warranted from a traffic network perspective and explore potential mitigation measures. Additional traffic modelling was conducted to review the feasibility of removing the Street 6 connection which determined the minimum number of road connections needed to service the Block 27 development (see **Appendix P**). With Street 6 terminating at Street 2, traffic was diverted to the adjacent roadways (i.e., Street 5) while maintaining an acceptable level of service. As such, it was determined that the road network would perform satisfactorily with the removal of the direct connection of Street 6 to Kirby Road and instead terminate at Street 2 just south of the significant woodlot provided that Street 5 develops as a 4-lane roadway at the onset of development.

As such, the Project Team explored the option to remove the road connection and only provide an active transportation multi-use path (MUP) for pedestrians and cyclists through the significant woodlot instead of a road. The multi-use path option was evaluated against an alternative with a reduced cross-section was developed which removes the landscape area and reducing buffer space as detailed in **Table 7-7**.

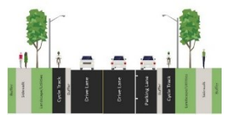
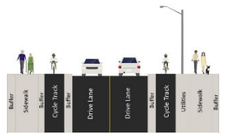
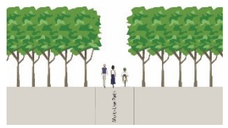
Table 7-7: Cross-Section Alternatives Through the Woodlot

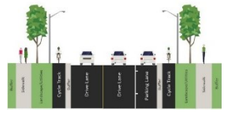
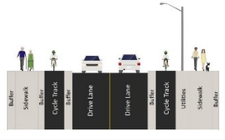
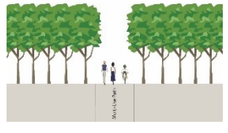
Significant Woodlot Crossing Alternative	Design Elements
Alternative WC2 (Separated Facilities - 16.9 m)	
	**Edge Buffers:** 0.5 m **Sidewalk:** 1.8 m **Buffer between AT Facilities:** 0.3 m **Cycle Track:** 1.5 m **Buffer:** 0.5 m **Drive Lane:** 3.5 m **Utilities Corridor:** 1.0 m
Alternative WC3 (Multi-Use Path)	
	The design and implementation of the multi-use path will be completed as part of future development applications, including completion of any additional technical studies and required permits/approvals

7.2.3.2 Alternatives Evaluation

An evaluation was completed for the three alternative cross-sections developed for the crossing of the significant woodlot which is summarized in **Table 7-8** below. The evaluation framework applied included the evaluation criteria utilized in the evaluation of the major and minor collector road cross sections with the addition of the natural environmental criteria from the collector road alignment evaluation framework.

Table 7-8: Woodlot Crossing Alternative Evaluation

Evaluation Criteria		Alternative WC1 (Preferred Street 6 Cross-Section – 24m)	Alternative WC2 (Road with Separated AT Facilities – 16.9m)	Alternative WC3 (Multi-Use Path)	Comment/Rationale
					
Transportation	• Active transportation and road safety • Transit serviceability • Road capacity • Design standard compliance • Community connectivity • High quality and sustainable public realm	◕	◑	◔	**Alternative WC1** is the preferred cross-section for the connection through the significant woodlot (Street 6) from an overall Transportation perspective for the following reasons: • Provides a road facility for a vehicular connection and transit service along Street 6 with a direct connection to Kirby Road, however, based on the results of the updated traffic modelling completed without a vehicular connection to Kirby Road, the overall road network will operate at an acceptable level of service without the road connection • Alternative provides greater separation between pedestrian and cycling facilities • Meets the minimum sidewalk and cycling facility width requirements per the City of Vaughan's Engineering Design Criteria & Standard Drawings (December 2020)
Natural Environment	• Vegetation, Wildlife, and Wildlife Habitat • Designated • Natural Heritage Features and • Environmentally Sensitive Areas • Rare Species, Species of Conservation Concern, and Species at Risk (SAR) • Potential to affect the quality of groundwater resources • Potential to affect surface water quality and quantity	◔	◑	◕	**Alternative WC3** is the preferred cross-section for the connection through the significant woodlot (Street 6) from an overall Natural Environmental perspective for the following reasons: • Significantly reduces the number of tree removals required • Provides greater flexibility in its alignment through the woodlot to avoid and minimize impacts to trees and sensitive features • Significantly reduces impacts to wildlife and wildlife habitat, including potential species of conservation concern that may be present • Reduces potential affects to the quality of groundwater and surface water quality and quantity
Socio-Economic Environment	• Surrounding land uses • Climate change • Noise and Air Quality Impact	◑	◔	◕	**Alternative WC3** is the preferred cross-section for the connection through the significant woodlot (Street 6) from an overall Socio-Economic Environmental perspective for the following reasons: • Provide active transportation facilities to provide connectivity for the mid-rise residential/mixed-used land-uses north of the significant woodlot to the land-uses (e.g., schools) south of the woodlot • Removes vehicular use which minimizes greenhouse gas emissions which addresses climate change • Removing the road facility through the woodlot will minimize noise and • Improve air quality through the reduction of vehicular use and preserving more trees in the significant woodlot

Evaluation Criteria		Alternative WC1 (Preferred Street 6 Cross-Section – 24m)	Alternative WC2 (Road with Separated AT Facilities – 16.9m)	Alternative WC3 (Multi-Use Path)	Comment/Rationale
					
Engineering and Cost	• Engineering Feasibility • Capital Cost • Operational / Maintenance Cost	◔	◑	◕	**Alternative WC3** is the preferred cross-section for the connection through the significant woodlot (Street 6) from an overall engineering and cost perspective for the following reasons: • Least complex construction • Lowest construction cost • Lowest operational / maintenance cost
Overall Evaluation		◑	◑	◕	**Alternative WC3 was identified as the preferred cross-section for the connection through the significant woodlot**

7.2.3.3 Selection of Preferred Significant Woodlot Crossing Alternative

Based on the evaluation of crossing alternatives through the significant woodlot, **Alternative WC3** was selected as the preferred crossing type which includes the provision of a multi-use path and removing the road component for the following reason:

- Although WC3 does not provide vehicular or transit connectivity along Street 6 directly to Kirby Road, traffic modelling results indicate the overall road network will operate at an acceptable level of service without a direct road connection along Street 6 through the significant woodlot to Kirby Road
- Active transportation facilities will be provided which increase connectivity for the mid-rise residential/mixed-use land-uses north of the woodlot to the land-uses (e.g., schools) south of the woodlot
- Reduces natural environmental impacts to the significant woodlot by reducing tree/vegetation removals, and minimizing impacts to wildlife and wildlife habitat, and potential species of conservation concern
- Minimizes potential effects to groundwater quality and surface water runoff quality and quantity
- Encourages active transportation which minimizes auto dependency which reduces greenhouse gas emissions and noise impacts and improves air quality
- Least complex construction
- Lowest construction and operational/maintenance cost

7.2.3.4 Design and Implementation of the Significant Woodlot Crossing

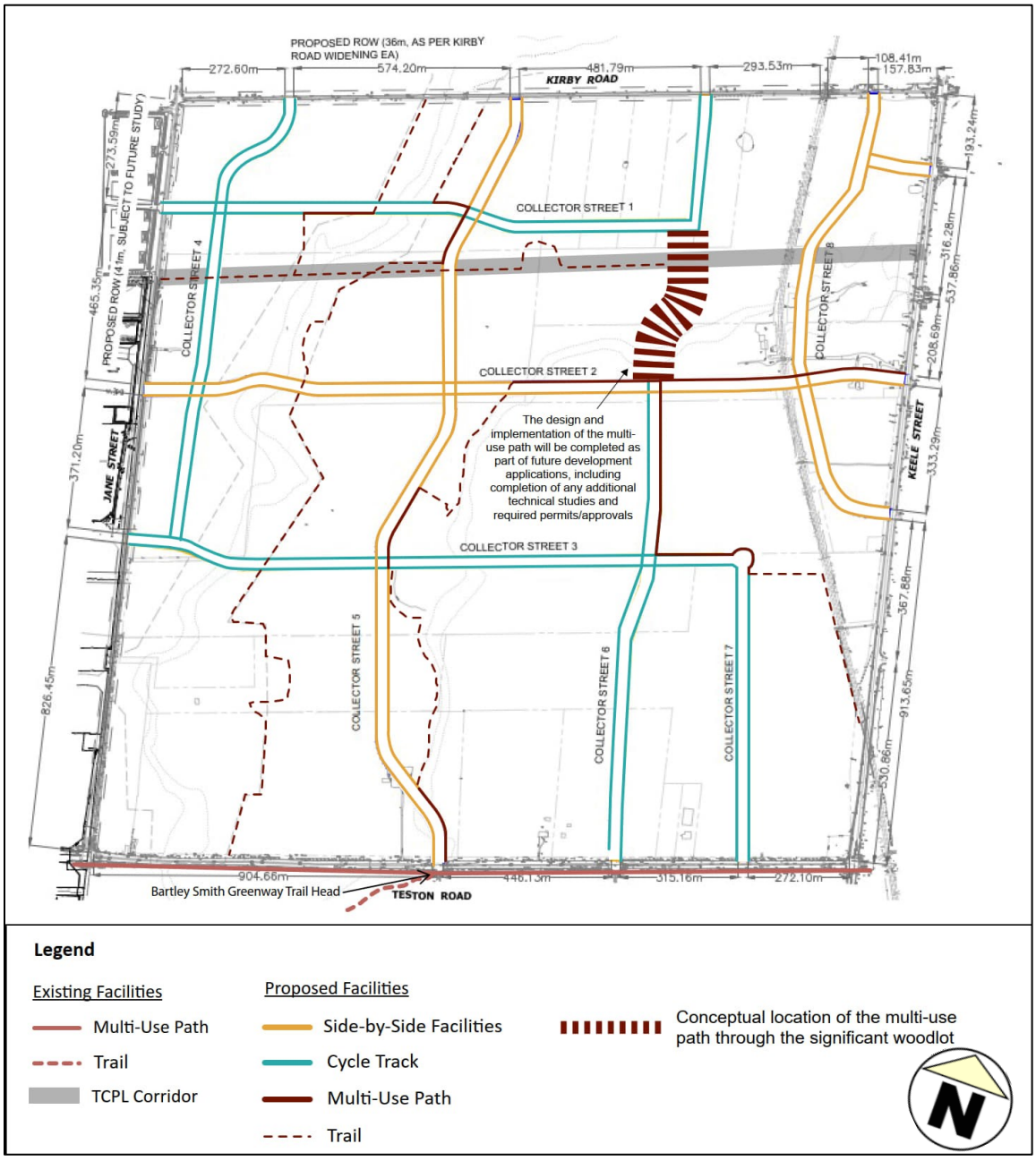
Per the *Municipal Class Environmental Assessment* (2023), the construction of a multi-purpose path, including water crossings, outside existing right-of-way and/or in a utility or rail corridor with an anticipated construction cost less than $4.1 million is exempt from the requirements of the MCEA. Given the anticipated construction cost for the significant woodlot crossing is anticipated to be under the $4.1 million cost threshold, it is exempt from the requirements of the MCEA and does not require EA approval to proceed and is not included in the Recommended Design for this EA study. Of note, MCEA cost thresholds are updated on an annual basis by the MECP based on MTO's Tender Price Index and will be effective when published on the Environmental Registry on Ontario (ERO). The latest MCEA cost threshold should be reviewed when significant woodlot crossing construction cost estimate is available to confirm the MCEA exemption / schedule confirmation.

The design and implementation of the multi-use path will be completed as part of future development applications. The design of the multi-use path will be completed in consultation with the City of Vaughan to determine the width and types of facilities that will be included as part of the trail (e.g., paving material, lighting requirements, etc.). Further technical studies will be required to support the design of the multi-use path (e.g., alignment), including but not limited to additional natural environmental studies (e.g., arborist report, tree inventory, etc.). The alignment through the woodlot will be determined through the findings and recommendations from the additional technical studies to minimize impacts to the natural environment through the woodlot. Any trail lighting should be designed to minimize impacts to wildlife and limit light pollution. Any required permits/approvals in support of the connection through the significant woodlot must be obtained prior to start of construction of the multi-use path.

7.2.3.5 *Recommended Active Transportation Facility Network*

Based on the selection of preferred major and minor collector cross-sections, **Figure 7-4** illustrates the recommended active transportation facilities (i.e., side-by-side facilities, multi-use path or cycle tracks) along the collector roadways. To create a continuous and safe connection with future recreational trails within the block (i.e., the Vaughan Super Trail), multi-use paths will be provided along portions of Street 1, Street 2, Street 3, Street 5, and Street 6. A future multi-use path is proposed between Street 1 and Street 2, in place of the Street 6 road connection through the woodlot. It should be noted that this connection is subject to future studies and will be implemented through a separate City process.

Figure 7-4: Recommended Active Transportation Network



8 RECOMMENDED DESIGN

The preferred design concepts for the recommended transportation network in the NVNCTMP and Block 27 Secondary Plan evolved over the course of this Class EA. The preferred road alignments identified as part of the Block 27 MCEA were ultimately selected based on a comparative evaluation process that considered transportation facilities for all road users (motorists, transit, cyclists, and pedestrians) and potential impacts to the community, natural environment, cultural environment, property and access requirements, and capital construction and maintenance costs. The preferred road alignments were also developed and refined through extensive consultation with agencies, stakeholders, Indigenous Communities, and the public.

This section describes the functional design and engineering features of the preferred transportation network in the study area, including:

- Alignments
- Cross-sections
- Watercourse crossings
- Channel realignments
- Intersection control measures
- Preliminary cost estimates
- Anticipated implementation process

A full set of plan and profile drawings and typical section drawings have been included in **Appendix N**. Note that these designs are conceptual, and are planned to be flexible to accommodate changes to the NHN boundaries as a result of updated OWES policies and specific site conditions identified through the draft plan review/approval process, as discussed in **Section 10**. Furthermore, the configuration and design of intersections along regional roads will be subject to York Region's approval during the detailed design/development approval phases.

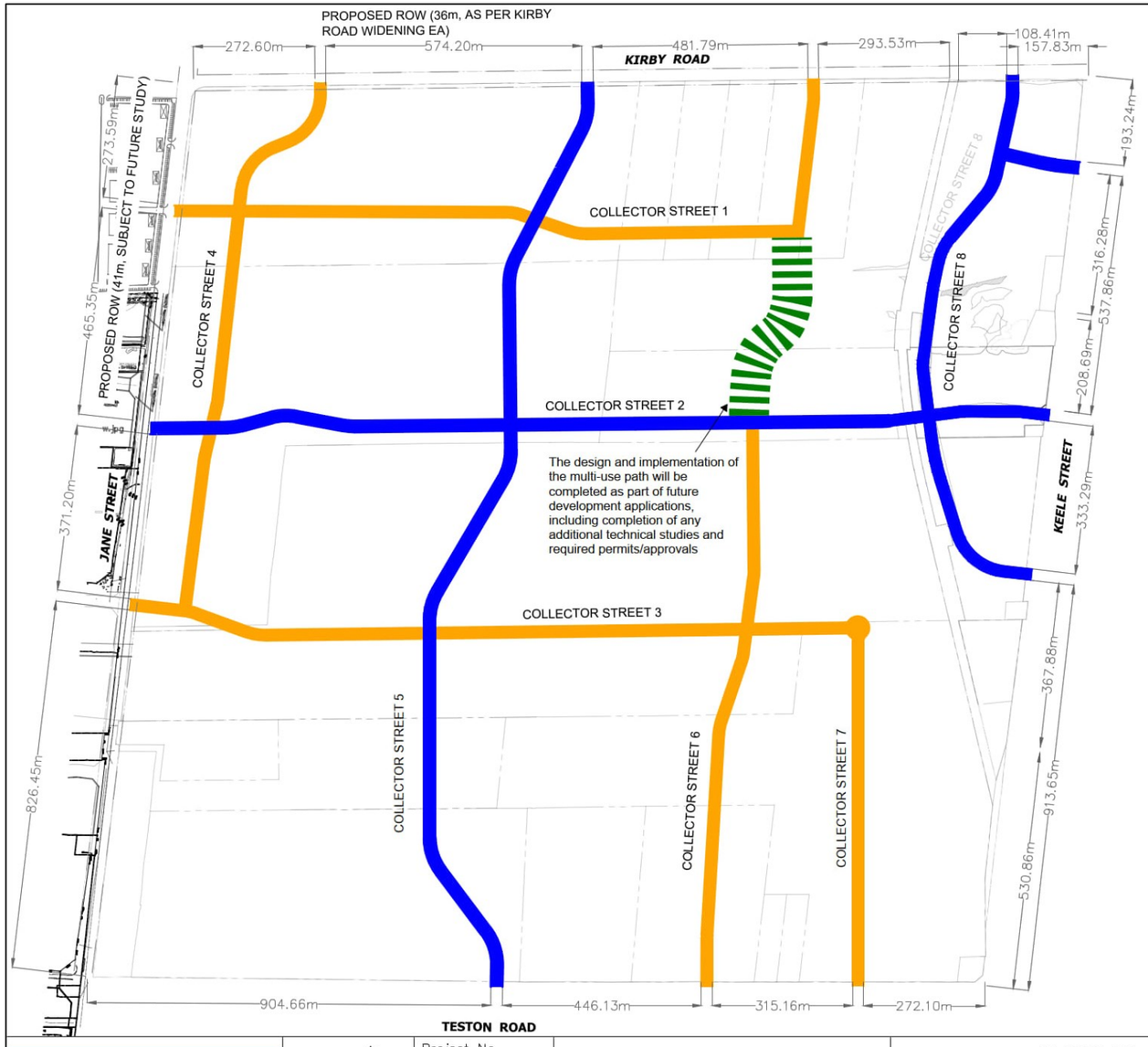
8.1 ALIGNMENTS

8.1.1 HORIZONTAL ALIGNMENT

The preferred alignment for all proposed collector roads is illustrated in **Figure 8-1** and provided in **Appendix N**. The design of Kirby Road and the North Maple Regional Park access with Street 8 was based on the recommended designs as per the Kirby Road Widening EA and North Maple Regional Park Ring Road Intersections with Keele Street IFC drawings, respectively.

It should be noted that refinements were made to the selected alternatives of Street 1, Street 5, Street 6, and Street 7 following the Public Information Centre and in consultation with TAC members. Refinements were made to increase the separation distance between intersections along regional roads, further minimize environmental impact of the selected alternatives, and improve lotting patterns on the block. These refinements are reflected in the overall preferred road network, illustrated, and described below. With the exception of Street 2 and Street 8/Vista Gate at Keele Street, and the right-in right-out of Street 8 to Kirby Road, all intersections with regional roads achieve a minimum separation of 215 m measured from curb return, and where possible, meets the region's target of 300 m.

Figure 8-1: Block 27 MCEA Study Preferred Alignments of Proposed Collector Roads



NOTES:

1. AS PER CITY OF VAUGHAN ENGINEERING DESIGN CRITERIA AND STANDARD DRAWINGS (DECEMBER 2020)

HORIZONTAL ALIGNMENT CRITERIA		
	COLLECTOR ST 2, 5 & 8	COLLECTOR ST 1, 3, 4, 6 & 7
ROAD CLASSIFICATION	MAJOR COLLECTOR	MINOR COLLECTOR
MIN. HORZ. CURVE RADIUS (m)	125	115

2. AS PER CITY OF VAUGHAN ENGINEERING STD. DWG. R – 108: HORIZONTAL CURVE RADIUS AT ANGLE BEND = 12m
3. AS PER TAC 3.2.6.1.18: INTERSECTING ROADS ARE ALLOWED TO MEET BETWEEN 70 – 110°
4. AS PER CITY OF VAUGHAN NORTH VAUGHAN NEW COMMUNITIES TRANSPORTATION MASTER PLAN (JAN 2019):
   MAJOR COLLECTOR ROADS TO HAVE A RIGHT–OF–WAY OF 26m
   MINOR COLLECTOR ROADS TO HAVE A RIGHT–OF–WAY OF 24m

LEGEND:

- MINOR COLLECTOR STREETS
- MAJOR COLLECTOR STREETS
- PROPERTY LIMITS
- PROPOSED ROAD WIDENING (BY OTHERS)
- CONCEPTUAL LOCATION OF THE MULTI–USE PATH CONNECTION THROUGH THE SIGNIFICANT WOODLOT

LEA Consulting Ltd. Consulting Engineers and Planners www.LEA.ca	N	Project No. 20009 Date AUG 22, 2024	NOT FOR CONSTRUCTION	BLOCK 27 VAUGHAN ONTARIO SCALE 1:10000	FINAL ROAD NETWORK	Drawing No. 001

8.1.1.1 Street 1

Street 1 is proposed as a minor collector with a 24.0 m ROW. The preferred east-west Street 1 alignment extends from Jane Street in the west to Street 6 in the east. The design criteria used for Street 1 are as follows:

- Design Speed: 50 km/h
- Minimum horizontal curve radius: 115 m

Alternative 1A was selected as the preferred alignment for Street 1 because it has the least impact to natural environmental features and requires a shorter floodplain crossing. Furthermore, Alternative 1A was selected as it increases the separation distance from the TransCanada Pipeline ROW to avoid undevelopable lands and better support surrounding land uses.

Since the evaluation of alternatives, refinements were made to Street 1 to provide better lotting patterns at the northwest quadrant of the block and to increase the intersection spacing between Street 1 and Kirby Road. The revised alignment shifts Alternative 1A approximately 20 m south, satisfying the minimum 215 m intersection spacing requirement as per York Region's design guideline and standards. It should be noted that the shift maintains similar crossing characteristics to Alternative 1A. The length of the road crossing the greenbelt is approximately the same and is anticipated to have similar environmental impacts as the evaluated alternative. Furthermore, the study team has consulted with the Block 34 East project team on the west side of Jane Street to coordinate the alignment of Street 1 and Block 34 East's driveway to form a single intersection location along Jane Street. The revised alignment of Street 1 is illustrated in **Figure 8-1**.

Street 1 will have one watercourse crossing location within the Greenbelt, approximately 300 m south of Kirby Road.

8.1.1.2 Street 2

Street 2 is proposed as a major collector with a 26.0 m ROW. The preferred east-west Street 2 alignment extends from Jane Street in the west to Keele Street in the east. The design criteria used for Street 2 are as follows:

- Design Speed: 60 km/h
- Minimum horizontal curve radius: 125 m

Alternative 2B was selected as the preferred alignment for Street 2 because it has the least impact to natural features. The bend along Alternative 2B's western route weaves between two PSWs within the Greenbelt valley corridor to avoid direct impact to these significant wetlands. Furthermore, the Alternative 2B crossing of DF1 is shorter in length than Alternative 2A which minimizes the impact on wetland and wildlife functions. Since the evaluation of alternatives, minor refinements were made to the Alternative 2B alignment to meet the City's minimum straight distance of 20 m between any intersections and road tangents.

It is recognized that the alignment of Street 2 is located between two woodlots found within the east portion of the Block and maintaining a functional connection between these woodlots is an important ecological objective. Due to grading as a result of the grade separation of Street 2 at the rail corridor, Street 2 will be at a lower elevation compared to the adjacent north-south lands. Given the location of the woodlot at the southeast corner of Street 6 & Street 2, respective to the CNR corridor, there is limited ability to provide a continuous ecological connection from north to south. As discussed in **Section 4.2.3**, alternative alignments further south were explored as part of the NVNCTMP. However, the location of the railway relative to Keele Street reduces the distance to have a viable grade-separation at a location south of the woodlot.

Street 2 will have two watercourse crossing locations. One within the Greenbelt at DF1 and another at DF3-2, located approximately 340 m and 1 km east of Jane Street, respectively.

8.1.1.3 Street 3

Street 3 is proposed as a minor collector with a 24.0 m ROW. The preferred east-west Street 3 alignment extends from Jane Street in the west and connects with Street 7 to the east. The design criteria used for Street 3 are as follows:

- Design Speed: 50 km/h
- Minimum horizontal curve radius: 115 m

Alternative 3B was selected as the preferred alignment for Street 3 because it has the least impact to natural environmental features and surface water quality and quantity. Alternative 3B minimizes the encroachment into a PSW by 0.28 ha less and avoids fragmentation of the large PSW along DF3 when compared to Alternative 3A.

Street 3 will have three watercourse crossing locations. One within the Greenbelt at DF1, one at DF3-2, and one at DF4, located approximately 270 m, 895 m, and 1.3 km east of Jane Street, respectively.

8.1.1.4 Street 4

Street 4 is proposed as a minor collector with a 24.0 m ROW. The preferred north-south Street 4 alignment extends from Kirby Road in the north to Street 3 in the south. The design criteria used for Street 4 are as follows:

- Design Speed: 50 km/h
- Minimum horizontal curve radius: 115 m

Alternative 4A was selected as the preferred alignment for Street 4 because it provides sufficient road capacity and intersection spacing from Jane Street to avoid traffic queueing from Jane Street to Streets 1, 2, and 3. Furthermore, Alternative 4A was selected as it avoids impact to a built-heritage resource, existing residential building, and farm structures that would be impacted under Alternative 4B.

Based on feedback received from the Region during TAC Meeting #2, there were concerns regarding the Street 4 alignment and its separation distance to Jane Street, along Kirby Road. Since the evaluation of alternatives, the study team has consulted with York Region to increase the intersection spacing between Street 4 and Jane Street. The revised alignment shifts Alternative 4A, north of Street 1, approximately 60 m east to satisfy the minimum 215 m intersection spacing requirement as per York Region's design guideline and standards. The revised alignment of Street 4 is illustrated in **Figure 8-1**.

Street 4 does not require the crossing of any natural environmental features.

8.1.1.5 Street 5

Street 5 is proposed as a major collector with a 26.0 m ROW. The preferred north-south Street 5 alignment extends from Kirby Road in the north to Teston Road in the south and will connect with Cranston Park Avenue. The design criteria used for Street 5 are as follows:

- Design Speed: 60 km/h
- Minimum horizontal curve radius: 125 m

Alternative 5A was selected as the preferred alignment because it has the least impact to natural environmental features. Alternative 5A requires one less crossing of the central drainage feature (DF3) and avoids the requirement for an additional floodplain crossing at the northern segment of Street 5 that would be required with Alternative 5B. Since the evaluation of alternatives and through the integrated process with the Block 27 Block Plan, refinements to the street alignment have occurred in order to improve upon the efficiency of neighbourhood blocks. The refinement of Street 5 is illustrated in **Figure 8-1**.

It is recognized that DF3 and the associated wetland is located directly across from Cranston Park Avenue. A connection of Street 5 with Cranston Park Avenue would result in extending the existing Teston Road culvert to accommodate this new road. This would require realignment of a portion of DF3 to avoid requiring two new crossings, address flooding conditions at Teston Road, and improve the watercourse alignment from both a geomorphic and ecological perspective. The existing channel has also been heavily modified (channelized), and realignment of the watercourse will provide opportunities for enhancement in the form of a more natural planform and riparian plantings.

The NVNCTMP and Block 27 Secondary Plan recommended a connection of Street 5 to Cranston Park Avenue to provide direct connectivity to the existing community south of Teston Road despite the presence of the watercourse. The connection of Street 5 to Cranston Park Avenue is required from a land use and transportation planning perspective to support the municipal wide auto and public transit network.

A Street 5 alignment alternative that avoids the natural system entirely (i.e., curving Street 5 further west), is not feasible as there is limited flexibility in modifying the curve radius of the Street 5 alignment to avoid the natural feature while connecting with Cranston Park Avenue at an appropriate angle that meets the City's road design standard at the Street 5 & Teston Road intersection. It should be noted that the alignment of Alternative 5A was designed to minimize impacts to DF3 to the extent possible while intersecting Street 5 to Teston Road at a 90-degree angle, as required by City of Vaughan design standards and guidelines for a standard intersection.

With realignment of DF3, Street 5 will have one watercourse crossing location at DF3-2 at Teston Road.

8.1.1.6 Street 6

Street 6 is proposed as a minor collector with a 24.0 m ROW. The preferred north-south Street 6 alignment extends from Street 2 in the north to Teston Road in the south. An additional segment of Street 6 from Kirby Road in the north to Street 1 in the south is proposed for access to properties in the northern portion of the block. The design criteria used for Street 6 are as follows:

- Design Speed: 50 km/h
- Minimum horizontal curve radius: 115 m

Alternative 6A was originally selected as the preferred alignment for Street 6 because it provides the recommended distance between signalized intersections and brings road users closer to the Kirby GO transit hub. Following comments received from external agencies and Indigenous Communities with concerns of the proposed impacts to the significant woodlot north of Street 2, the project team further evaluated the need for a Street 6 connection through the woodlot. Alternative WC3 was selected as the preferred crossing of the woodlot as it reduces natural environmental impacts and encourages active transportation while maintaining acceptable vehicular levels of service.

8.1.1.7 Street 7

Street 7 is proposed as a minor collector with a 24.0 m ROW. The preferred north-south Street 7 alignment extends from Teston Road in the south and connects with Street 3. The design criteria used for Street 7 are as follows:

- Design Speed: 50 km/h
- Minimum horizontal curve radius: 115 m

While Alternative 7A would provide an additional intersection along Street 6 which increases community connectivity and allows for an efficient grid-like road pattern, Alternative 7B was selected as the preferred alignment because it would have the least impact to natural environment features by avoiding encroachment into the significant woodland buffer and minimizes the disturbance to wildlife movement. Furthermore, Alternative 7B does not require further archaeological assessment work and exhibits a shorter road length which results in a lower capital, operating, and maintenance costs.

The intersection spacing between Alternative 7B and Keele Street is approximately 215 m which meets the minimum spacing requirement as per York Region's design guideline and standards. However, based on feedback received from the Region during TAC Meeting #2, there were concerns regarding the Street 7 alignment and its terminus at Teston Road in relation to Keele Street. Since the evaluation of alternatives, the study team has consulted with York Region to increase the intersection spacing between Street 7 and Keele Street to better accommodate queues and traffic flow from the Block. The revised alignment shifts Street 7 approximately 78 m west and replaces the previous curved connection to Street 3 with a roundabout. The Project Team understands that the Street 7 connection to Teston road is being studied and considered by the Teston Road IEA team. The connection can be achieved and will be studied further during detailed design. The revised alignment of Street 7 is illustrated in **Figure 8-1**.

Street 7 does not require the crossing of any natural environmental features.

8.1.1.8 Street 8

Street 8 is proposed as a major collector with a 26.0 m ROW. The preferred north-south Street 8 alignment extends south from Kirby Road and curves east to connect with Keele Street, aligning with the North Maple Regional Park north access. An additional extension off Street 8 is proposed to align with Vista Gate. The design criteria used for Street 8 are as follows:

- Design Speed: 60 km/h
- Minimum horizontal curve radius: 125 m

Alternative 8D was selected as the preferred alignment for Street 8 because the alternative removes the connection to Peak Point Boulevard which avoids significant impacts to the PSW west of Keele Street. Further, there are challenges in topography that would complicate the development of any crossing of the environmentally sensitive area and would result in added cost of construction, maintenance, and property impacts. Alternative 8D was selected as the preferred alignment as it better accommodates driveways for properties north and south of Street 2 on Keele Street and does not require impacts to non-participating landowners.

It is recognized that the separation distance between Street 8 and Keele Street, and Vista Gate and Kirby Road are short of the minimum 215 m intersection spacing requirement as per York Region's design guideline and standards. However, due to the slopes along Kirby Road north of Street 8 from the EA approved Kirby Road widening, the Street 8 connection to Kirby Road is proposed with an unsignalized right-

in right-out (RIRO) configuration. A westbound left-tun lane from Kirby Road to Street 8 would not be required, enabling the ability to maximize the eastbound storage space, and eliminating the possibility of back-to-back left turn lanes.

Furthermore, as part of the NVNCTMP and the Block 27 Secondary Plan, it was determined that the preferred network for Block 27 include a connection between Street 8 and Keele Street, aligning with Vista Gate. The connection would serve as a gateway to the future Kirby GO station and is critical from a traffic flow perspective to better distribute traffic given the RIRO configuration at Street 8 & Kirby Road. Based on a review of the future Block 27 traffic operations, northbound queues at Kirby Road & Keele Street can be accommodated within the available separation distance to Vista Gate and is adequate to accommodate the anticipated vehicle queues along Keele Street.

It should be noted that work on the Kirby GO transit station area is currently underway. The intersection of Street 8 with Kirby Road and any modifications to the Street 8 alignment to better accommodate or avoid environmental impacts is subject to further review as part of the Transit Hub Special Study for the Kirby GO Station.

Street 8 will have one watercourse crossing location at DF3-2 approximately 575 m south of Kirby Road.

8.2 VERTICAL ALIGNMENT

The vertical alignments of the proposed roads are designed in accordance with the City of Vaughan's design criteria. All proposed collector roads are designed to a maximum slope of 5%. The exception is Street 2 which crosses the CNR corridor and connects with Keele Street. The section of Street 2 under the rail corridor is designed with a maximum slope of 6.6% to accommodate the grade difference between the railway crossing and Keele Street as a result of the underpass. This profile solution and configuration provides the minimum 5.3 m vertical clearance for the underpass. Of note, the intersection of Street 2 & Street 8, between the rail corridor and Keele Street, flattens to a slope of less than 5%. The plan and profile drawings for Street 2 are provided in **Appendix N**.

8.3 STRUCTURES

8.3.1 GRADE SEPARATION STRUCTURES

An underpass grade separation (rail over road) was selected as the preferred solution for Street 2 at the CNR corridor as it minimizes cut/fill length and maximizes grade. Several bridge types and construction methodologies were considered including track diversion and staged construction to maintain single-track operations. Based on a review of the surrounding natural features, track diversion was not carried forward as the alignment curvature immediately north would require extensive diversion and high-fill embankment, significantly impacting the area's wetlands and woodlots. Furthermore, based on discussions with Metrolinx, a staged construction approach was not carried forward as single-track closures for a long duration would impact freight and commuter rail operations. Given the identified limitations, the structural design of the underpass grade separation for Street 2 is subject to further discussion with Metrolinx and will be determined as part of the subsequent detailed design phase.

8.3.2 WATERCOURSE CROSSING STRUCTURES

The streets that comprise of this MCEA study and a majority of the subject site are located within the Upper West Don Subwatershed, part of the Don River Watershed, with a small portion in the northwestern corner

of the Block identified as part of the East Humber River Watershed (East Purpleville Creek). Two major drainage features (DF1 and DF3) traverse Block 27 lands and outlet through existing box culverts at Teston Road. In addition to these, two small drainage features (DF2 and DF4) have been identified on Block 27.

There are eight watercourse crossings associated with the preferred road network design, all of which are proposed as culvert structures. In addition, the DF3 watercourse is proposed to be realigned for approximately 350 m before exiting the Block 27 area. The existing box culvert at Teston Road will be extended further upstream (by approximately 40 m) to convey the DF3 watercourse to accommodate the proposed Street 5A alignment.

8.3.2.1 Watercourse Crossing Design Criteria

The proposed watercourse crossings were sized adequately to convey the regulatory flows and were based on the TRCA Crossing Guideline for Valley and Stream Corridors, MTO Highway Drainage Design Standards, and MNR Technical Guide Flooding Hazard Limit. In addition to the hydraulic factors, design considerations included the proposed road geometry, grading design, and fluvial geomorphological and ecological conditions and design requirements. In all cases, hydraulic requirements dictate the crossing size as they require the largest opening sizes. The requirements considered under each of the guidelines include but were not limited to:

<u>TRCA – Watercourse Crossing Design and Submission Requirements (September 2015)</u>

- Early planning considering the natural hazards and natural heritage objectives is essential for new crossings;
- Proposed crossings should be perpendicular to the valley and stream corridors and, where possible should cross at the narrowest point of the valley/stream;
- Minimize the total number of crossings in valley corridors to reduce overall impacts;
- Minimize Flood Risk:
    - Ensure that the proposed crossing does not increase flood risk for all storm events up to and including regional storm events;
    - Safely convey the applicable design flows from upstream tributary considering future land use; and
    - Ensure safe ingress/egress access points in case of overtopping of the culvert during regional storm events.
- Minimize Geomorphic Hazards:
    - Crossing should span the meander belt or the 100-year erosion limit to reduce risks from channel migration over time.
- Minimize Geotechnical Hazards:
    - Avoid sites of active erosion and locations with risk of slope instability (i.e., over-steepened slopes and locations where the watercourse is coincident with the toe of the slope);
    - Ensure that the construction of the crossing structure does not aggravate valley slope instability;
    - Avoid siting crossing infrastructure where there is a need for permanent dewatering; and
    - Ensure appropriate restoration of valley slopes where slope treatments are necessary.
- Minimize impacts to the aquatic and terrestrial habitat:
    - Valley and stream corridor crossings should be sited and designed to avoid or minimize the physical footprint impact to habitats and on terrestrial and aquatic connectivity; and
    - Crossings should be designed to satisfy the openness ratio for the passage of wildlife.

MTO - Highway Drainage Design Standards (January 2008)

- Non-regulated watercourses shall be designed based on the Standard WC-1 design flows (Bridges and Culverts) depending on road classification;
- A freeboard of at least 1 m or greater is required for collector roads for the Standard WC-1 design flows (Bridges and Culverts), i.e., 50-year design flows for spans greater than 6 m and 25-year design flows for spans less than 6 m;
- The Clearance for freeways, arterials, and collector roads shall be greater than or equal to 1.0 m. The Clearance for local roads shall be greater than or equal to 0.3 m. The water level used to establish the minimum clearance shall be the higher of:
    - The high-water level associated with Design Flow established in Standard WC-1; and
    - The water level caused by ice jams and having a return period equal to that of the Design Storm

Safe Access and Egress Requirements (Technical Guideline River and Stream Systems: Flooding and Hazard Limit, Ontario Ministry of Natural Resources (MNR), 2002

- To provide safe access, when the existing road (Teston Road) is being overtopped, three parameters (velocity, depth, and the product of depth and velocity) should be calculated and assessed. The safe condition for crossing the floodplain is when the combined depth and velocity factor is less than 9 ft^2/s, and the depth of spill is limited to 0.3-0.4 m. It should be noted that this depth can increase for a larger vehicle, but 0.3-0.4 m depth is considered safe for passenger vehicles. It should be noted that emergency vehicles, like ambulances and police vehicles, have better exhaust system clearance from the ground and stability and can travel through deeper water.

8.3.2.2 Proposed Watercourse Crossings

The eight collector roads cross the NHN in eight locations including three proposed crossings of DF1, four proposed crossings of DF3, and one proposed crossing of DF4. There are no proposed road crossings of DF2. **Figure 8-3** illustrates the location of the proposed watercourse crossings.

A variety of structure types and crossings were considered including free-spans in the area. However free-spans were not determined to be required as the proposed structure type satisfy the requirements from a hydraulic and ecological perspective. The proposed crossing designs are based on hydraulic design standards and fluvial geomorphological and ecological considerations including impacts to aquatics and terrestrial communities, and wildlife and fish passage. **Table 8-1** summarizes the structure types and size of the watercourse crossings including the low flow channel dimensions proposed for the proposed road crossings. Hydrologic and hydraulic modelling discussions are on-going with TRCA as part of the MESP process and all proposed crossing structure sizes and designs will be confirmed as part of the MESP process in consultation with TRCA. Detailed design of the road crossing designs, restoration, and compensation plan will be provided to TRCA for review in the subsequent detailed design phase.

The low flow channel section is a trapezoidal shape, with 3:1 side slopes, and is designed to convey 2-year flows. Dry shoulders are provided where feasible to accommodate wildlife movement. Structural details for each crossing will be provided at detailed design.

Table 8-1: Summary of Proposed Road Crossing Sizing

Street Name and Crossing ID*	Reach	HEC-RAS Cross Section	Type	Culvert Dimensions		Invert Elevation (m)		Low Flow Channel Dimension (m)		
				Depth (m) x Span (m)	Length	U/S	D/S	Bottom Width	Top Width	Depth
Crossing A Street 1	DF1	2828.99	Structural Open-Bottom Culvert	2.44x12.81	45	268.00	267.70	0.35	2.15	0.30
Crossing B Street 2	DF1	2299.11	Structural Open-Bottom Culvert	3.35x14.64	45	262.76	262.24	0.70	2.50	0.30
Crossing C Street 3	DF1	1650	Structural Open-Bottom Culvert	3.35x14.64	55	256.19	256.06	0.70	2.50	0.30
Crossing D Street 8	DF3	3230	Structural Open-Bottom Culvert	1.83x7.315	55	278.98	277.53	1.50	3.30	0.30
Crossing E Street 2	DF3	2368.51	Structural Open-Bottom Culvert	2.44x12.81	55	266.40	265.32	2.00	3.80	0.30
Crossing F Street 3	DF3	1809.25	Structural Open-Bottom Culvert	2.44x12.81	50	259.93	259.00	1.80	3.60	0.30
Crossing G Street 3	DF4	1014	Structural Open-Bottom Culvert	1.22x4.27	40	264.70	264.14	0.80	1.70	0.15
Crossing H Teston Rd.**	DF3	924.94	Box**	1.36x7.744**	90	248.28	248.14	2.5	0.30	0.30
			New Pipe	Ø1.5 Conc. Pipe	90	248.28	248.14	-	-	-

Note: **Refer to Figure 8-3 for the Crossing IDs*
*** Existing box culvert to be extended to accommodate Street 5*

Design Considerations - Hydraulics

The hydraulic assessment of the proposed road crossings was completed using the HEC-RAS model based on the post-development uncontrolled flows generated in the PCSWMM model. The proposed culverts were sized to convey the regulatory flows for both interim and ultimate conditions. Additional details of the hydraulic assessment are presented in **Appendix J**. **Table 8-2** presents a summary of the hydraulic modeling results. As shown, with the exception of the existing Teston Road crossing (Crossing H), all crossings accommodate future uncontrolled Regional Storm flows without road overtopping.

Table 8-2: Hydraulic Analysis of the Proposed Road Crossings

Reach	Street	Type	Culvert Dimensions (m)		Road Elevation (m)	Future Uncontrolled Flows (m^3/s)		Water Surface Elevation (m)	
			(Depth/span)	Length		100-Yr	Regional	100-Yr	Regional
DF1	Street 1 Crossing A	Structural Open-	2.44×12.81	45	272.45	0.84	21.80	268.21	269.18

Reach	Street and Crossing ID	Type	Culvert Dimensions (m)		Road Elevation (m)	Future Uncontrolled Flows (m^3/s)		Water Surface Elevation (m)	
			(Depth/span)	Length		100-Yr	Regional	100-Yr	Regional
		Bottom Culvert							
DF1	Street 2 Crossing B	Structural Open-Bottom Culvert	3.35×14.64	45	267.67	2.99	27.73	263.04	264.00
DF1	Street 3 Crossing C	Structural Open-Bottom Culvert	3.35×14.64	55	262.11	4.54	32.74	256.66	257.61
DF3	Street 8 Crossing D	Structural Open-Bottom Culvert	1.83×7.315	55	283.46	2.998	11.682	279.42	281.79
DF3	Street 2 Crossing E	Structural Open-Bottom Culvert	2.44x12.81	55	271.04	3.799	17.766	267	267.34
DF3	Street 3 Crossing F	Structural Open-Bottom Culvert	2.44×12.81	50	264.0	5.847	23.964	260.66	261.15
DF4	Street 3 Crossing G	Structural Open-Bottom Culvert	1.22×4.27	40	268.11	0.62	1.81	264.92	265.16
DF3	Teston Rd Crossing H**	Box	1.36×7.744	90	251.39	11.46	41.96	249.64	251.62

Note: **Refer to Figure 8-3 for the Crossing IDs*
*** Existing box culvert to be extended to accommodate Street 5*

Under existing conditions, the existing Teston Road crossing of DF3 (1.36m x 7.74m box culvert) does not convey the existing Regional Storm flow. The existing culvert conveys the 2 year to 100 year storm flows without overtopping. Based on HEC-RAS modelling, the maximum Regional Storm depth of flow over the Teston Road in the existing condition is 0.46m, and the average velocity is 2.73m/s resulting in a velocity (v) x depth (d) factor of 1.26 m^2/s which is greater than MNR safe condition criteria of 0.836 m^2/s (9 ft^2/s). With the proposed extension of this culvert by an additional 40 m upstream of Teston Road, the culvert capacity will be somewhat reduced and subsequently the overtopping flow will increase, and the combined factor of v x d will increase.

Therefore, to reduce the v x d factor in both existing and extended culvert conditions under the existing uncontrolled regulatory flow, it is proposed to install two additional circular culverts of 1500mm adjacent to the existing culvert via trenchless technology (jack and bore). By adding additional culverts, the v x d factor, depth as well as velocity factors were assessed in both interim and ultimate conditions to ensure the existing condition is not exceeded and, in fact, improved. With the additional proposed culverts, the depth and velocity have been reduced, and the v x d factor becomes less than that in the existing conditions. For further information and supporting calculations, see **Appendix J**.

Fluvial Geomorphology

All of the proposed crossings minimize geomorphic hazards through the provision of spans that support the long-term form and function of each drainage feature (i.e., 100-year erosion limit). The angle of the crossings will be confirmed during detailed design in consultation with TRCA to ensure the best possible feasible angle is provided with respect to the watercourse.

With the exception of Crossings D and E, all of the proposed road crossing structures were developed to accommodate the existing channel planform (span and skew/orientation), and all of the proposed crossing structure are open-bottom with spans sized to accommodate the active (bankfull) channel width. Given the heavily modified, poorly defined nature of the drainage features in Block 27, the localized channel realignments proposed at Crossings D and E are supported from a geomorphic perspective as these realignments will optimize the channel alignment relative to the crossings.

Proposed new crossing designs conform to the TRCA's Crossings Guideline for Valley and Stream Corridors (TRCA 2015) geomorphic design recommendations and can be supported from a geomorphic perspective.

The Street 5 alignment requires the extension of the existing Teston Road culvert and channel realignment along a portion of the downstream reaches of DF3 and DF4 east of this new collector road. The proposed natural channel design, discussed further in **Section 8.3.2.4**, will enhance morphologic diversity, aquatic, and terrestrial habitat within these stream corridors.

At detailed design, opportunities to avoid the placement of stone in the channel should be evaluated.

Ecology – Aquatic and Terrestrial Habitats

DF1 and DF3 support direct fish habitat. The remaining drainage features do not support direct fish habitat in the locations of the proposed crossings however they are features that contribute to fish habitat in downstream areas.

Proposed crossings D, E, F, and H have the potential to impact direct fish habitat. Proposed crossings A, B, C and G have the potential to impact contributing fish habitat.

Figure 3-8 illustrates the locations of wetlands and woodlands in Block 27. As shown, both wetlands and woodlands are located along drainage features.

The design of each new road crossings has considered the potential for the loss of fish habitat, impacts to riparian vegetation and drainage and barriers to fish passage. Proposed crossings include the installation of new culvert structures (Crossings D, E, and F) and extension of existing culverts (Crossing H), in addition to the construction of wing walls within the floodplain and riparian habitat (Crossings E and F), which will result in the loss of fish habitat from removal and/or enclosure. Project mitigation to reduce the overall footprint within fish habitat, riparian areas and valleys includes:

- An optimized road alignment from a natural environment perspective, avoiding natural features or minimizing footprint within natural features;
- The maintenance of the existing drainage feature channel alignment, if possible;
- The use of open-bottom structures to maintain natural substrate and any groundwater table interactions; and
- The use of headwalls and wing walls to minimize culvert length and slope encroachment into the riparian habitat.

In order to minimize the potential for a HADD, the proposed culvert length will be minimized to the extent possible, and, as the proposed crossings are open footing structures that span the existing drainage

feature/watercourse (with the exception of the few realignments), opportunities to avoid armouring of the channel/floodplain should be evaluated through subsequent design stages.

Restoration of channel and riparian habitat in the vicinity of the proposed culverts is recommended to offset the permanent loss of fish habitat and decrease in habitat quality under the culverts. Additional measures to offset any habitat loss may be required by DFO under the Fisheries Act.

No barriers to fish passage are likely to result from the proposed crossings. With the exception of the new culverts proposed at Crossing H to address road overtopping conditions, open bottom culverts with low flow channels are being proposed for each crossing.

Wildlife crossings considerations have been addressed to facilitate movement and reduce road mortality of small wildlife. The Crossings Guideline for Valley and Stream Corridors prepared by TRCA (2015) was reviewed in relation to the proposed crossings. TRCA outlines objectives for the road crossings in relation to natural hazards and natural heritage functions. TRCA crossing objectives state that for new crossings, many aspects of natural hazards and natural heritage objectives can be achieved through proper siting of the infrastructure. For wildlife, the objectives relate to terrestrial connectivity functions:

- Avoid siting infrastructure in locations of existing forests, wetlands, seepage areas, and other sensitive habitats;
- Minimize footprint impacts of crossings on important terrestrial features and their ecological functions through site selection and design; and
- Maintain terrestrial habitat and wildlife connectivity functions by avoiding the priority areas for habitat and wildlife connectivity or by siting and designing crossings to structurally connect habitat patches and to permit wildlife movement, which includes the measure of structures openness for targeted wildlife groups and as well as presence of elements that allow for dry passage for wildlife.

The criteria used to evaluate crossings for wildlife connectivity is the openness ratio (OR), which is calculated based on the dimensions of the proposed culverts. Generally, a greater openness ratio is expected to increase the likelihood of wildlife utilization of a given structure. General recommendations for all wildlife crossing structures include ensuring that structure openness ratio (OR) and dimensions are adequate for the target species or habitat, and structure length is minimized to the extent possible, as wildlife species are more likely to enter a culvert if they can see light at the other end.

Fencing, in conjunction with an appropriately sized crossing structure can be used to guide wildlife to a given crossing structure and reduce road-mortality. The feasibility and appropriateness of fencing will be addressed during the detail design phase of the project.

Beacon Environmental calculated the openness ratios of the crossings for proposed culverts based on grading plans and drawings of the proposed crossings (Schaeffers 2023) and compared them with the CVC targets (CVC 2017). This information is presented in **Appendix F**.

Recommendations for the openness ratio of crossing structures have been compiled by Credit Valley Conservation (CVC) from several sources for different groups of wildlife commonly found within the Credit River watershed (CVC 2017). Many of the proposed crossing structures can accommodate the targets for wildlife passage based on the openness ratio. Three of the proposed crossing structures have their openness ratio value close the recommended minimum value: Crossing D, Crossing G and Crossing H.

- **Crossing D** – The openness ratio for Crossing D is slightly greater than 0.1 which is the minimum recommended for mid-sized mammals. However immediately downstream existing 0.5 m and 1.5 m

CSP culverts under the railway are the limiting factor along DF3 for wildlife connectivity, therefore the proposed Crossing D is not anticipated to further reduce wildlife movement potential along DF3.

- **Crossing G** - The recommended design for crossing structures is dependent on the species or groups of species being targeted. Given that proposed Crossing G structure is connecting natural areas of limited size (approximately 1.3 ha) north of Street 3, comprised of wetlands and associated vegetated buffer, to the rest of the wetland system downstream along DF4, the proposed crossing is recommended to be designed for wetland-to-wetland movement and target amphibians and reptiles. Crossing H has an openness ratio of 0.1 which is sufficient for this wildlife group as per CVC guidelines (CVC 2017).
- **Culvert H** - A 40 m long extension to the existing 50 m long culvert under Teston Road is proposed at this crossing to accommodate Street 5, which will decrease the openness ratio from 0.2 to 0.1 which is the minimum recommended for targeted groups of amphibians, reptiles and small mammals. Crossing rates are usually negatively associated with structure length, and the total length of 90 m of the future culvert is more the maximum recommended for amphibians and reptiles although best efforts have been made to minimize the length of the culvert extension. Based on water levels resulting from hydraulic modelling (SCE 2023), the culvert is always submerged with at least 25 cm of water in average in existing conditions and post-development conditions with no dry passage for all or part of the year. As many species refuse, or prefer not to walk through water, the structure already constitutes a barrier to movement for some wildlife groups in existing conditions.

With the exception of Crossing H, all of the proposed crossings have sufficient room to accommodate dry passages (above bankfull elevations) on each side of the channel. Proposed Crossing H will need to be evaluated further during detailed design to see if dry passages structures (ledges) can be incorporated along one side of the culvert to promote terrestrial wildlife passage.

A natural substrate should be maintained on the floor of the culvert (at least on a 1 m wide passage) to facilitate terrestrial wildlife passage; rip rap is difficult for amphibians to traverse. Or, alternatively, riprap should be filled with material appropriate for wildlife footing.

Channel Realignments

Where possible, the proposed road alignment and crossings are designed in a way to not significantly affect the natural drainage feature alignments. However, it is not possible to totally avoid all drainage features. As a result, natural channel realignments are required at the following four locations (DF3 (culvert D), DF3 (Culvert E), DF3 (Collector Street 5), and DF4 (Culvert G) in the Block 27 area.

8.3.2.3 Channel Works at Culverts D, E and G

Localized channel realignments are proposed at Crossings D, E and G to align drainage feature planform with the road crossing structures. Through subsequent design stages, natural channel design principles will be implemented to replicate the existing form and function of the drainage feature in these locations, ensuring the provision of a low flow channel and overbank zone within the culverts, and optimizing the alignment of the drainage features and hydraulic transition at the culvert inlets and outlets to mitigate risk of long-term erosion.

8.3.2.4 Channel Works Associated with Street 5 at DF3/DF4 Near Teston Road

As noted in **Section 6.2.5**, the proposed Street 5 alignment requires the extension of the existing Teston Road culvert and channel realignment along the downstream portions of Drainage Features DF3 and DF4 east of this new collector road. This section describes existing conditions in the vicinity of the proposed channel realignment, design objectives, elements of natural channel design, delineation of the realigned NHS and integration with adjacent SWM facilities.

Existing Conditions along DF3/DF4

Under existing conditions, the lower reaches (Reaches 3-1 and 3-2) of DF3 have been heavily modified with a channelized planform and minimal riparian vegetation. DF4 (Reach 4-1) is characterized as a poorly defined, intermittent feature with riparian vegetation consisting of mainly herbaceous plants with some grasses and shrubs. Lands immediately adjacent to DF3 and DF4 are in active agricultural uses. The confluence of DF3 and DF4 is located approximately 30 m upstream of the existing DF3 Teston Road culvert crossing. Photos 1 and 2 show typical conditions along the downstream reaches of DF3 and DF4, respectively.

A regulatory floodplain exists along both drainage features, and both DF3 and the downstream portion of DF4 have been characterized as providing fish habitat by *The Don River Watershed Plan* (TRCA 2009), identifying them as intermittent cool to warmwater systems. In addition, both drainage features are associated with wetland unit WT12. Permanent flow exists in this location due to high groundwater levels.

Figure 8-2 illustrates the typical conditions along Reach 3-1 of DF3 and Reach 4-1 of DF4.

Figure 8-2: Typical Conditions along Reach 3-1 of DF3 and Reach 4-1 of DF4

Note: Left - Typical conditions along Reach 3-1 of DF3
Right - Typical conditions along Reach 4-1 of DF4

Channel Realignment Design Objectives

The proposed corridor realignment conceptual design has been prepared to satisfy the following design objectives:

- Replicate and enhance the existing functions of DF3 and DF4;
- Connect the realigned channel with upstream and downstream inverts. The realigned portions of channel will be tied into existing upstream features and the downstream Teston Road culvert invert elevation. These tie-in elevations determine the governing energy gradient of the realigned channel;
- Replicate the existing hydraulic conveyance (up to and including the Regional Storm future flows) and riparian storage functions of DF3/DF4;
- Accommodate natural hazards. The channel must accommodate the DF3 25 m meander belt dimension and the Regulatory floodplain;
- Incorporate enhanced channel form and function through the reinstatement of a natural, sinuous planform, including an optimal downstream tie-in alignment with the Teston Road culvert inlet. Currently DF3 flows north-south direction at Teston Road, while the existing culvert is skewed at an angle to the southwest;
- Maintain north-south linkage along drainage features;
- Replicate and enhance the riparian corridor through the development of a restoration planting plan for the realigned corridor. Under existing conditions, DF3 has been heavily modified with a channelized planform and minimal riparian vegetation. The proposed realignment provides opportunities for enhancement in the form of wetland creation, habitat enhancement design elements and riparian plantings ;
- Integrate engineering design elements including the accommodation of two stormwater management facility outlets to the channel corridor; and
- Include riparian wetland creation to enhance the overall function of the stream corridor and compensate for wetland removals along this stream reach.

Conceptual Channel Design

The main objective of the proposed conceptual realignment design for DF3 is to replicate and enhance the existing form and function of the low flow channel using natural channel design principles while providing enhanced aquatic and terrestrial habitat conditions through the creation of riparian wetland features and installation of riparian plantings. The riparian wetland features will also function to receive flows from two proposed adjacent stormwater management ponds (SWMP-H and SWMP-I). **Figure 8-4** illustrates the conceptual realignment, including corridor grading requirements and various design elements.

Similar to the approach to delineate other stream corridor widths/conditions, the limits of the proposed stream corridor reflect the new collector Street 5 alignment and is defined by the greater of:

- Meander belt plus 10 m setback
- Regulatory floodline plus 10 m setback
- Defined top of bank plus 10 m setback
- New wetland boundary plus 15 m setback
- Fisheries setback of 15 m on either side of the low full channel

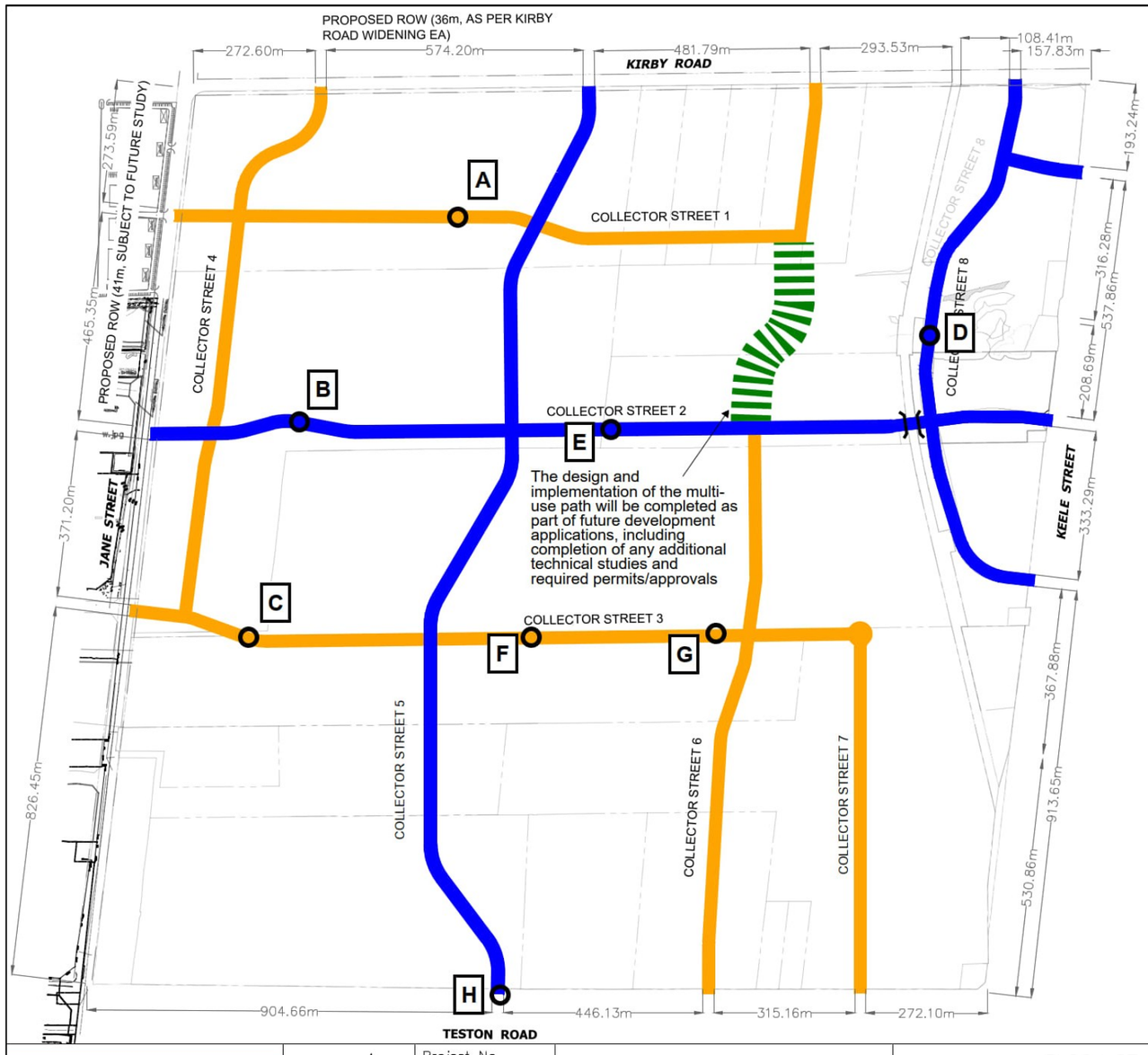
Each of these design considerations have been addressed and are presented along with the resulting NHN limit on a typical cross-section for the realigned corridor on **Figure 8-4.** Design components include:

- Low Flow Channel - The proposed conceptual design incorporates a low flow channel with dimensions in the range of 1.75-2.0 m in width and 0.25-0.40 m in depth. The channel will have a variable slope, connecting to existing sections of DF3 and DF4 at the locations shown on **Figure 8-4**. The low flow channel dimensions were developed to reflect existing conditions within Reach 3-1. These dimensions are generally sufficient to convey the field-based estimate of bankfull discharge of 0.41 m^3/s for DF3 low flow channel design discharge at the variable gradients proposed by Schaeffers Engineering for the corridor while promoting frequent inundation of the floodplain to support proposed riparian wetland features. The substrate mix for the low flow channel will be hydraulically sized through subsequent design stages, referencing modelled low flow channel future hydraulic conditions, as well as existing conditions along DF3.
- Meander belt - The proposed realigned DF3 corridor bottom width dimension accommodates the recommended 25 m meander belt for Reach 3-1 of DF3.
- Regulatory Floodplain – The proposed channel realignment maintains existing riparian storage along DF3 and DF4 in the vicinity of the proposed realignment. As shown on **Figure 8-4**, the regulatory flows (future Regional Storm flows) will be contained within the channel corridor.
- New Wetlands - Formal and passive riparian wetland features are proposed within the floodplain to provide enhanced terrestrial habitat and compensate for WT12wetland removals. The formalized wetland features will also function to receive and convey flows released from SWM Ponds H and I to the channel, while promoting detention/retention, evapotranspiration and infiltration.
- Defined top of bank – Grading requirements associated with stream corridor realignment are illustrated on **Figure 8-4**. Corridor side slopes of 3:1 (H:V) create a defined top of bank on both sides of the realigned channel.
- Fisheries setback – **Figure 8-4** illustrates that the 15m fisheries setback on both sides of the low flow channel are contained within the realigned stream corridor.

- Habitat Enhancement Design Elements - It is the intent that the natural channel design includes a variety of habitat enhancement design elements, such as wood debris/brush piles, basking logs and gravel point bars. To replicate and enhance existing vegetation communities within the floodplain, a combination of native woody plantings and meadow marsh or shallow marsh seed mix are anticipated within the riparian corridor. These details will be identified and included as appropriate through future design stages.
- Integration with Adjacent SWM Facilities - The TRCA Stormwater Erosion Criteria (2012) document provides the following general guidance for the location of proposed SWMF outfall structures so that minimal risk to the structure will occur over time due to erosion:
    - Place infrastructure (e.g., outfall and plunge pool) outside of the meander belt wherever possible
    - Avoid placing outfalls, plunge pools and/or outfall channels in erosion prone areas
    - Avoid disturbance to low flow channel where possible
    - Orient outfall and/or outfall channel appropriately to minimize impact on the receiving watercourse
    - Soft landscape treatment including native species including species with slope stabilizing root system should be considered

Figure 8-4 also illustrates the location of the proposed SWM Pond H and I outfalls relative to the realigned channel. All outfalls will be located beyond the proposed toe of slope associated with the corridor and, as such, are not proposed within an erosion prone area.

Figure 8-3: Proposed Road Crossing Locations



NOTES:

1. AS PER CITY OF VAUGHAN ENGINEERING DESIGN CRITERIA AND STANDARD DRAWINGS (DECEMBER 2020)

HORIZONTAL ALIGNMENT CRITERIA		
	COLLECTOR ST 2, 5 & 8	COLLECTOR ST 1, 3, 4, 6 & 7
ROAD CLASSIFICATION	MAJOR COLLECTOR	MINOR COLLECTOR
MIN. HORZ. CURVE RADIUS (m)	125	115

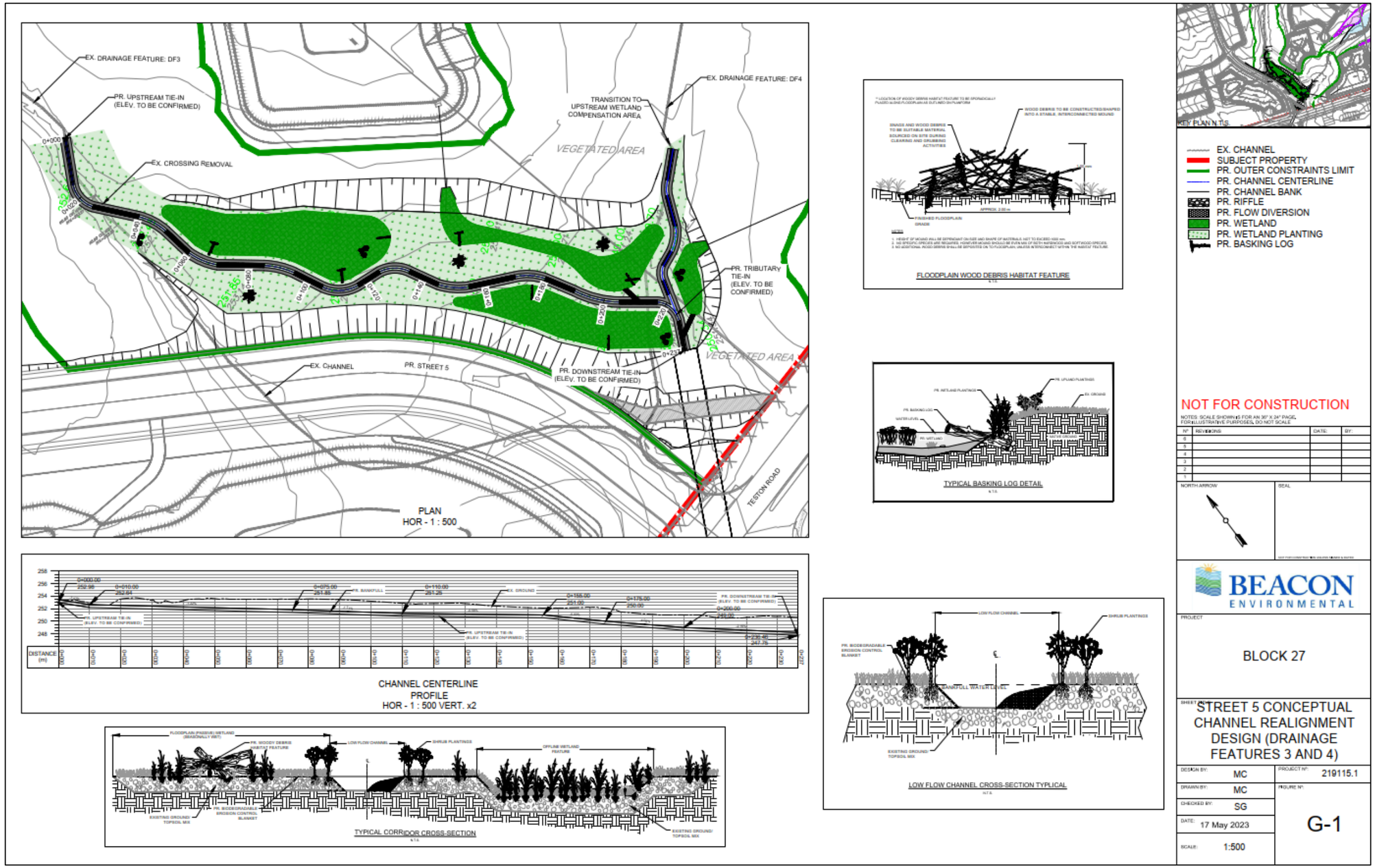
2. AS PER CITY OF VAUGHAN ENGINEERING STD. DWG. R – 108: HORIZONTAL CURVE RADIUS AT ANGLE BEND = 12m
3. AS PER TAC 3.2.6.1.18: INTERSECTING ROADS ARE ALLOWED TO MEET BETWEEN 70 – 110°
4. AS PER CITY OF VAUGHAN NORTH VAUGHAN NEW COMMUNITIES TRANSPORTATION MASTER PLAN (JAN 2019):
   MAJOR COLLECTOR ROADS TO HAVE A RIGHT-OF-WAY OF 26m
   MINOR COLLECTOR ROADS TO HAVE A RIGHT-OF-WAY OF 24m

LEGEND:

- MINOR COLLECTOR STREETS
- MAJOR COLLECTOR STREETS
- PROPERTY LIMITS
- PROPOSED ROAD WIDENING (BY OTHERS)
- CONCEPTUAL LOCATION OF THE MULTI-USE PATH CONNECTION THROUGH THE SIGNIFICANT WOODLOT
- CULVERT
- GRADE SEPARATION

LEA Consulting Ltd. Consulting Engineers and Planners www.LEA.ca	N	Project No. 20009 Date AUG 22, 2024	NOT FOR CONSTRUCTION	BLOCK 27 VAUGHAN ONTARIO SCALE 1:10000	FINAL ROAD NETWORK	Drawing No. 001

Figure 8-4: Street 5 Conceptual Channel Realignment Design



Source: Beacon Environmental (May 2023)

8.4 UTILITIES AND STREETLIGHTING

Full illumination is proposed for the preferred road network. Street illumination design will be based on City of Vaughan standards and will be completed during detailed design. Elements such as street profile and other active transportation requirements will also be considered and confirmed during detailed design.

8.5 INTERSECTION CONTROL AND NETWORK PERFORMANCE

Technical transportation assessments were completed as part of the Block 27 Block Plan submission to forecast future operations of the preferred road network and to identify auxiliary lane requirements and intersection controls. The analysis was conducted based on an 8-year planning horizon to the year 2031 with full buildout of the Block 27 development.

For all new Block 27 intersections (both external and internal), intersection control and lane configurations were determined through an assessment of the initial intersection capacity analysis results. Intersections were recommended for signalization based on signal warrants, the analysis results, and additional non-traffic considerations (e.g., facilitating pedestrian/cyclist movement). Furthermore, Turn lanes were added to support inbound and outbound movements from the surrounding regional arterial roads, where applicable. The location of turn lanes from the surrounding regional roads will be coordinated during detailed design. This includes coordination between Block 27 and the design of Kirby Road.

Furthermore, to mitigate constraints, signal timing optimization has been identified for the existing signalized intersections and are recommended to be further optimized as part of the development application or draft plan review/approval process. Detailed analysis results are provided in LEA's Block 27 Transportation Mobility Plan (**Appendix E**). Additional traffic modelling was conducted to review the feasibility of removing the Street 6 connection from a traffic perspective and determine the minimum road connection needed to service the Block 27 development (see **Appendix P**).

Recommended Intersection Control

The recommended intersection control for the study area is summarized below, based on the traffic assessment conducted for the Block 27 development. To note, signalization of intersections along regional roads are subject to traffic signal warrants and Regional approval. The proposed controls for all Block 27 intersections are listed in **Table 8-3** and illustrated in **Figure 8-5**.

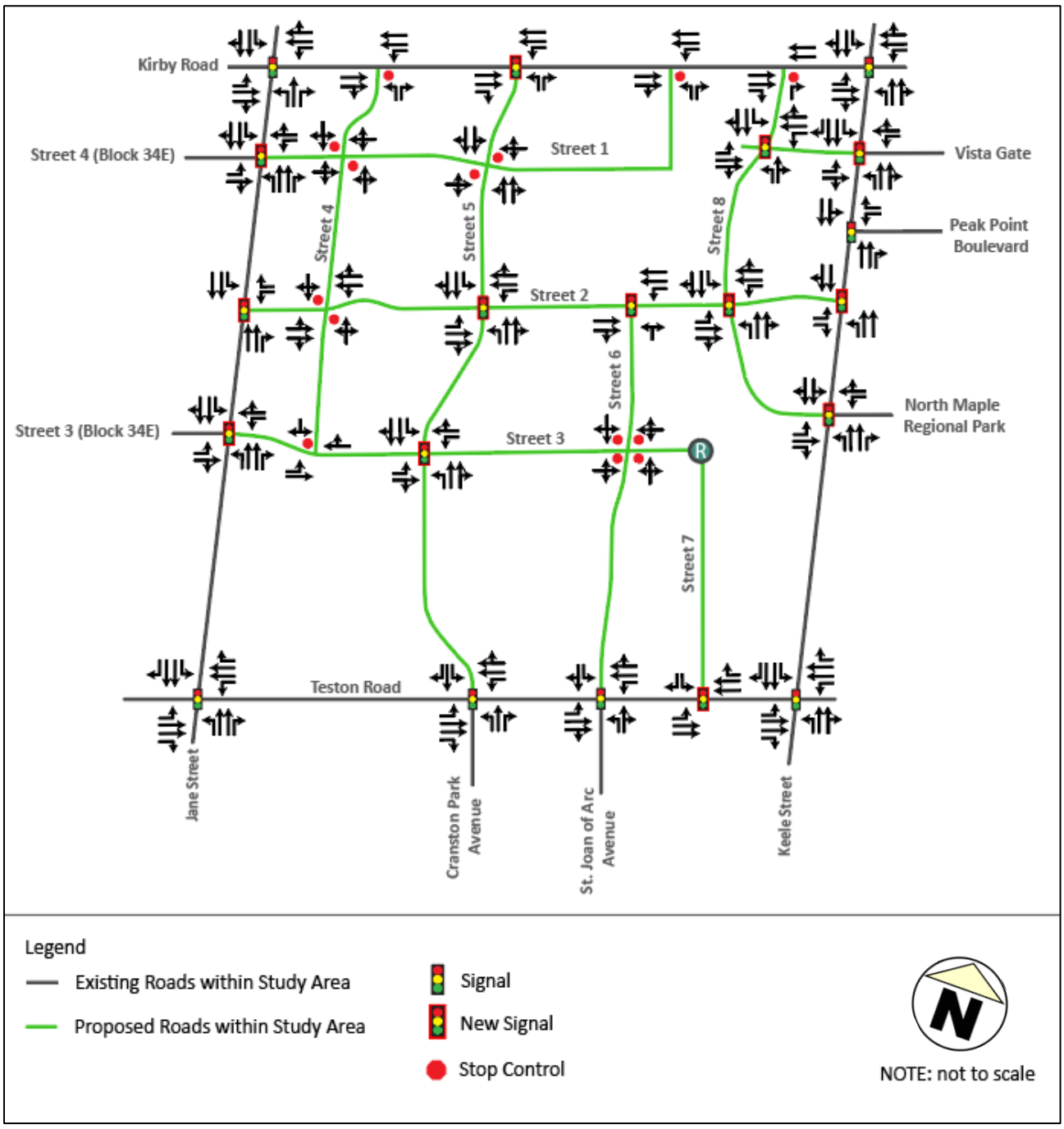
Table 8-3: Recommended Intersection Control

Location of Intersection	Intersection With	Recommended Control*
Jane Street	All intersections between and including Kirby Road and Teston Road	Signalized
Kirby Road	Street 5	Signalized
	Street 4, Street 6, Street 8	Unsignalized
Keele Street	All intersections between and including Kirby Road and Teston Road	Signalized
Teston Road	All intersections between and including Jane Street and Keele Street	Signalized
Street 1	Street 4, Street 5	Unsignalized
Street 2	Street 4	Unsignalized
	Street 5, Street 6, Street 8	Signalized
Street 3	Street 4, Street 6	Unsignalized
	Street 5	Signalized
Street 8	Vista Gate	Signalized

** Subject to traffic signal warrant and Regional approval*

Based on the overall performance of the preferred network, auxiliary lane requirements were identified based on capacity results, access needs and road classification. Adjustments to the intersection control may be considered as development plans are received or in consideration of more detailed data during the draft plan review/approval process. **Section 10** of this ESR identifies those elements of the design that may be adjusted during the draft plan review/approval process.

Figure 8-5: Recommended Intersection Control for Block 27 Study Area



8.6 PHASING AND IMPLEMENTATION

Development within the Block 27 study area is anticipated to occur by year 2031. The preferred road network identified as part of this Block 27 MCEA study are to be implemented at once and prior to development on the site. Details of the proposed collector roads will be determined through subsequent functional design work and refined through future Draft Plan submissions. For roads that extend beyond a

single property owner, maintaining the identified boundary location and road geometry is critical to not result in increased impacts for implementation of the road. It is expected that the City will enforce the adherence to the road geometry at the time of approval of the individual plans and subdivision.

As noted in **Section 7.2.3.4**, The design and implementation of the multi-use path will be completed as part of future development applications, including completion of any additional technical studies and required permits/approvals.

8.7 PRELIMINARY COST ESTIMATES

Preliminary roadworks cost estimates are presented in **Table 8-4** with a detailed breakdown in **Appendix Q**. The proposed Block 27 collector roads network is estimated to cost approximately **$138,531,685**. This estimate was determined based on the following assumptions:

- Cost includes 20% contingencies
- Cost includes 25% soft costs
- Cost does not include HST
- Cost does not include the cost of sanitary sewers, watermain, SWM ponds or grading
- Cost does not include any land costs
- Estimate is based on the unit rate of 2022
- Costs associated with culvert foundations to be determined during detailed design upon further geotechnical investigations

Table 8-4: Summary of Preliminary Cost Estimates for Block 27 Collector Roads

Street Name	Right of Way	Length (m)	Total
Proposed Structure (Bridge) at Street 2/CNR corridor			$30,000,000
Street 1	24 m	1,750	$7,877,974
Street 2	26 m	2,007	$9,748,390
Street 3	24 m	1,570	$7,632,244
Street 4	24 m	1,167	$10,051,976
Street 5	26 m	2,145	$12,036,821
Street 6	24 m	1,280	$4,757,537
Street 7	24 m	817	$2,738,821
Street 8	26 m	1,231	$6,991,688
Street 8 (Vista Gate Extension)	26 m	180	$519,006
Total Cost Estimate for Roads Based on Unit Rate of 2022			**$92,354,457**
Contingencies (20%)			**$18,470,891**
Soft Costs (25%)			**27,706,337**
Total			**$138,531,685**

Note: Costs consider base and top asphalt, storm sewers, culvert structures, bridge structures, gas pipeline crossings, streetlighting, and landscaping.

9 ANTICIPATED IMPACTS AND MITIGATION MEASURES

Phase 3 of the MCEA process requires identifying the potential impacts and determining appropriate mitigation measures. The following section documents the anticipated impacts of the recommended design on the following features, along with the proposed mitigation measures to reduce these effects. A summary of the anticipated impacts and mitigation measures is provided in **Table 9-4**.

- Nosie & Vibration
- Air Quality
- Contamination
- Transportation System
- Natural Environment
- Groundwater
- Stormwater Management
- Climate Change
- Culture Heritage
- Archeology
- Property Requirements

9.1 SOCIO-ECONOMIC ENVIRONMENT

9.1.1 NOISE

The Noise and Vibration Considerations Letter was prepared by Valcoustics Canada Ltd. in 2023 to determine the potential road traffic operational and road construction noise impacts from the proposed collector road network onto existing noise-sensitive receptors at the subject lands. Potential impacts from road traffic operational noise were determined by identifying the Noise Influence Areas from each roadway based on setback distances in accordance with MECP criteria. None of the existing noise-sensitive land uses were identified within the Noise Influence Area of any roadway. As such, there are no potential noise impacts from the proposed collector road operations onto existing noise-sensitive receptors at the non-participating lands and holdout properties within Block 27. Thus, noise mitigation measures are not required. The assessment concludes that operational noise is unlikely to cause any significant noise impact.

Construction noise does have the potential to cause noise issues. However, these impacts are temporary and will depend on the type of work being done and equipment being used.

Mitigation

Emissions associated with construction activities may result in a short-term increase in local ambient levels of indictor compounds. Where possible the following measures should be implemented to help reduce impacts on local air quality:

- Reduce idling of equipment when possible;
- Ensure equipment is in working order (properly maintained, emission control devices installed);
- Utilize fuel-efficient equipment when possible;
- Implement dust management practices such as road watering to reduce fugitive road dust;

- Implement wetting or apply dust suppressants during cutting and crushing activities; and,
- Cover or water material stock piles, when possible, to minimize fugitive dust from wind erosion.

Detailed noise studies will be completed as part of future land use approval applications (e.g., draft plan and Site Plan approval applications) once more details of the building designs are known to further refine the noise control requirements and to ensure compliance with the MECP Publication NPC-300. Any mitigation measures recommended in subsequent noise studies should be implemented.

9.1.2 VIBRATION

Vibrations from the operation of the roadways (i.e., due to vehicle movements on roadways) are not expected to create significant impact. However, construction activity (such as soil compacting, excavation, movement of heavy machinery etc.) can induce ground-borne vibrations.

Mitigation

To ensure that the existing uses are not impacted negatively by construction vibration, further vibration studies will be conducted at a later stage of the development process, once details of the road construction methods are finalized. The City of Vaughan should be consulted to determine the applicable criteria.

Full details of the recommended noise and vibration mitigation measures are provided in **Appendix B**.

9.1.3 AIR QUALITY

Based on the preliminary results of the Block 27 Collector Roads Air Quality Assessment Memo (2024), the Block 27 development will not introduce any large industrial sources of emissions. The main sources of emissions from the development will come from changes in local traffic levels. However, as vehicle emission standards are reduced and more fuel-efficient vehicles become present on the roadway, the influence these vehicles will have on local air quality will reduce.

Short-term emissions generated from initial construction and continued maintenance activities have the potential to impact sensitive receptors (i.e., snow removal, landscaping, road repairs, etc.). Emissions associated with construction activities include the combustion of fossil fuels from mobile and stationary equipment, as well as the generation of fugitive dust from construction activities. During construction there may be localized impacts which exceed the relevant criteria, however, these impacts are transient and can be minimized through the implementation of a construction best management practice plan.

Post construction, given the increase in traffic volumes and ambient conditions, additional exceedances of relevant criteria may occur as a result of the project. However, the average ambient concentrations are unlikely to change significantly due to the development.

Mitigation

Mitigation measures during both the construction and operational phases can be implemented to reduce potential impacts to local air quality and protect sensitive receptors. Mitigation measures during construction include developing anti-idling policies for all vehicles and machinery on-site during construction, ensuring that all vehicles, machinery, and equipment are in good working condition, utilizing fuel-efficient equipment when possible, and implementing dust management practices to reduce fugitive road dust. Best Practices for the Reduction of Air Emissions from Construction and Demolition Activities (Cheminfo, 2005) should also be followed during the construction phase.

Traffic and operational mitigation measures recommended to be implemented through the lifespan of the development include but are not limited to, providing appropriate separation between roadways and proposed sensitive receptors where possible, using green space as buffer distances and planning appropriate setback distances during design phases, providing proper air filtration equipment, and designating electrical vehicle charging locations to promote and allow for electrification of passenger vehicles. Further air quality assessments should be conducted throughout the development of Block 27. Any future air quality assessment reports supporting the collector roads will be sent to YRPH for information during the next detailed design phase

Full details of the recommended air quality mitigation measures are provided in **Appendix C**.

9.1.4 CONTAMINATION

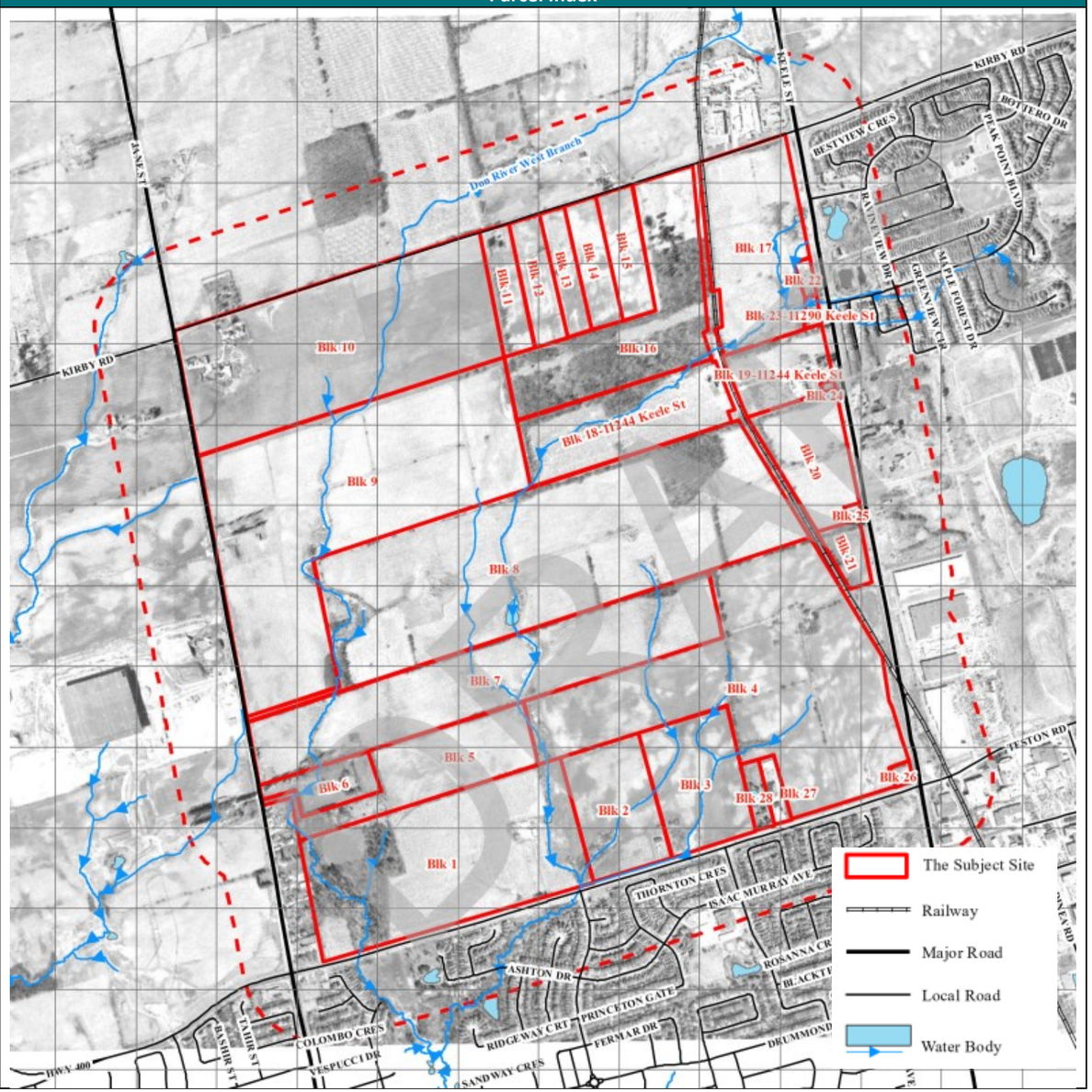
A Contamination Overview Study was completed by Soil Engineers Ltd. in 2022 to identify any potential environmental concerns associated with each of the 28 parcels within Block 27 and its neighbouring properties. Historical impacts that may lead to soil and groundwater contamination in Block 27 includes the use of pesticides as part of agricultural activities, scattered debris including metals, wood, concrete and hydro poles, and the presence of diesel ASTs, oil fuel ASTs, pesticides ASTs and petroleum products. Any required mitigation measures to address contaminated soils/groundwater will be considered throughout the MESP phase.

Mitigation

Phase 1 and Phase 2 Environmental Site Assessments (ESAs) were completed on a number of property parcels within Block 27. Completion of a Phase 1 ESA is recommended for areas impacted by the major roads to identify if there are any areas of potential environmental concerns requiring further Phase 2 ESA to identify soil and/or groundwater management during construction. Where required, full Phase 1 ESAs, Phase 1 ESA Updates, Phase 2 ESAs, and Phase 2 ESA Updates should be completed in accordance with O. Reg 153/04, as identified in **Table 9-1**. It will be the responsibility of the landowner to complete any required contamination studies and adhere with MECP regulations during construction. A Record of Site Condition will be required for the road property prior to dedication.

Full details of the recommended contamination mitigation measures are provided in **Appendix D**.

Table 9-1: Phase 1 and Phase 2 Required Environmental Site Assessments

Parcel # (Municipal Address)	Assessment Required (in accordance with O. Reg. 153/04)	Parcel Index
1 (2700 Teston Road) 5 (10971 Jane Street)	Updated Phase 1 ESA + Phase 2 ESA	
2 (2588 Teston Road) 4 (2400 Teston Road) 6 (10977 Jane Street) 8 (11140 Jane Street) 9 (11273 Jane Street) 10 (2939 Kirby Road) 11 (2615 Kirby Road) 12 (N/A) 13 (N/A) 14 (N/A) 15 (N/A) 16 (N/A) 17 (11390 Keele Street) 19 (east part of 11244 Keele Street) 20 (11140 Keele Street) 21 (10960 Keele Street) 22 (11320 Keele Street) 23 (11290 Keele Street) 24 (N/A) 25 (N/A) 26 (2270 Teston Road) 27 (2430 Teston Road) 28 (2440 Teston Road)	Phase 1 ESA + Phase 2 ESA	
3 (2546 Teston Road) 7 (10995 Jane Street) 18 (west part of 11244 Keele Street)	Updated Phase 1 ESA + Updated Phase 2 ESA	

Source: Contaminant Overt Study (Soil Engineers Ltd., 2022)

9.1.5 TRANSPORTATION SYSTEM

The addition of Block 27 collector roads will increase transportation connectivity within the study area by providing new multi-modal transportation routes that are safe and convenient to use. It is anticipated that the added active transportation and public transit infrastructure will reduce the number of personal vehicles to the site and encourage sustainable modes of transportation. Encouraging active transportation will also reduce air quality effects. The proposed road network and grade separation will accommodate existing and future (GO Transit and YRT) infrastructure.

A traffic assessment for the study area was conducted by LEA Consulting Ltd. as part of the Transportation Mobility Plan Study for the Block Plan (see **Appendix E**). According to the traffic assessment, development of Block 27 and adjacent areas add high volumes of traffic to the local network. However, planned widenings along Jane Street and Kirby Road, recommended lane configurations, and recommended signal optimizations and coordination will reduce the impact of congestion. A number of capacity constraints have been identified, mostly related to the portion of the network where Teston Road, Jane Street, the Highway 400 NB Off-Ramps, and Spine Road (Block 34E) are in close proximity to each other with high volumes. However, the collector street network of Block 27 performs well, both where the collector streets intersect with each other and where they intersect with regional roads.

Mitigation

The future traffic conditions are expected to be reviewed with individual development proposals through transportation impact studies and other related studies to verify intersection control and road geometry recommended through this Class EA. These proposals should be required to confirm their integration with the proposed design. It is further recommended that as part of the development application or draft plan review/approval process, signal timings in the area be reviewed to reflect up to date traffic flow within the study area.

A construction staging plan should also be completed during the draft plan review/approval process, as determined during detailed design, to maintain access for and mitigate impact on the adjacent properties through the construction process.

9.2 NATURAL ENVIRONMENT

Natural environmental impacts were considered in the evaluation of road alignments alternatives and the design of all proposed collector streets. Impacts to the natural heritage features and areas have been minimized through the consideration of additional road alignment alternatives and reduction of cross-section widths. This work has been done with full knowledge of natural heritage features and natural hazards present in the block through coordination and inputs from ecological and engineering disciplines.

The proposed collector road network corresponds to the preferred road alignment resulting from the evaluation of road network alternatives. This proposed road network will affect the natural heritage system and crossings are proposed at several locations:

- Three road crossings of the Greenbelt Plan Area, two of which directly impact wetlands (i.e., WT8 and WT9) to some degree;
- Seven crossings of drainage features outside of the Greenbelt Plan Area, five of which directly impact wetlands (i.e., WT12-3, WT12-4, WT17, WT20 and WTA) to varying degrees; and
- One crossing of a wetland that is not connected to other features (WT18);

The three permanent or intermittent watercourses (DF1, DF3, and DF4) and their associated valleys or stream corridors constitute north-south corridors, in existing conditions and in a future urban context, which will be protected as part of the proposed NHN. Habitat connectivity is a vital property of landscapes and is especially important for sustaining wildlife movement across the landscape. Despite the multiple crossings of these features, it is intended that they will continue to function as local movement corridors in a post-development condition.

Potential effects on natural heritage features were assessed and mitigation measures recommended for the protection of natural heritage features based on the assessment of existing conditions and proposed design of the preferred alternative of each collector road. Some aspects of the impacts and mitigation may need to be refined or amended through the detailed design process. However, the approach and principles as well as most of the site-specific recommendations are expected to continue to be applicable through the detailed design phase.

Collector road alternatives have been evaluated and alignments have considered avoidance of sensitive natural features where feasible. Construction of the proposed collector roads will act as barriers, with varying levels of permeability depending on the species under consideration. As some degree of fragmentation is inevitable when developing linear infrastructure, mitigation measures will need to be implemented to ensure connectivity along corridors. The loss of vegetated areas (i.e., wetlands, woodlands and cultural communities) will result in the removal of portions of wildlife habitat for a variety of common and urban tolerant species.

Impacts on wildlife habitat resulting from the proposed collector road network are linear in nature and relatively narrow. The proposed collector road network primarily entails the removal of the farmed fields and some of its associated treed hedgerows and cultural meadows. Most of these areas are anthropogenic and have limited function on the landscape. These trees will be assessed in the arborist report and will be subject to compensation as required by the City of Vaughan.

However, greater impacts will occur in areas where the roads cross natural habitats along the drainage features. The majority of the natural features that are proposed for removal to accommodate the new roads are limited in size and function as best efforts have been made to minimize the roadway footprints and the removal of vegetation, to locate crossings in areas that have been previously disturbed (e.g., areas where historic farm crossings remain) and to reduce impacts to wildlife and wildlife habitat. Many aspects of natural hazards and natural heritage objectives have been achieved through proper siting of the infrastructure. Restoration of disturbed areas as well as compensation are intended to offset potential habitat losses.

The construction of the proposed collector road network involves:

- Removal of approximately 1.06 ha of wetlands forming part of the Don River West Branch Headwater Wetland Complex PSW. The breakdown of the size and location of affected areas are outlined in **Table 9-2**.
- Removal of approximately 0.28 ha of woodlands is proposed. Forest communities located within the Greenbelt corridor will be mostly undisturbed except for a minor encroachment of 0.11 ha resulting from Street 3 crossing through the corridor.
- Street 1 and Street 5 would result in the removal of approximately 2.59 ha of Bobolink and Eastern Meadowlark nesting habitat;
- Portions of DF3 that support fish communities will be impacted by the proposed collector road network resulting in loss and enclosure of fish habitat; the affected reaches provide only seasonal,

low quality habitat and lacks attributes suitable for functions such as spawning or rearing. The potential for impacts to fish and fish habitat are more likely in the short term at the construction phase of the project;

- Riparian vegetation at crossings supporting fish habitat will be removed by the culvert works and construction of the head walls and wing walls; and
- No barriers to fish passage will result from the proposed crossings. Instead, the installation of new culverts will include the removal of channel impediments at existing farm crossings.

Table 9-2: Staked Natural Features Impacts to Accommodate the Proposed Collector Road Network

Feature ID (Figure 5A and figure 5B)	Type of Feature	Current Status	Area (ha)	Feature Area (ha) removed under EA Act	Street Generating Direct Impact
WT8	Wetland	PSW	2.32 ha	0.18 ha	Street 2, Street 3
WT12-2	Wetland	PSW	1.13 ha	0.59 ha	Street 5
WT12-3	Wetland	PSW	2.98 ha	0.02 ha	Street 3
WT12-4	Wetland	PSW	0.74 ha	0.10 ha	Street 3
WT17	Wetland	PSW	0.71 ha	0.08 ha	Street 8
WT18	Wetland	PSW	0.39 ha	0.07 ha	Street 8
WT20	Wetland	PSW	0.37 ha	0.02 ha	Street 3
WD7	Woodland	Significant	0.76 ha	0.11 ha	Street 3
WD8	Woodland	Significant	0.60 ha	0.11 ha	Street 8
WD10	Woodland	Not Significant	0.58 ha	0.06 ha	Street 8
		Total Wetlands	**8.64 ha**	**1.06 ha**	-
		Total Woodland	**1.94 ha**	**0.28 ha**	-

Figures 5A, 5B, 6A and **6B** in **Appendix F** illustrate impacted areas.

Where feasible, compensation measures are proposed to address the wetland and woodland removals. Details of the compensation will be addressed in the Block 27 MESP in consultation with the City of Vaughan and the TRCA.

Potential impacts to the habitat for endangered and threatened species have also been assessed. The proposed construction of Street 1 and Street 5 would result in the removal of approximately 2.59 ha of Bobolink and Eastern Meadowlark nesting habitat as well as habitat fragmentation effects. There are provisions under the Environmental Standards Act (ESA) for the removal of and compensation for this type of habitat. Authorization under the ESA will be required in accordance with the habitat regulations for this species.

Mitigation

Recommended design and mitigation measures as it relates to the Natural Environment are outlined in Table 9-3.

Table 9-3: Natural Environment - Recommended Design and Mitigation Measures

Recommended Design and Mitigation Measures	
1.	An optimized road alignment from a natural environment perspective, avoiding natural features or minimizing footprints within natural features where possible.
2.	The maintenance of the existing drainage feature channel alignment, if possible.
3.	The use of open-bottom structures to maintain natural substrate and any groundwater - surface water interactions. Opportunities to avoid armouring of the channel/floodplain should be evaluated through subsequent design stages.
4.	The use of headwalls and wing walls to minimize culvert length and slope encroachment into the riparian habitat.
5.	Minimize geomorphic hazards through the provision of spans that support the long-term form and function of each drainage feature (i.e., 100-year erosion limit).
6.	Accommodate the existing channel planform (span and skew/orientation), active (bankfull) channel width, and maintain sediment and flow transport to downstream reaches;
7.	Restoration of channel and riparian habitat in the vicinity of the proposed culverts is recommended to offset the permanent loss of fish habitat and decrease in habitat quality under the culverts.
8.	Maintain terrestrial habitat and wildlife connectivity functions by avoiding the priority areas for habitat and wildlife connectivity or by siting and designing crossings to structurally connect habitat patches and to permit wildlife movement, which includes the measure of structures openness for targeted wildlife groups and as well as presence of elements that allow for dry passage for wildlife.
9.	Removal of fish barriers at existing farm crossing.
10.	All in-water and near water works are subject to agency approvals (i.e., DFO (Fisheries Act), and TRCA [O. Reg. 166/06]).
11.	Work areas will be delineated with construction fencing to minimize the area of disturbance
12.	Appropriate sediment control structures will be installed prior to construction and maintained and monitored during construction to prevent entry of sediments into the watercourse.
13.	Where cofferdams are to be employed, unwatering effluent will be treated prior to discharge to receiving watercourse.
14.	Fish isolated by construction activities will be captured and safely released to the watercourse.
15.	Disturbance within the drainage feature channel should be minimized as much as possible, with any necessary in-water works isolated and occurring “in the dry”.
16.	Undertake works in proximity to drainage features during the summer low flow period.
17.	Schedule works in proximity to drainage features with respect to fisheries timing windows.
18.	Implement Best Management Practices (BMPs) for all fuel handling and storage and prepare a spill response plan for works in or near the drainage feature and take necessary actions

Recommended Design and Mitigation Measures	
	and notify appropriate personnel in the event of a spill. For example, conduct vehicle maintenance and fueling at designated and properly contained maintenance areas outside of all floodplains and a minimum 30 m away from any identified natural heritage features.
19.	Disturbed riparian areas will be vegetated and/or covered with an erosion control blanket as quickly as possible to stabilize the banks and minimize the potential for erosion and sedimentation.
20.	Restoration of the disturbed areas and edge management planning along the proposed road network within areas of required vegetation clearing, and more specifically at the proposed crossing locations, is recommended through planting of native trees, shrubs and ground cover species to enable soil stability and achieve a self-sustaining vegetation cover. Restoration planting opportunities will be further considered at the detailed design stage.
21.	Fencing, in conjunction with an appropriately sized crossing structure can be used to guide wildlife to a given crossing structure and reduce road-mortality. Given the complexities of fencing in urban areas where wildlife fencing and crossing do not address large ungulates, the feasibility and appropriateness of fencing will be discussed further during the detail design phase of the project.
22.	Address and implement surface water and groundwater management recommendations as well as wetland water balance requirements from the MESP.
23.	To reduce impacts to wildlife, the following construction timing windows should be met: ○ Birds – Vegetation removals should be undertaken outside the breeding season for birds, which in southern Ontario is generally from April to August. Thus, vegetation clearing should be conducted between September and March. If any vegetation clearing is proposed within the breeding bird season, or if nesting is suspected outside the typical dates, a qualified Avian Biologist should perform nest searches immediately prior to vegetation removal to ensure that no active nests are present. ○ Bats - As non-regulated bats were recorded within the northeastern woodland (WD3 and WD4), all tree removals to facilitate the construction of proposed Street 6, of required are to occur outside of the active bat roosting period (April 1- October 31) to avoid interacting with bats.

These environmental protection/mitigation measures will greatly reduce the potential adverse effects to natural features. Full details of the recommended natural heritage mitigation measures are provided in **Appendix F**.

9.2.1 GROUNDWATER AND SOURCE PROTECTION

The construction of the proposed collector road network has the potential to impact hydrogeological conditions in the short-term as a result of construction dewatering activities at watercourse crossings or in excavations for installation of services. Water well surveys conducted within 500 m of the study area identified wells with depths ranging from 11 m to 49 m, where shallow dug wells were identified along Jane Street, north of Teston Road, and on Kirby Road, west of Keele Street. Construction impacts include temporary lowering of the water table during dewatering, the permanent removal of sand lenses that contribute to the well or contribute discharge to drainage features, diversion of groundwater due to granular fill placed in excavations, and well damage due to vibrations from heavy machinery use. Potential impacts are only anticipated in shallow wells (wells completed within 15 m of the surface) located in close vicinity to road construction.

Any impacts to the drainage features and surrounding wetlands as a results of dewatering activities (i.e., a reduction in groundwater discharge) would be temporary and surface flows would be supplemented with discharge from the dewatering. To ensure that groundwater flow directions are maintained, best practices including the use of seepage collars to prevent redirection of groundwater or the placement of granular fill to support groundwater flow should be implemented.

Additional impacts may result from a reduction in recharge with the addition of hard surfaces to the landscape and increase in sodium and chloride in the shallow groundwater from road salt applications. As majority of Block 27 is located within a Significant Groundwater Recharge Area (SGRA) as shown in **Figure 3-15,** and is within delineated WHPA-Q for water quantity in the Source Protection Mapping (CTC Source Protection Committee July 2015), best management practices to maintain pre-development recharge is required as detailed below.

Mitigation

Prior to road construction, a dewatering assessment, particularly in the vicinity of any crossing locations should be completed to calculate dewatering volumes and the potential zone of influence from dewatering activities. The assessments should include calculating zone of influence, Source Protection, plans for encountering highly productive/artesian zones, dewatering inferences with surface water and groundwater users, and groundwater and surface water monitoring plans. Any properties located within close proximity to the construction activities should be re-surveyed prior to construction to identify any shallow wells that could potentially be impacted by the construction. The well survey should be completed during the detailed design phase of the project. Should impacts to private drinking water be identified during the subsequent detailed design phase, the Regional Municipality of York Public Health department will be informed.

Any wells identified as being susceptible to impacts should have baseline water quality and water levels collected and have water levels monitored through construction. A well interference and reporting protocol should be established before construction to outline actions to be taken should a complaint from a private well owner be received and ensure that a supply of water is provided for the private resident. Mitigation measures include the following:

- Notification of residents of proposed construction ahead of startup;
- Provision of contact information for a designated person as part of a response protocol;
- A reporting and investigation protocol to address complaints; and
- Supply of alternate water source in case of confirmed impact.

Erosion and sediment control (ESC) plans are also required to ensure that construction activities do not impact the surface water features. The plans will identify the required ESC BMPs and various sediment control methods and structures to ensure sediment laden water is not discharged to the surface water features. Water must be discharged to land at least 30 m from any wetland or drainage feature. Discharge should be monitored for turbidity to ensure that any sediment in the water is effectively being removed to acceptable levels prior to entering the surface water features. Based on estimated discharge rates, environmental permission such as EASR or PTTW may be required.

In addition to dewatering assessment, water balance calculations are required to determine the potential reduction in recharge as a result of the collector road network. Low impact development (LID) measures to promote infiltration should be incorporated into the stormwater management plans to maintain pre-development recharge volumes. With the implementation of LID measures, no impact to groundwater levels

and recharge to aquifers and water supply quantity are anticipated. Furthermore, to mitigate runoff from winter maintenance activities that can infiltrate into the groundwater, road salt application should be managed by the municipality as per York Region's Salt Management Plan and Guidance for Best Management Practices for Road Salt Usage Standards to minimize any impacts.

Full details of the recommended hydrogeological mitigation measures are provided in **Appendix G**.

9.2.2 STORMWATER MANAGEMENT

As outlined in **Section 3.8.1**, existing drainage conditions as well as proposed drainage and stormwater management requirements for the collector roads have been addressed through analyses completed as part of the Block 27 MESP. The MESP work provides an integrated assessment of the collector road system along with development of the whole block. It addresses existing drainage conditions, SWM design criteria and a storm drainage concept to manage surface water quality and quantity in accordance with accepted practices. Through implementing the proposed SWM facilities and LID measures, the SWM criteria identified for the block, including the collector roads, will be met. The Stormwater Management Report is available in **Appendix H**.

Mitigation

The proposed drainage and stormwater management plan for the Block with strategies and recommended measures to meet the required stormwater quantity, quality, and erosion requirements. The following provides a summary of the recommended measures to minimize/mitigate potential impacts on existing watercourses, natural features and functions, and downstream systems. As part of the detailed design phase, the proposed SWM plan will be reviewed to refine the sizing of and confirm the design recommendations of various proposed components of the stormwater management system.

9.2.2.1 Stormwater Management Facilities

Ten SWM facilities are proposed within Block 27 to service majority of the development. Additional on-site storage is proposed for catchments whose area is less than 6ha. Maximum efforts will be made to mimic the existing drainage conditions. In addition to the storm sewer, a clean water collector system is proposed to recharge the existing and proposed wetlands. All SWM ponds will be sized to provide quality, erosion, and quantity control (both 2-100 year and regional control).

With few exceptions, the major and minor drainage systems for the block are designed to direct surface runoff from collector roads to SWM facilities prior to discharge to drainage features within the Don River watershed. SWM ponds designed to meet the required quantity, quality, and erosion requirements will provide the appropriate controls for runoff from the collector road system. The quantity and quality control for a small area of Street 5, close to Teston Road, will be provided by online storage and OGS treatment units since this area cannot be drained to any SWM ponds.

9.2.2.2 Water Balance

While low-impact development (LID) measures are not being implemented specifically within the road ROWs, they form part of the proposed SWM plan for the development of the block. With the implementation of LID measures on the Block 27 lands to maintain recharge volumes, no impact to the quantity of groundwater is anticipated and with the use of Best Management Practices for the application of road salt, no impacts to the quality of groundwater related to the collector roads is anticipated.

9.2.2.3 Erosion Control

An erosion threshold analysis was completed by Schaeffer & Associates Ltd. and Beacon Environmental. Various scenarios were analyzed to establish the erosion control strategy for the proposed development. Based on the analysis conducted, it is recommended that all ten SWM facilities which drain to reaches DF1, DF3, and DF4, should provide 96-hour extended detention for the 30mm storm event and 3mm retention within their subject catchments, however, details of the erosion control strategy is on-going with TRCA as part of the MESP process and will be confirmed as part of the MESP. The approved erosion control strategy shall be implemented in detailed design.

During the subsequent detailed design phase, erosion and sediment control should be confirmed before construction. LIDs for erosion control shall also be sent to TRCA for review during Detailed Design.

9.2.3 CLIMATE CHANGE

On June 4, 2019, the City of Vaughan declared a climate emergency for the purposes of naming and deepening the commitment to protect Vaughan's economy, environment, and community from the impacts of climate change. In addition to this declaration, Council directed City staff to update the Sustainability Performance Metrics program to encourage new construction to be more energy efficient and to continue with the revision of *Green Directions Vaughan*. This community sustainability plan was approved in December 2019 and described the City's environmental and sustainability priorities to help achieve a healthy natural environment. Notably, objective 1.47 focuses on best practices for transportation infrastructure construction and maintenance. Furthermore, objectives 3.1 to 3.3 relate to the development of sustainable transportation networks with a low environmental impact. This includes implementing complete streets, maintaining non-vehicular networks such as pedestrian and cycling pathways, and reducing single-occupant vehicle trips to support active transportation and enhance adaptability.

The Block 27 Collector Roads MCEA focuses on a large study area which is mainly in a natural, semi-natural, or agricultural state. Modifying and introducing new infrastructure to the area requires significant consideration to integrate more resilient and sustainable infrastructure. Potential effects of the project on climate change include greenhouse gas emissions associated with the operation, maintenance, and construction of the proposed collector road network, including the physical machinery and equipment, travel distance and time for construction workers to get to and from the site, and the sourcing of building materials.

Potential effects of climate change on the project include future extreme weather conditions (e.g., unusually high or low daily temperature extremes, increasing or decreasing mean annual temperatures or precipitation, and increasing or decreasing frequency of storm events). These potential effects could cause disruptions to construction, increase runoff during construction, and will require more frequent maintenance and repairs throughout the lifetime of the proposed roads.

<u>Mitigation</u>

To minimize the project's potential effects on climate change and support the City's sustainability objectives, the following mitigation measures will be considered, particularly to reduce greenhouse gas emissions associated with the construction of the project. It is expected that details of the proposed mitigation measures will be determined and implemented at the onset of construction.

- Implement anti-idling policies for all vehicles and machinery on-site during construction;

- Ensure all vehicles, machinery, and equipment are in good working condition to reduce inefficiencies in the operation of the equipment;
- Design construction contracts to encourage sourcing from suppliers with strong sustainability policies and practices;
- Use materials that have a lower carbon footprint and a longer lifespan, including sustainable and permeable concrete and asphalt, where possible. The use of sustainable building materials can improve carbon footprint during construction by reducing CO2 in concrete by up to 100%; and
- Provision of dedicated active transportation improvements where appropriate. The preferred cross-sections identified as part of this Class EA include active transportation facilities on both sides of the roadway including sidewalks, boulevard cycle tracks, and/or multi-use paths. The provision of safe and accessible active transportation facilities can help discourage the use of single-occupant vehicle travel and reduce GHG emissions associated with vehicles.

Furthermore, the following adaptation measures should be considered during the design and construction of the collector road network to better respond to climate change. These adaptation measures aim to strengthen the resilience of the project.

- Explore opportunities to implement stormwater management LID strategies and consider appropriate stormwater capacity to mitigate additional run-off;
- Consider additional boulevard space to accommodate vegetation native to the area and tree planting for additional carbon storage and water retention for stormwater run-off. The preferred cross-sections identified as part of this Class EA process include 2.5 m wide landscape/boulevard space on both major and minor collector roads with the exception of roads with reduced ROW widths within natural environmentally sensitive areas, creating an opportunity for vegetation, tree planting, and potential LID measures along the roadways;
- Consider designing roads and crossing structures to minimize risk from flooding and erosion and to be more resilient to frequent free-thaw cycles; and
- Use resilient materials that can tolerate extreme heat or reduce heat absorption (e.g., light-coloured aggregates in asphalt or concrete).

The above-noted mitigation and adaptation measures outline opportunities for the project to decrease greenhouse gas emissions that contribute to climate change and improve the proposed collector road network's resiliency to climate change. Additional mitigation/adaptation measures will be considered during the detailed design phase. Updated information on the additional climate change mitigation and adaptation measures being considered during the detailed design phase of the project should be sent to the Regional Municipality of York's Public Health Department. Sustainable measures will be reviewed, addressed, and reconfirmed in the design of the collector roadways to further reduce and mitigate the negative effects of climate change.

9.3 CULTURAL HERITAGE AND ARCHAEOLOGY

9.3.1 CULTURAL HERITAGE

Introduction of the proposed collector road network has the potential for direct or indirect impact to the identified cultural heritage landscapes illustrated in **Figure 3-18**. Notably, CHL 1 and CHL 7 are listed as a

Property of Architectural and Historical Significance in the City of Vaughan's Register of Properties of Cultural Heritage Value. There are direct permanent impacts to the farmstead setting and context of the cultural heritage landscape of both properties through the implementation of the road network. The same conclusions were identified for CHL 2 and BHR 17.

Temporary, limited, and disruption impacts related to road construction were also identified for a number of properties (CHL 3, CHL 4, CHL 5, CHL 6, and BHR 18). Once complete, the visual impact on the cultural heritage landscape will be permanent. No impacts from the proposed collector road network were identified for the remaining cultural heritage landscapes and built heritage resources on the subject lands.

Mitigation

Based on the conditions identified in the CHRA (2015) and the April 2023 survey of Block 27 conducted by UMcA, the following general mitigation measures are recommended:

- Construction activities and staging should be suitably planned and undertaken to avoid impacts to identified cultural heritage resources.
- Following detailed design of the proposed work, impacts and mitigation measures of the undertaking on cultural heritage landscapes will be confirmed. Mitigation measures may include completing heritage impact assessments, documentation reporting, or employing suitable measures such as landscape, buffering or other forms of mitigation, where appropriate. Provincial guidelines should be consulted for advice and further heritage assessment work should be undertaken as necessary.

For the listed cultural heritage landscapes associated with CHL 1 and CHL 7, it is recommended that prior to detailed design, Heritage Impact Assessments (HIAs) be completed in accordance with the City of Vaughan's *Guidelines for Cultural Heritage Impact Assessment (2017)* and heritage policies and should be submitted to City heritage staff for review and approval.

Furthermore, protective property fencing should be erected prior to road construction along the north property line of the cemetery on CHL 3 and the residence on BHR 18 to limit potential construction encroachment. In addition, a cultural heritage photo documentation report with a property history, aerial photography and historical mapping is recommended for CHL 2 for local archival records and should be provided to Heritage Planning at City of Vaughan prior to road construction.

Full details of the recommended cultural heritage mitigation measures are provided in **Appendix K**.

9.3.2 ARCHAEOLOGY

There are a number of areas identified for archaeological potential, given the largely undisturbed nature of the study area. Concession 4, Lot 26 was identified as having significant archaeological potential. Furthermore, based on the gap analysis conducted by Archaeology Consultants of Canada (ACC) in 2021, four sites require a Stage 3 assessment, including AlGv-2 (The Teston Site & Potential Ossuary), AlGv-121 (Potential Euro-Canadian Homestead), AlGv-122 (Potential Euro-Canadian Homestead), and AlGv-130 (Lithic scatter, unknown affiliation). Stage 3 Cemetery Investigations are also required for the two historic cemeteries with unknown historic borders within Block 27, including a 10 m buffer area surrounding the cemeteries.

The areas with archaeological potential where the proposed alignments of the recommended design are impacted are subject to further Stage 2-3 archaeological assessment (AA) as shown in **Figure 3-20,** and

cleared of archaeological potential prior to the start of construction. Archaeological monitoring will be required even after a Stage 2 archaeological assessment for the pre-development topsoil removal (grading) for lands located within 1000 m of documented village sites and within 300 m of any current or former water source or within 100 m of the Teston ossuary. Archaeological monitoring should be consistent with the recommendations of the York Region Archaeological Management Plan.

Potentially interested Indigenous Communities should be contacted prior to initiating all Stage 2+ archaeological assessment work to ensure engagement and inclusion for outstanding archeological fieldwork within Block 27.

No archaeological assessment, no matter how thorough or carefully completed, can necessarily predict, account for, or identify every form of isolated or deeply buried archaeological deposit. In the event that archaeological remains are found during subsequent construction activities, construction and alteration of the site shall stop immediately, and the relevant authorities and Indigenous Communities shall be immediately notified.

Full details of the recommended archeological mitigation measures are provided in **Appendix L**.

9.4 OPERATIONS AND MAINTENANCE ACTIVITIES

Best management approaches will be adopted to ensure that the Block 27 collector road network will operate well. These approaches will centre around preventing negative environmental impacts, protecting the existing environment, and capitalizing on opportunities for the rehabilitation and enhancement of impacted areas. Post-construction monitoring and maintenance will be conducted to ensure that all mitigation measures are effective and functioning properly. Operating and maintenance costs will be determined in the detailed design phase of the project.

9.5 SUMMARY OF ANTICIPATED IMPACTS AND MITIGATION MEASURES

Phase 3 of the MCEA process requires identifying the potential impacts and determining appropriate mitigation measures. The table below indicates the anticipated impacts of the recommended design for the Block 27 collector roads, as well as proposed mitigation measures.

Table 9-4: Summary of Anticipated Impacts and Mitigation Measures

Anticipated Impacts		Mitigation Measures
Noise & Vibration	• Potential noise impact from road construction • Ground-borne vibration due to construction activity	• Applicable noise control by-law (City of Vaughan By-law 96-2006) should be obeyed • Detailed noise and vibration studies to be completed as part of future land use approval applications (e.g., draft plan and Site Plan approval applications) to further refine the noise control requirements and to ensure compliance with the MECP's *Environmental Noise Guideline* limits
Air Quality	• Air pollutant emissions during construction	• A construction best management practice plan is recommended with mitigation measures such as anti-idling policies for all vehicles and machinery on-site during construction, as well as ensuring that all vehicles, machinery, and equipment are in good working

Anticipated Impacts		Mitigation Measures
		condition to reduce inefficiencies in the operation of the equipment • Any future air quality assessment reports supporting the collector roads will be sent to YRPH for information during the next detailed design phase • Mitigation measures such as setback distances, proper air filtration equipment, and the incorporation of greenspaces will be considered during initial project planning • Further air quality assessments will be conducted throughout the development of Block 27
Contamination	• Potential for contamination soils/groundwater during construction	• Completion of a Phase 1 ESA is recommended for areas impacted by the major roads to identify if there are any areas of potential environmental concerns requiring further Phase 2 ESA to identify soil and/or groundwater management during construction • Where required, full Phase 1 ESAs, Phase 1 ESA Updates, Phase 2 ESAs, and Phase 2 ESA Updates will be completed and be in accordance with O. Reg 153/04 • It will be the responsibility of the landowners to complete any required contamination studies and adhere with MECP regulations during construction • Any required mitigation measures to address contaminated soils/groundwater will be considered throughout the MESP phase
Transportation System	• Increase in traffic volumes, leading to potential capacity constraints • Disrupt access to adjacent properties during construction	• Although there are intersections operating near capacity, it is expected that all intersections will continue to operate sufficiently. The City of Vaughan and York Region will monitor the operations of the study area intersections and make the necessary changes to the signal timings to optimize traffic movements in the area • The City will require all future development applications to demonstrate integration with the proposed design through transportation impact studies, intersection control reviews, and other related studies • The City will require all future developments to consider the implications of the proposed infrastructure phasing to ensure adequate capacity and connectivity is provided in the network prior to proceeding with development • A construction staging plan should be completed during the draft plan review/approval process, as determined during detailed design, to maintain access for and

Anticipated Impacts		Mitigation Measures
		mitigate impact on the adjacent properties through the construction process
Natural Environment	• Road crossing of natural habitat and drainage features • Loss of vegetated areas (i.e., wetlands, woodlands, and cultural communities) • Removal of portions of wildlife habitat	• Optimize road alignment to avoid natural features and maintain existing drainage feature channel alignment, where possible • Open bottom structures to maintain natural substrate and any groundwater-surface water intersections. • Headwalls and wing walls to minimize culvert length and slope encroachment into riparian habitat • Minimize geomorphic hazards through the provision of spans that support long-term form and function of each drainage feature • Accommodate the existing channel planform, active channel width, and maintain sediment and flow transport to downstream reaches. • Maintain terrestrial habitat and wildlife connectivity and restore channel and riparian habitat of the proposed culverts • Implement Best Management Practices for all fuel handling and storage and prepare a spill response plan. • Restoration of disturbed areas and edge management planning along proposed roads within areas of required vegetation clearing and crossing locations • Fencing, in conjunction with an appropriately sized crossing structure to guide wildlife to a given crossing structure and reduce-road mortality • Full list of mitigation measures detailed in **Section 9.2**.
Groundwater and Source Protection	• Lowering of water table from dewatering activities at watercourse crossings • Removal of sand lenses due to excavations for installation of services • Reduction in recharge due to addition of hard surfaces • Increase in sodium and chloride in groundwater	• Complete a dewatering assessment prior to road construction to identify potential zones of influence from dewatering. Well surveys should be completed during the detailed design phase. A well interference and reporting protocol should be established which outlines actions to be taken should a complaint from a private well owner be received • Should impacts to private drinking water be identified as a result of the collector roads during the subsequent detailed design phase, the Regional Municipality of York Public Health department will be informed • Prepare erosion and sediment control (ESC) plans that outline methods and structures to ensure sediment laden water is not discharged to the surface water features. Environmental permissions such as EASR or PTTW may be required

Anticipated Impacts		Mitigation Measures
		• Conduct water balance calculations to determine the potential reduction in recharge. Implement LID measures to promote infiltration and maintain pre-development recharge volumes • Manage road salt application through York Region's Salt Management Plan and Guidance for Best Management Practices for Road Salt Usage Standards
Stormwater Management	• Need for stormwater quantity and quality control • Controls required to minimize erosion and sedimentation during construction	• Ten SWM facilities are proposed within Block 27 to service majority of the development including the collector road system. All SWM ponds will be sized to provide quality, erosion, and quantity control. • SWM facilities will control future peak flows to target levels for the 2 year to 100 year events and the Region Storm • While LIDs are not being implemented specifically within the ROW, LID measures are part of the overall Block 27 development and will maintain recharge volumes • SWM facilities in catchments discharging to DF1 will provide for 48-hour extended detention for 30 mm storm event and 3 mm retention. Facilities draining to catchments discharging DF3 and DF4 will provide for 48-hour extended detention for 25 mm storm event and 5 mm retention • During subsequent design stages, erosion and sediment control should be identified for implementation during construction
Climate Change	• Greenhouse gas emissions associated with the operation, maintenance, and construction of the proposed collector road network	• To minimize the project's effect on climate change, construction contracts should encourage sourcing from suppliers with strong sustainability policies and practices. Materials that have a lower carbon footprint including sustainable and permeable concrete and asphalt should be considered • The provision of dedicated active transportation facilities along all collector roads will reduce vehicle use and result in decreased greenhouse gas (GHG) emissions caused by automobiles • To further reduce and mitigate the impacts of climate change, opportunities to implement stormwater management LID strategies and additional space to accommodate vegetation should be considered • Use of materials that can tolerate extreme heat or reduce heat absorption such as light-colored aggregates in asphalt or concrete can also help mitigate impacts of climate change

Anticipated Impacts		Mitigation Measures
		• Sustainable measures will be reviewed, addressed, and reconfirmed in the design of the collector roadways to further reduce and mitigate the negative effects of climate change • Updated information on the additional climate change mitigation and adaptation measures being considered for the collectors during detailed design will be sent to the Regional Municipality of York's Public Health Department for information
Built Heritage Resources & Cultural Heritage Landscapes	• Potential for direct or indirect impact to the identified cultural heritage resources • Permanent impacts to the context of the cultural heritage landscape, specifically for CHL 1 and CHL 7 as identified as Properties of Architectural and Historical Significance.	• Conduct Heritage Impact Assessments (HIAs) for CHL 1 and CHL 7 in accordance with the City of Vaughan's *Guidelines for Cultural Heritage Impact Assessment (2017)* and submit to City heritage staff for review and approval prior to road construction • Erect protective property fencing prior to road construction along the north property line of the cemetery on CHL 3 and BHR 18 to limit construction encroachment • Prepare cultural heritage photo documentation and historical mapping for CHL 2 for local archival records. This should be provided to Heritage Planning at City of Vaughan prior to road construction
Archaeology	• Unanticipated discovery of archaeological and/or human remains	• Areas with archaeological potential requiring further Stage 2-3 archaeological assessment were identified within the study area (**Figure 3-20).** All areas shall be cleared of archeological potential prior to an area being impacted • Archaeological monitoring will be required even after a Stage 2 archaeological assessment for the pre-development topsoil removal (grading) for lands located within 1000 m of documented village sites and within 300 m of any current or former water source or within 100 m of the Teston ossuary • Indigenous Peoples will be contacted prior to initiating any Stage 2+ archaeological assessment work to ensure engagement and inclusion for outstanding archeological fieldwork within Block 27
Operations and Maintenance Activities	• Operations and maintenance activities to be conducted to ensure all mitigation	• Operations and maintenance activities will center around preventing negative environmental impacts, protecting the existing environment, and capitalizing on opportunities for the rehabilitation and enhancement of impacted areas

Anticipated Impacts		Mitigation Measures
	measures are effective	• Operating and maintenance costs will be determined in the detailed design phase of the project

10 REVISIONS AND ADDENDA TO THE ENVIRONMENTAL STUDY REPORT

This section will delineate minor adjustments that have been contemplated in the recommended design and major changes that would necessitate a formal addendum to the ESR. Any addenda required shall be led with the ESR and the Notice of Filing of Addendum shall be given immediately to all potentially affected members of the public and review agencies, as well as those who were notified in the preparation of the original ESR. The ESR addendum will be placed on the public record with the City for a 30-day review period. An eligible person or party with concern regarding the addendum may make a written request to the Minister of Environment for a Section 16 Order of the Environmental Assessment Act within this 30-day review period. Provided that no Part II Orders are received, the City may proceed to Phase 5 of the MCEA process, design, and construction.

10.1 LASPE OF TIME

According to the MCEA process, "if the period of time from the filing of the Notice of Completion of Environmental Study Report in the public record or the MECP's denial of a Section 16 Order request(s),or the proposed commencement of construction for the project exceeds ten years, the proponent shall review the planning and design process and the current environmental setting to ensure that the project and the mitigation measures are still valid given the current planning context. The review shall be recorded in an addendum to the Environmental Study Report which shall be placed on the public record."

It should be noted that the above noted expiration of the approval is subject to further extensions offered by the Minister in accordance with Environmental Assessment Act R.S.O 1990, E. 18, s. 11.5 (as amended July 21, 2020). The extension offered by the Minister can be issued at any time including after the 10th anniversary of the approval and the Minister can through the extension set a date in which the approval would expire.

10.2 CHANGES IN PLANNING CONTEXT OR BACKGROUND CONDITIONS

Subsequent to the filing of the ESR, any modification to the project or change in the environmental setting for the project shall be reviewed by the proponent. Should the change be considered significant, it should be documented as an addendum to the ESR detailing the circumstances necessitating the change, the environmental implications of the change, and the mitigating measures. A minor change to the undertaking can proceed without an addendum as long as they are in line with the intent of the environmental assessment.

10.3 CHANGES IN ADJACENT PLANS OR SUBDIVISION OR SITE PLANS

It is noted that the specific future geometry of the collector streets, area required, proposed lane configurations, and applicable sightlines will be determined and reviewed through the development application and draft plan review/approval process. During the development application process, the City may request studies including, but not limited to, Transportation Impact Studies, Functional and Preliminary Designs, Safety Assessments, and Sightline Analyses. It is expected that these roads will be secured through spine servicing agreements through the Block Plan process.

10.4 ARCHAEOLOGICAL

As noted in **Section 3.9.2**, several areas with archeological potential require further assessment. As part of the draft plan review/approval process, the proposed road alignments shall be subjected to further Stage 2-3 archeological assessments in advance of construction. Results of these assessments are not expected to trigger an addendum to this EA.

10.5 GEOTECHNICAL INVESTIGATION

As part of this Class EA, geotechnical investigations were not conducted. Rather, it is understood that through the course of the development application process, soil management and soil excavation plans will be prepared for the subject sites. Through this process, it is expected that additional information regarding the soil composition will be obtained.

Soil management provisions will be undertaken in accordance with Ontario Regulation 153/04 and are expected to include a Record of Site Condition. Through the course of the geotechnical investigations, it may be identified that the soil conditions within the proposed ROWs are unsuitable. In such cases, a qualified person (as outlined in Ontario Regulation 153/04) will be engaged to develop either a soil treatment or disposal program. It is also understood and anticipated that the qualified person may make recommendations to the alignment of the road ROW to minimize overall impact to soil management requirements. Provided the intersection and crossing locations do not change significantly, these modifications would be considered to be minor in nature and will not require an addendum to the ESR.

The geotechnical engineer engaged during the draft plan review/approval process will identify the necessary soil bearing requirements and make recommendations with respect to the proposed foundation type for the development of Block 27. While the anticipated foundation and structure type may change as a result of further investigations, it is anticipated that any changes will be considered minor in nature and will not require an addendum to the ESR.

10.6 WATERCOURSE SPAN

10.6.1 ECOLOGICAL CONSIDERATIONS

Changes to the watercourse spans would increase the footprint within the environment and may require the collection of further environmental data and analysis. However, this is not expected to trigger an addendum to this ESR.

10.6.2 HYDRAULIC CONSIDERATIONS

As discussed in previous chapters, there are various watercourse crossings that have been identified due to the addition of new roads. All structures were designed to meet TRCA, MTO, and MNR criteria/guidelines and environmental constraints. A structural culvert is proposed for all new watercourse crossing structures. At the time of preparing this Class EA, significant wetlands and associated boundaries were identified in accordance with policies prior to the OWES update. Should the identification of certain hydraulic features be modified or reduced in size, an update to the hydraulic analysis would be required as part of detailed design of crossing structure. This is expected to proceed without needing an addendum to this ESR.

10.7 REVIEW AND ADJUSTMENT OF RECOMMENDED ROW

Road classification and ROW widths were recommended through the NVNCTMP and Block 27 Secondary Plan. These ROW widths were then used to establish the relevant design criteria and cross-section elements for both major and minor collector roads.

It is acknowledged that opportunities to adjust the ROW width, and associated cross-section elements, and minor changes to property requirements may be considered during the development application process; draft plan review/approval process; and in response to changes in development plans, municipal servicing requirements, or if a physical/road design constraint is identified. All draft plan ROWs shall be finalized prior to the draft plan approval.

Any consideration of modified ROW width would be conditional on the completion of supporting technical studies and designs (e.g., Transportation Impact Studies, servicing plans, alternative cross-sections, etc..) that provide a rationale and justification for the proposed adjustment. The technical studies must demonstrate that the proposed modification is appropriate and is consistent with the intent of the recommended design as identified in this ESR and would be subject to approval by the City.

10.8 INTERSECTION CONTROL MEASURES

The intersection control measures recommended and the subsequent preliminary designs for intersections provided in this Block 27 ESR may be revised or modified based on refinements to the individual design elements brought forward through the Plan of Subdivision and detailed design processes (e.g., lane widths, queue storage requirements, roundabout diameter, etc.). This would require the provision of updated design drawings and relevant transportation analysis with appropriate traffic modelling to demonstrate that the proposed intersection control/geometry appropriately accommodates forecasted traffic demand, active transportation, safety, and natural environment impacts. Changes with respect to the recommended intersection control, or the preliminary design plates provided in this ESR would be subject to approval by the Region and City and be consistent with approved guidelines. Any such updates are not expected to trigger an addendum to this ESR.

Despite the above, intersection locations shown in the ESR, and the recommended intersection control, does not preclude the Region/City from approving access to individual development blocks as development occurs in Block 27. Furthermore, this ESR does not preclude the Region/City from approving intersections along the corridors within the scope of the ESR (signalized, unsignalized, or roundabout), subject to appropriate rationale and analysis provided, and a design being provided that is acceptable to the Region/City. Any additional intersections or driveways would be considered as part of the development application process for individual development sites which may be proposed as the area builds out.

10.9 GEOMORPHOLOGICAL INVESTIGATIONS

It is recognized that as part of detailed design or the draft plan review/approval process additional geomorphological investigations will be required to develop the footing designs, ensure slope stability and mitigate potential erosion. Incorporating the findings of this studies are not expected to result in significant changes to the recommended design and would not trigger an addendum to the ESR.

10.10 OTHER CHANGES

In addition to the items outlined above, it is expected that through the course of the detailed design and draft plan review/approval process, minor alterations to the recommended design may be required. The determination of whether a change is deemed minor and is accordance with the environmental assessment is noted to be at the discretion of the City. Changes deemed minor can occur within the draft plan review/approval process and do not require a public notification. It is anticipated that through this, the City will work with its partner agencies to notify if changes to the design have been made.

11 COMMITMENTS FOR FUTURE WORK

This ESR identifies items to be reviewed and confirmed during the detailed design and construction phases of the project. Items of particular interest to be addressed include:

Noise and Vibration

- Complete detailed noise and vibration studies to further refine the noise control requirements and to ensure compliance with the MECP's Environmental Noise Guideline limits.

Climate Change and Air Quality

- Review, address, and reconfirm sustainable measures in the design of the collector roadways to further reduce GHG emissions and mitigate the negative effects of climate change.

Contamination

- Complete Phase 1 and Phase 2 Environment Site Assessments where it was not previously completed.
- A Record of Site Condition will be required for the road property prior to dedication

Transportation System

- Confirm/refine alignments based on more detailed topographic and field surveys.
- Undertake traffic studies in support of the development process, including traffic analysis and intersection control/configuration reviews.
- Confirm intersection configurations.
- Consult with York Region Transit (YRT) during detailed design to determine appropriate transit stop locations.
- Develop a traffic management plan to maintain vehicular access during construction.
- Actively engage CN Rail/GO Transit/Metrolinx to ensure railway safety is maintained through the design and construction of the planned grade separated structure.
- Determine type of retaining walls to be used in areas that require fill for grade separations.

Active Transportation Connection Through the Significant Woodlot

- The design and implementation of the multi-use path will be completed as part of future development applications.
- Further technical studies will be required to support the design of the multi-use path (e.g., alignment), including but not limited to additional natural environmental studies (e.g., arborist report, tree inventory, etc.).
- The design of the multi-use path will be completed in consultation with the City of Vaughan to determine the width and types of facilities that will be included as part of the trail (e.g., paving material, lighting requirements, etc.).
- Obtain required permits/approvals/exemptions in support of the connection through the significant woodlot.
- The latest MCEA cost threshold should be reviewed when significant woodlot crossing construction cost estimate is available to confirm the MCEA exemption

Natural Environment

- Prepare a feature-based water balance as part of the MESP

- Prepare a post-construction restoration plan to compensate for removed vegetation and enhance buffer areas using native species, as part of subsequent detailed design phase.
- Crossing features and culverts shall meet fish and wildlife objectives, including appropriate openness ratios, to be confirmed in consultation with the City and TRCA during design phase. The provision of more substantial wildlife and pedestrian crossings should be considered during detailed design. Where appropriate, fish habitat fragmentation should be monitored.
- Review and confirm appropriate compensation for Natural System and features impacted.
- Evaluate opportunities to avoid armouring of the channel/floodplain through subsequent design stages.
- Ensure that construction impact mitigation measures as described in the ESR are incorporated into construction contract documents.
- As part of each draft plan of subdivision approval, provide a detailed tree preservation study to the satisfaction of the City. This study will include an inventory of all existing trees, assessment of significant trees to be preserved, and proposed methods of tree preservation based on the arborist report recommendations.

Groundwater and Source Protection

- Complete dewatering assessments prior to road construction. Well surveys should be completed during the detailed design phase. Well interference and reporting protocols should be established to outline actions to be taken should a complaint from a private well owner be received.
- Prepare erosion and sediment control (ESC) plans to identify required ESC BMPs to address construction related impacts on surface water feature and to ensure that sediment laden water is not discharged to surface water features.
- Conduct water balance calculations to determine the potential reduction in recharge.
- Conduct a feasibility assessment of the hydrostratigraphic context at the rail crossing.

Geotechnical

- Complete a detailed geotechnical study to assess ground conditions along the alignments and to provide geotechnical design recommendation for various components of the project.

Drainage/Stormwater Management

- During the detailed design phase, review the latest available standards for the drainage design in consultation with TRCA to address current requirements.
- Finalize proposed stormwater outlet locations and servicing as part of the MESP.
- Complete design of the proposed stormwater management facilities.

Archaeology and Cultural Heritage

- Complete Heritage Impact Assessments for CHL 1 and CHL 7.
- Complete Archeological Assessments (AA) to the stages required.
- All outstanding stages of AAs (including those arising from the planned Stage 2 and 3 studies), will take place as early as practicable during detailed design phase, and before the commencement of ground-disturbing activities. All areas should be cleared of archaeological potential prior to construction.
- Indigenous communities that express interest in AAs will be included and consulted throughout the assessment process.

- Should any archaeological resources be unexpectedly encountered during construction activities, construction and alteration of the site shall stop immediately, and the relevant authorities and Indigenous Communities shall be immediately notified.

Subsurface Utility Investigations (SUE)

- Complete subsurface utility investigations and engage with utility companies to determine proposed relocation of utilities, where required.

Cost

- Review and confirm preliminary cost estimates.

Permits and Monitoring

- Permits anticipated, but may not be limited to, the regulations that are set forth by the below legislation:
    - Department of Fisheries and Oceans
    - Species-at-Risk Act
    - Fisheries Act
    - MECP
        - Ontario Environmental Assessment Act
        - Ontario Water Resources Act
        - Environmental Protection Act
        - Endangered Species Act
    - MNR
        - Fish and Wildlife Conservation Act
    - City
        - Noise Control By-law
        - Traffic By-Law
    - TRCA
        - Ontario Regulation 41/24

Monitoring will be required in accordance with the above legislation, and others identified through the draft plan review/approval process, during both the construction and post-construction periods:

- Contractors must be aware of all environmental considerations to ensure that all environmental standards and commitments are met.
- Contractors should carefully review **Section 9** of this ESR to ensure they are aware of the potential impacts of the proposed projects and employ appropriate mitigation measures.
- During design and construction, reports and plans should be based on a best management approach that centres around the prevention of impacts, protection of the existing environment and capitalizing on opportunities for rehabilitation and enhancement of any impacted areas

The proponent is also to engage in post-construction monitoring to ensure all mitigation measures have been effective and are functioning properly. At this time, additional measures that may be required will be identified and reviewed.

BLOCK 27 LANDOWNERS
GROUP INC.