

HIGHWAY 404 RAMP EXTENSION AT MAJOR MACKENZIE DRIVE ENVIRONMENTAL STUDY REPORT ADDENDUM

Schedule "C" Municipal Class Environmental Assessment Addendum

City of Markham

October 28, 2026

FIRM PROJECT NO.: 074748



Prepared for:



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- Appendix D – Stage 1-2 Archaeological Assessment Report & MCM Correspondence**
- Appendix E – Noise Impact Assessment Report**
- Appendix F – Air Quality Assessment Report**
- Appendix G – Geotechnical Site Investigation**
- Appendix H – Drainage & Stormwater Management Report**
- Appendix I – Transportation Study Update**
- Appendix J – Future Commitments for a 3:1 Slope**

EXECUTIVE SUMMARY

In 2009, the City of Markham completed a Class Environmental Assessment (EA) for the Highway 404 Ramp Extension at Major Mackenzie Drive Project in accordance with Schedule C of the Municipal Class Environmental Assessment (MCEA) process.

The purpose of the project was to identify solutions to address increased growth and travel demands in the Cathedral District. The road extension from the Highway 404 northbound off-ramp at Major Mackenzie Drive intersection was identified as the recommended solution for the following reasons:

- Provides an opportunity for direct access to the development in the Business Corridor of the Cathedral District Community from Highway 404;
- Provides an opportunity to improve traffic operations at the Highway 404 ramp terminal and intersections along Major Mackenzie Drive; and,
- Provides an additional gateway to the Cathedral District Community from the Highway 404 northbound off-ramp to help relieve traffic congestion particularly at the Major Mackenzie Drive/Markland Street intersection.

A Public Information Centre was held for the study, as well as a second public contact to those who identified interest at the first PIC. As only seven members of the public attended the first PIC, and they were all associated with the development communities, it was determined that the second point of public contact would be conducted as a meeting with the developers of the Cathedral Community, which was held on January 5, 2007. The study was documented in an Environmental Study Report (ESR), which received environmental clearance in October 2009.

As there has been a lapse of more than ten (10) years, and the environmental setting and transportation needs have changed, an addendum to the 2009 ESR is required according to the 2024 MCEA. As a result, the City is recommencing the MCEA for the Highway 404 ramp extension project at Major Mackenzie Drive to update the environmental effects and mitigation measures to address environmental impacts. The Addendum also provides a summary of changes to the existing environmental conditions within the Study Area and identifies any changes to conditions that have occurred since the original 2009 ESR was completed. In accordance with the MCEA process, this Addendum is being filed for review by the public and technical agencies.

Technical studies completed in support of this Addendum include the following reports:

- Noise Impact Assessment;
- Air Quality Assessment, a Geotechnical Report;
- Phase 1 and Phase 2 Environmental Site Assessment (ESA); and,
- Preliminary Structural Design Report.

In addition, the following technical studies have been *updated* since the completion of the original 2009:

- Natural Environment Impact Assessment;
- Drainage & Stormwater Management Report; and,
- Transportation Study.

A summary of changes to the existing conditions in the Study Area since the 2009 ESR is provided in **Section 3.0**.

Based on updated information regarding existing conditions, as well as a review of relevant legislation, regulations and policies, an updated assessment of impacts and measures mitigation are included in **Section 5.0**.

A Notice of Addendum has been circulated to all potentially affected members of the public and review agencies, including those who were contacted during the original MCEA planning process, where possible. A period of 30 calendar days has been provided for review and response by the public. The Notice includes information about how to request a higher level of study (i.e., an individual or comprehensive EA) or that conditions be imposed (e.g., requiring further studies) by the Ministry of the Environment, Conservation and Parks (MECP) prior to proceeding to implementation of the project.

1.0 BACKGROUND

The City of Markham is experiencing rapid population growth, leading to increased demand on the existing transportation network. The Highway 404 ramp extension at Major Mackenzie Drive (the Project) was originally completed in 2009 following the 2000 Schedule 'C' Municipal Class Environmental Assessment (MCEA) Study (October 2000, as amended 2007, 2011, 2015, 2023 and 2024). As there has been a lapse of more than ten (10) years, and the environmental setting and transportation needs have changed, an addendum to the 2009 Environmental Study Report is required according to the 2024 MCEA. As a result, the City is recommencing the MCEA Addendum for the Highway 404 ramp extension project at Major Mackenzie Drive. This study will address the anticipated growth and traffic demand in the Cathedral District Community, and the Business Corridor near Highway 404 and Major Mackenzie Drive.

1.1 Project Purpose

The purpose of the current study (as documented in this Addendum) is to validate the 2009 preliminary design recommended through the MCEA process, based on the current environment setting and transportation needs.

1.2 Project Overview

As part of the original 2009 MCEA Study, a preliminary preferred alignment was selected with a total length of 560 m. The Highway 404 ramp extension at Major Mackenzie Drive was recommended to cross the westbound Major Mackenzie on-ramp to the northbound Highway 404, proceeding through greenfield properties and connecting to Markland Street. This includes realignment of the existing Highway 404 E-N on-ramp, and construction of a bridge over the realigned ramp and supporting retaining wall(s). See **Figure 1** below.

Additionally, it is worth noting that the greenfield properties to the east of the proposed extension road is now under development (see further discussion below).

1.2.1 Project Study Area

The current Study Area is shown in **Figure 1**. Highway 404 is located to the west, Markland Street to the north and east, and Major Mackenzie Drive to the south of the Study Area.



Figure 1: Study Area Key Map

1.3 Addendum Study Purpose

This Addendum document summarizes the consultation, baseline environmental conditions, evaluation and decision-making from the 2009 ESR, updates on current Study Area conditions, validation of the recommended design concept, and associated mitigation measures. Background material from the 2009 ESR was reviewed and gaps identified in the previous study were addressed in this Addendum.

1.4 Summary of 2009 Environmental Study Report (ESR)

To accommodate for future population growth and increased traffic volumes in the Cathedral District Community, as identified in the *Town of Markham Official Plan (Office Consolidation 2005)*, the City of Markham (former Town of Markham) retained McCormick Rankin Corporation (MRC) to carry out a Schedule 'C' MCEA for the proposed ramp extension at Highway 404 northbound off-ramp at Major Mackenzie Drive intersection. An MCEA was completed in September 2009 to assess the need for the proposed ramp extension, identify the effects on the environment of the alternative solutions, examine design alternatives, and identify the preferred alternative and design concepts.

Traffic volumes along Major Mackenzie Drive were expected to rise due to the development of Cathedral District, surrounding areas, and population growth. Traffic analyses used data from the *Traffic Impact Study for the West Cathedraltown Community*, which projected traffic volumes for both 2014 and 2021. The 2021 volumes were calculated by adding seven years of traffic growth to the 2014 totals. The study also considered planned road improvements, such as widening Major Mackenzie Drive and Woodbine Avenue, and assumed the future extension of Markland Street into the Cathedral District Community.

The EA recommended that the Highway 404 ramp extension connects the Highway 404 northbound off-ramp at Major Mackenzie Drive directly to Markland Street, providing improved access to Cathedral District and future developments. The direct connection of the ramp was expected to enhance overall traffic operations along Mackenzie Drive corridor between Highway 404 and Woodbine Avenue.

Phase 1: Problem Statement

Phase 1 of the MCEA process focused on identifying the problems or opportunities that the project aimed to address. The following problem statement was identified in the 2009 ESR (MRC, 2009, p. 7):

The purpose of the Class EA Study was to assess the need and alignment of the proposed road extension which would extend northerly from the Highway 404 northbound off-ramp and Major Mackenzie Drive intersection, and address overall transportation needs in the surrounding area. Therefore, the study included the following:

- *Assessment of travel demand (existing and future);*
- *Review of alternative solutions;*
- *Identification of the preferred alternative solution;*
- *Development of alternative design concepts;*
- *Identification of the preferred alternative design concept; and,*
- *Identification of mitigation measures.*

The City of Markham anticipated that growth and traffic demand in the Cathedral District may lead to congestion concern as the existing Highway 7 corridor, as well as existing issues of increasing congestion due to significant employment growth in the area. The extension of Major Mackenzie Drive and the Highway 404 northbound exit ramp would alleviate potential congestion in the area.

The problem statement identified in the 2009 ESR will not be revised as part of this Addendum as anticipated growth in the area is still a concern that will lead to traffic congestion.

Phase 2: Development of Alternative Solutions

Phase 2 of the MCEA process focused on developing alternative solutions to address the overall traffic congestion (i.e., “problem”) identified in Phase 1. As documented in the 2009 ESR, the alternative solutions were identified as follows:

- Do Nothing;
- Provide transit and other modes of transportation;
- Proposed road extension from Highway 404 northbound off-ramp; or,
- Road improvements/other access.

The road extension from the Highway 404 northbound off-ramp at Major Mackenzie Drive intersection was identified as the recommended solution for the following reasons:

- Provides an opportunity for direct access to the development in the Business Corridor of the Cathedral District Community from Highway 404;
- Provides an opportunity to improve traffic operations at the Highway 404 ramp terminal and intersections along Major Mackenzie Drive; and,
- Provides an additional gateway to the Cathedral District Community from the Highway 404 northbound off-ramp to help relieve traffic congestion particularly at the Major Mackenzie Drive/Markland Street intersection.

The alternative solutions developed as part of the 2009 ESR will not be re-evaluated as part of this Addendum, as the alternative solutions are no longer feasible due to adjacent planned developments. With this in mind, the preferred solution will be re-confirmed and further refined to bring it into compliance with current standards (i.e., Transportation Association of Canada and Ministry of Transportation (MTO)).

Phase 3: Alternative Design Concepts for the Preferred Solution

Phase 3 of the MCEA process involved developing alternative design concepts to implement the preferred solution identified in Phase 2 of the process. Four (4) alternative design concepts (Alternatives A, B, C, and D) were initially developed, as shown in **Figure 2**.

The proposed road extension will be grade separated from the existing Highway 404 E-N on-ramp due to the limited space between the existing ramp and the mainline Highway 404. The realignment of the ramp further to the west to allow for the proposed road extension without a grade separation would reduce the radius on the ramp to less than 55 m which is considered to be deficient. This section of the proposed road extension from Major Mackenzie Drive to the north end of the grade separation structure is common to all alternative design concepts. The alignment of the four (4) alternatives varied from the north of the grade separation structure to

Markland Street to reflect different property impacts based on design speeds, the associated design criteria, length of the roadway, and location where it intersects with Markland Street.

A meeting with developers (Loblaws Properties Inc., Majorwood Developments, and Monarch Corporation) of the Cathedral District Community was held on September 7, 2006 to discuss and review the preliminary alternative alignments (Alternatives A-D) and to identify the developers' key issues. **Figure 4** depicts the developers' lands relative to the proposed road extension. The key concerns identified by representatives of the developers at the meeting were the overall footprint of the proposed road extension and property impact (e.g. grading), if the road would bisect any properties and whether the remnant land is developable.

Representatives of the developers agreed that Alternatives A and D would be preferred. Therefore, Alternatives A and D were carried forward for further consideration.

Following the September 7, 2006 meeting with the developers, Alternative A and Alternative D were modified (thereafter, Alternative D was renamed as "Alternative B" given that there were only two design alternatives carried forward).

- **Alternative A:** To minimize the impact to the woodlot located along the northerly property line of the Loblaws property, the design speed of Alternative A was reduced from 70 km/h to 60 km/h, so a minimum horizontal curve of 130 m radius could be used. The tangent from Major Mackenzie Drive was lengthened by approximately 30 m, followed by a 130 m curve and another tangent of approximately 170 m before intersecting with Markland Street as a T-intersection. Overall, the alignment was shifted slightly to the north by approximately 15 m, and the alignment would impact only the most westerly corner of the woodlot. Refer to **Figure 4** below.
- **Alternative B (formally Alternative D):** The alignment was shifted slightly to the west to be as close to the Ministry of Transportation (MTO) property limits as possible. The alignment was shifted to the east so that it continues northerly from the grade separation structure through two back-to-back 130 m radius curves and extends northerly parallel to the MTO property limit for approximately 140 m where the edge of pavement is 8 m from the property line. It would then turn to the northeast through a 130 m radius curve and intersect with Markland Street and would connect as an all-way intersection to a proposed future intersection. Refer to **Figure 5** below.



Figure 2: Alternative Alignments (Excerpt, MRC 2009)



Figure 3: Nearby Developers Lands in 2009



Figure 4: Alternative Alignment A (Excerpt, MRC 2009)

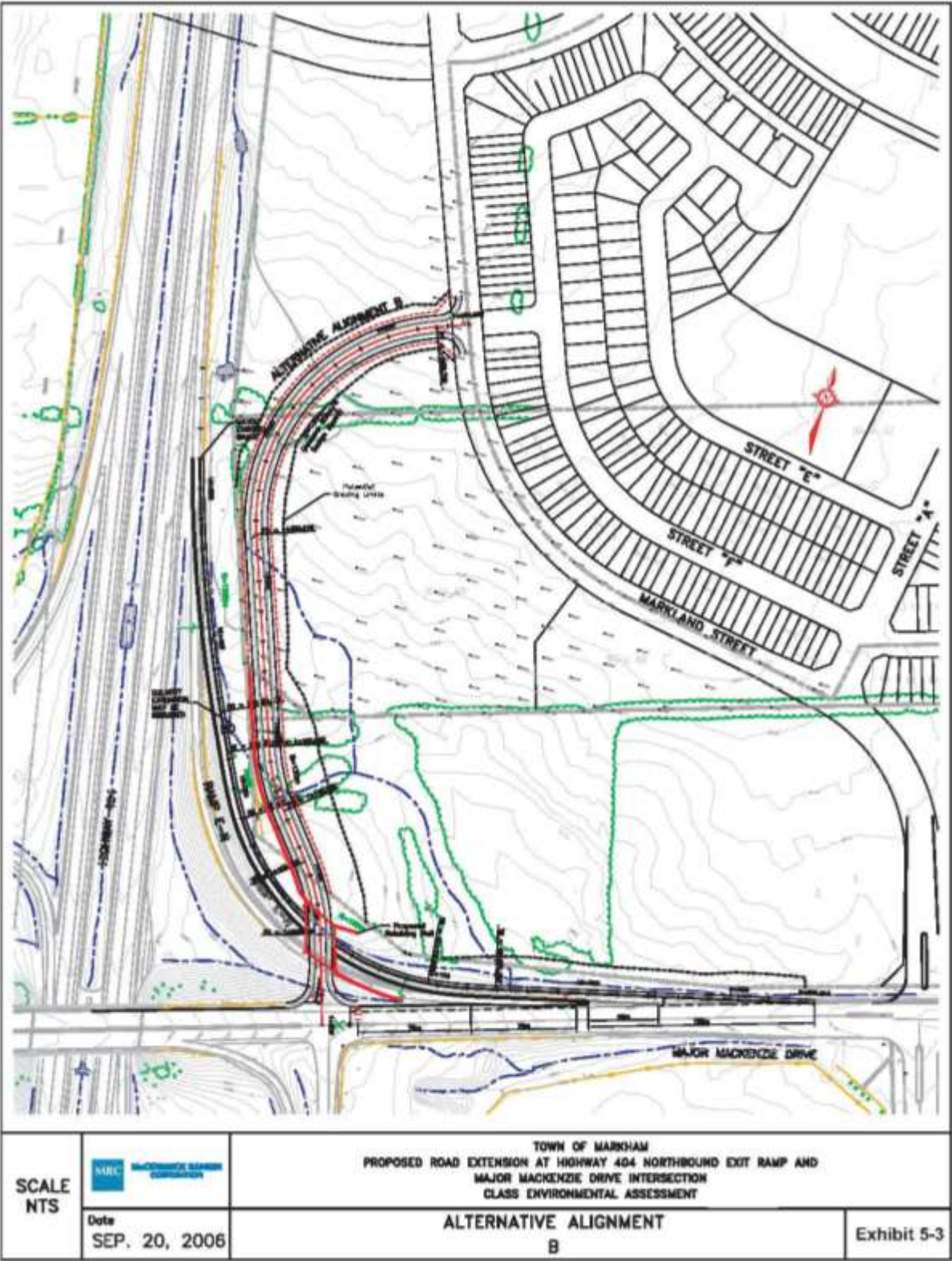


Figure 5: Alternative Alignment B (Excerpt, MRC 2009)

Following Public Information Centre (PIC) 1 held on October 2, 2006, the Town of Markham advised that the woodlot located along the northerly property line of the Loblaws property is to be preserved per Town of Markham Council resolution. Subsequently, Alternatives A and B were modified. Alternative A is now referred to as **Alternative A2** and modifications included:

- Avoiding the woodlot by increasing the radius of the curve to 190 m (i.e. meeting the design criteria of 70 km/h design speed), and the alignment was shifted to the west by approximately 20 m in the proximity of the woodlot area;
- Provide access to the Loblaws property by introducing a flare north of the grade separation structure which would provide a right-in / right-out to the Loblaws property. The right turn lane will continue as a through lane; and,
- Continue the two lanes northbound from the Loblaws access until it intersects with Markland Street as a T-intersection (i.e. 2 northbound lanes).

Following a second PIC on January 5, 2007, developers of the Cathedral District Community, including representatives from Loblaws Properties Limited, Majorwood Developments Inc., Monarch Corporation, Stantec, LEA Consulting, and Zelinka Priamo Ltd., attended a meeting. The purpose of the meeting was to review the activities since PIC 1, identify the preferred alternative alignment, and to obtain input from developers.

Alternative A2 was identified as the preliminary preferred alternative since the greater radius is considered to be more desirable in terms of road geometry, the design did not require properties from MTO, and had a lower estimated cost. In addition, there was general support for the alignment of Alternative A at PIC 1. Subsequently, the alignment and profile for Alternative A2 were further refined per comments from MTO. Refer to **Figure 6** below.



Phase 4: Environmental Study Report

The ESR was completed, and the Town of Markham issued a 'Notice of Completion' on October 15, 2009, making the ESR available for review by the public and commenting agencies for a 30-day review period.

1.5 Addendum Process

According to Section A.4.3 of the MCEA document (February 2024) an Addendum is triggered if a significant change occurs to a project, its environmental setting after the Environmental Study Report (ESR) has been filed has changed, and/or more than 10 years have passed since the ESR was filed and construction has not yet started. The proponent is required to re-evaluate the planning and environmental conditions to ensure the project and its mitigation measures are still valid. Any findings from this review need to be documented in a new addendum, filed on the public record, and communicated to relevant stakeholders through a Notice of Addendum.

A 30-day public review period follows, during which time comments can be submitted. After the review period, an additional 30-day waiting period is required before any work can proceed—provided no order is issued or pending. During this time, no construction or activities that might impact the reviewed elements of the project are allowed.

As indicated above, a Schedule 'C' Municipal Class EA Study was completed for the Highway 404 ramp extension at Major Mackenzie Drive project in 2009. As there has been a lapse of more than 10 years, and the existing environmental conditions may have changed, an addendum to the 2009 MCEA Study is required.

1.5.1 Addendum Steps

In accordance with the MCEA, this Addendum documents the following aspects:

Table 1: Report Contents in Accordance with Municipal Class Environmental Assessment (2024)

Addendum Requirements	Reference
Study objectives.	Section 1.0
The Addendum process followed, including Change of Project or Environment and Lapse of Time.	Section 1.4
An update to existing environmental conditions.	Section 3.0
A summary of changes to the current planning and policy context.	Section 3.2
A description of changes to the Recommended Preferred Design from the original ESR.	Section 4.0
A Summary of Environmental Concerns and Commitments, updated to capture any changes to existing environmental conditions, environmental impacts, and mitigation measures.	Section 5.9
Identification of all future project approvals, licenses, and permits which have been or must be obtained prior to construction.	Section 6.1
Further commitments to be addressed during detail design and construction.	Section 6.0

Addendum Requirements	Reference
Consultation with stakeholders, Indigenous communities, and the public as part of the Addendum process.	Section 2.0

2.0 CONSULTATION

The following section provides a summary of how the City of Markham engaged and consulted with the public, government review agencies, the Region of York, Indigenous Communities, and other stakeholders as part of the EA Addendum. Additional details and specific records of consultation, meetings, correspondence, etc. can be found in the Consultation Record contained in **Appendix B**.

Public consultation in the form of a public information center (PIC) or public open house was not a requirement in order to fulfill the ESR Addendum. A PIC is typically required only if major changes are being proposed that would significantly alter the previously approved project or its potential impacts. Since the overall design, purpose, or location of the previously approved project largely remains unchanged, a PIC was not required. The Addendum has been made available for public and agency review in accordance with the MCEA process, which fulfills the applicable consultation requirements.

2.1 Overview of Engagement Methods & Activities

2.1.1 Project Contact List

A Project Contact list was developed and includes the following:

- Provincial Review Agencies
 - Ministry of Environment, Conservation, and Parks (MECP)
 - Ministry of Citizenship and Multiculturalism (MCM)
 - Ministry of Municipal Affairs and Housing (MMAH)
 - Ministry of Natural Resources and Forestry (MNRF)
 - Ministry of Transportation (MTO)
- Conservation Authorities
 - Toronto and Region Conservation Authority (TRCA)
- Indigenous Communities
- Regional Municipality of York
 - Regional Staff
 - Regional School Boards
- Utility Companies
- Other:
 - Business/Economic Development Organizations

The contact list contains the names, addresses, phone numbers, and e-mail addresses of organizations so they can receive project updates and other notifications throughout the addendum process. This list was kept up to date on a regular basis throughout the project to reflect changes in contact information and/or new/additional people that were added to the list.

As of today, the contact list identified in this Addendum remains largely consistent with the contact list from the 2009 ESR. Updates have been made to reflect organizational changes since 2009, including agency and utility company name changes, mergers, and instances where organizations/companies are now defunct.

2.1.2 French Translation

An area that is identified as a French Designated Areas (FDA) under the *French Language Services Act* requires services to be provided by government agencies in French. All Ontario government agencies are subject to this Act. French language services were provided (where requested) as part of consultation activities, as the Highway 404 Ramp Extension at Major Mackenzie Drive falls within the Regional Municipality of York (City of Markham) designated area.

2.2 Project Update Letter

A Project Update Letter was circulated via E-mail on April 5, 2023 to the following Agencies, developers, and utility companies presented in **Table 2**. Responses were received indicating acknowledgement of the project as well as additional information and questions related to the previously completed studies within the Study Area.

Table 2: Notice of Commencement Circulation

Agency/Company	Notice of Commencement Issued	Response Received
Transport Canada	April 5, 2023	<i>No response received.</i>
Ministry of Environment, Conservation, & Parks (MECP)	April 5, 2023	April 5 & 21, 2023
Ministry of Citizenship and Multiculturalism (MCM)	April 5, 2023	May 3, 2023
Ministry of Municipal Affairs & Housing (MMAH)	April 5, 2023	<i>No response received.</i>
Ministry of Natural Resources & Forestry (MNRF)	April 5, 2023	April 5, 2023
Ministry of Transportation (MTO)	April 5, 2023	April 5, 2023
Toronto and Region Conservation Authority (TRCA)	April 5, 2023	April 5, 2023
York Region	April 5, 2023	April 18, 2023
York Region District School Board	April 5, 2023	<i>No response received.</i>
York Catholic District School Board	April 5, 2023	<i>No response received.</i>
Owner of Site A (770 Markland Street) (see Figure 7)	April 5, 2023	April 18, 2023
Owner of Sites B & C (see Figure 7)	April 5, 2023	May 3 & 11, 2023
Bell Canada	April 5, 2023	<i>No response received.</i>

Agency/Company	Notice of Commencement Issued	Response Received
Rogers Cable	April 5, 2023	<i>No response received.</i>
Trans-Northern Pipelines Inc. (TNPI)	April 5, 2023	April 10, 2023
FVB Energy	April 5, 2023	<i>No response received.</i>

A copy of the correspondence can be found in **Appendix B**.

2.3 Engagement with Indigenous Communities

The City of Markham is committed to building positive and meaningful relationships with Indigenous peoples and communities. The City of Markham actively engaged with Indigenous communities as part of this Addendum to ensure their perspectives and involvement are integrated. A list of Indigenous Communities to be engaged as part of this Project was confirmed with the MECP on April 21, 2023.

2.3.1 Project Update Letters

A Project Update Letter was circulated via E-mail on May 10, 2023, to the following Indigenous Communities:

- Alderville First Nation;
- Beausoleil First Nation;
- Chippewas of Georgina Island;
- Chippewas of Rama First Nation;
- Curve Lake First Nation;
- Hiawatha First Nation;
- Huron-Wendat Nation;
- Mississaugas of the Credit First Nation; and,
- Mississaugas of Scugog Island.

Responses were received from the Chippewas of Georgina Island, Hiawatha First Nation, Huron-Wendat Nation, and the Mississaugas of the Credit First Nation expressing interest in reviewing archaeological studies previously conducted in the Study Area. A follow-up letter was circulated via E-mail on September 25, 2024 to Indigenous Communities; Huron-Wendat Nation expressed interest in reviewing archaeological studies previously conducted in the Study Area.

Follow-up phone calls were initiated on October 9 and 23, 2024 to Indigenous Communities who had not responded to the Project Update Letters. Responses were received from Chippewas of Georgina Island and the Mississaugas of the Credit First Nation acknowledging the receipt of the letter and indicating that they have no questions at the time, but would like to be informed as the project progresses. Mississaugas of the Credit First Nation also expressed interest in participating in the Addendum review. A copy of the correspondence can be found in **Appendix B**.

2.4 Consultation with Technical Agencies

2.4.1 Ministry of Transportation (MTO)

The Highway 404 E-N on-ramp falls under the jurisdiction of MTO. Given that the proposed works may interact with the ramp, coordination with MTO is necessary to ensure compliance with applicable standards and requirements. Although MTO policy may limit the potential for future driveway access along the proposed Highway 404 ramp extension, this option can continue to be assessed, provided it can be demonstrated to be technically feasible. Furthermore, it is anticipated that access will be required to support the future development of adjacent blocks, and this requirement will be addressed through ongoing planning and design processes.

An initial kick-off meeting with MTO was held on May 24, 2023 to provide a project overview of the Highway 404 Ramp Extension at Major Mackenzie Drive as well as the 2023 EA Addendum. Discussions during this meeting included geotechnical strategy, proposed works, traffic, permitting requirements, and project timelines. Additionally, MTO was requested to provide data such as record drawings, previous reports, and topography relevant to the Study.

A subsequent meeting was held on November 23, 2023 to discuss traffic Terms of Reference (ToR). The meeting provided a recap of the initial discussion held on May 24, 2023, as well as other topics such as the traffic study area, traffic counts, and traffic forecasting and operational analysis. There was also an open discussion for MTO to address questions and provide clarification on roadway geometry, drainage, and grading.

A draft Transportation Study Update Report was submitted to MTO on July 2, 2024 for review and feedback. MTO provided their comments on July 19, 2024 regarding road widening, traffic signals, and bike paths, as well as a copy of MTO's Bikeways Design Manual for review.

Draft Preliminary Design drawings were shared on November 5, 2024 during the Technical Agency Committee (TAC) Meeting. MTO was requested to review and provide feedback on the Preliminary Design drawings. MTO provided comments on November 19, 2024 regarding pavement (e.g., pavement type). Additionally, MTO requested that all future work related to the project conform to the standards outlined in the MTO Foundation Manual. This includes the submission of all necessary plans, drawings, and reports for MTO review and comment. It was also noted that the existing two (2) 10m boreholes were insufficient to support the future bridge design. As such, any future proposed work must include additional geotechnical investigations and fully comply with the MTO Foundation guidelines for new bridge construction. The project team acknowledged and agreed to these commitments, and has referenced the MTO Foundation Manual to ensure compliance. To best derisk MTO's approval for the detailed design and construction phases, it is recommended that the geotechnical, excess soils and hydrogeological fieldwork plan be shared for MTO buy-in when detailed design initiates.

Confirmation was requested from MTO regarding the future ownership of the bridge crossing the Highway 404 E-N on-ramp on November 19, 2024. No response has been received to date.

In an e-mail dated January 6, 2025, MTO confirmed that no new driveway connections will be permitted along the proposed extension. All access to adjacent development sites must be from Markland Street. This restriction is due to the MTO's 400-metre desirable offset spacing criterion, which requires a minimum distance between a ramp terminal intersection and the

first entrance or intersection on the extension road. The purpose of this spacing is to prevent vehicle queues from backing up to the ramp terminal and disrupting highway operations.

Notwithstanding the above, any feasibility studies will need to be carried out by the developers, and driveway connections to the extension road may continue to be explored where it is demonstrated to be technically feasible. In addition, it should be noted that access will be required to support future development of the blocks adjacent to the new roadway.

2.4.2 Toronto and Region Conservation Authority (TRCA)

A meeting was held with the TRCA on June 16, 2023. The purpose of the meeting was to provide a project overview and background understanding of the previous 2009 ESR completed in the Study Area as well as the recommencement of the Project. The topics in the discussion included 2023 EA scope of work, natural environment, drainage and stormwater management, as well as a request for TRCA input regarding to requirements in the Addendum. The Draft Natural Environment Impact Assessment Report was shared with the TRCA on March 18, 2025 to obtain feedback.

TRCA provided one (1) comment on April 10, 2025 regarding an unevaluated wetland agreed to be removed. On May 5, 2025, TRCA confirmed the agreement to remove the unevaluated wetland, and there were no further comments.

2.4.3 York Region

Background information was requested from York Region on April 10, 2023. The request for information included photogrammetry data of the Highway 404 and Major Mackenzie Drive interchange, Part II Order, and construction details for ongoing/future projects nearby. York Region provided the requested information on April 18, 2023.

A meeting was held with York Region on August 15, 2023 to provide a project overview of the Highway 404 Ramp Extension at Major Mackenzie Drive as well as background traffic information and traffic study ToR. Topics discussed during this meeting consisted of traffic counts, traffic forecasting methods, operational analysis, and other road improvements.

2.4.4 Technical Agency Committee (TAC) Meeting

A Technical Agency Committee Meeting was held on November 5, 2024 to provide a project overview of the Highway 404 Ramp Extension at Major Mackenzie Drive. The topics discussed included 2023 EA scope of work, preliminary design, drainage, environmental, and structural work.

The following parties attended the meeting:

- City of Markham;
- Gannett Fleming;
- Ontario Ministry of Transportation (MTO);
- Toronto and Region Conservation Authority (TRCA); and,
- York Region.

Discussions included the proposed recommended design concept being based on the original 2009 EA Study preliminary design, new and updated studies (e.g., noise, air quality, natural environment), development plans, the inclusion of how cyclists and pedestrians are being

incorporated into future infrastructure at Major Mackenzie Drive, existing drainage conditions, as well as information regarding an onsite wetland within the project footprint.

2.5 Consultation with Nearby Developers

Refer to **Figure 7** for nearby development locations within the Study Area.

2.5.1 Loblaw Ontario Municipal Board (OMB) Settlement

In December 2005, a Minutes of Settlement agreement was reached between Loblaw Properties Limited, Fieldgate Holdings Limited, and the City of Markham to resolve appeals before the OMB regarding the development of a 16.8-hectare site at 2938 Major Mackenzie Drive East.

The agreement supports the development of a large-format retail centre, including a new Loblaw's store, office, and service uses, and outlines specific provisions related to land use, transportation, and design. Key commitments include the conveyance of land for road improvements or alternative access routes, financial contributions toward environmental preservation and traffic calming, enhanced urban design and landscaping, restrictions on drive-through uses, and the conveyance of land for a future fire station and emergency medical services facility.

In accordance with the OMB Settlement, the conveyance of the 20m ROW for the Highway 404 off-ramp extension to the City will be at no cost and free of encumbrance.

2.5.2 Owner of Site A

The City has been coordinating with the Owner of 770 Markland Street (Site A) regarding the interface between the proposed Highway 404 Ramp Extension and the adjacent private development lands.

A meeting was first held with the Owner on December 21, 2023, to better understand the proposed development and its relationship to the future road extension. At that time, the Owner advised that a Zoning By-law Amendment had been submitted in April 2023, with Site Plan Approval and Site Alteration Permit applications anticipated in spring/summer 2024. Concerns were raised regarding a potential driveway connection to the future ramp extension; however, in a subsequent submission, that connection was removed to separate the private development application from the road project.

On March 18, 2024, Development Services provided comments on the Site Plan Application, requesting clarification on how the proposed private site grading would interface with the future road extension and confirmation of ultimate grading conditions once the road extension is constructed.

The Owner subsequently provided TRCA comments related to their rezoning submissions, updated topographic survey information, and on March 28, 2024, submitted a Phase 1 Environmental Site Assessment, 2938 Major Mackenzie Drive, Markham (2017 and 2021). Draft preliminary CAD drawings of the road design were exchanged the week of November 4, 2024 for information only.

Further meetings were held on November 14 and November 20, 2024, during which the Owner raised concerns about an approximately 4-metre elevation difference between the proposed

road extension and the private development lands. The Owner requested that the road profile be lowered to help address this difference and facilitate driveway access.

Following a detailed technical review, the City provided written correspondence on February 4, 2025, confirming that lowering the road profile was not feasible due to:

- Insufficient vertical clearance between the road extension and the Highway 404 east-to-north on-ramp;
- Sight distance requirements; and,
- Inadequate space to accommodate truck turning movements (as demonstrated through swept path analysis).

In addition, the Ministry of Transportation (MTO) advised that access to the development must be limited to Markland Street, noting that the proposed extension road (approximately 360 m) does not meet the desirable 400 m offset spacing guideline from a ramp terminal to the first intersection or entrance.

A grading discrepancy was also identified between the preliminary development grading and the TRCA-approved site plan dated May 13, 2025.

To support ongoing coordination, the City requested updated CAD files on May 14, May 20, and May 29, 2025. The files were ultimately provided on November 28, 2025, following additional discussions.

An additional coordination meeting was held on October 22, 2025, to review the preferred 3:1 slope design option, possible temporary construction easements, and potential mitigation measures. Under standard municipal design practice, roadway embankments are typically graded at a maximum 3 horizontal to 1 vertical (3:1) slope. This slope is considered stable, maintainable, and appropriate for use within the public right-of-way.

Due to the approximately 4-metre elevation difference between the road extension and the adjacent private lands, applying a standard 3:1 slope from the road down toward the development would extend significantly into the 770 Markland Street property. This would affect the 770 Markland Street site grading and limit the developable area. Since lowering the road is not technically feasible, and a standard 3:1 slope would encroach onto 770 Markland Street, an alternative treatment is required.

As the Owner has commenced construction activities on 770 Markland Street, it is now necessary to confirm and implement appropriate mitigation measures to address the interface between the road works and the advancing site grading. The built site conditions must be considered during detailed design to ensure proper coordination of grading, drainage, and the interface with the road extension.

For the purposes of the ESR Addendum, the recommended design includes a retaining wall. The retaining wall:

- Provides a defined and stable separation between the public road works and the private development lands
- Minimizes grading impacts to the adjacent site
- Allows the road extension to proceed at the approved elevation and alignment
- Establishes a clear and constructible boundary condition

It should be noted that the City's standard approach is to construct roadway embankments using a 3:1 slope within the public right-of-way. Where a property owner's proposed grading or development constraints cannot accommodate the standard 3:1 slope and requires alternative infrastructure, such as a retaining wall, that alternative solution is considered the responsibility of the property owner. Given the grade difference between the proposed roadway and the adjacent 770 Markland Street property, and because the property owner cannot accommodate a standard 3:1 slope, a retaining wall is required. Therefore:

- The property owner would be responsible for all costs associated with the design and construction of the retaining wall or other alternative solution. This includes inspection and any necessary maintenance over the life of the retaining wall.
- The retaining wall would be located entirely on private property.
- Its final size and location would be confirmed during detailed design, in consultation with the property owner.
- The property owner would provide the City with a permanent easement over the area between the road right-of-way and the outer face of the retaining wall to protect the integrity of the public infrastructure.

The City and the Owner of 770 Markland Street (Site A) will continue to coordinate during Detailed Design; however, this coordination will be limited to confirming the retaining wall's technical specifications and precise location. The recommended design, which includes the retaining wall, will be maintained, and refinements will not extend to changes in the road profile or grading approach, as the Owner's site constraints (including parking requirements) are to be addressed within their property.

Alternatives that would alter the approved road alignment, embankment configuration, grading, drainage, or elevation will not be considered.

2.5.3 Owner of Sites B & C

A Project Update Letter was circulated via E-mail on May 10, 2023. The Owner responded on May 11, 2023, with a letter requesting that an updated transportation study be undertaken. A copy of the Transportation Study Update was provided to the Owner on November 14, 2024. It is acknowledged that ownership of these sites had changed in 2025, and there are now two separate property owners (one for Site B and another for Site C).



Figure 7: Nearby Developers

2.6 Draft Environmental Study Report (ESR) Addendum Circulation

As part of seeking comments and feedback on the Draft Environmental Study Report (ESR) Addendum prior to issuing the Notice of ESR Addendum, an e-mail to confirm interest from Indigenous Communities in reviewing the Draft ESR Addendum was distributed on July 28, 2025. Responses were received from Alderville First Nation, Hiawatha First Nation, and Chippewas of Rama First Nation expressing interest in reviewing the Draft ESR Addendum.

A copy of the Draft ESR Addendum was circulated to the following agencies and Indigenous Communities on August 14, 2025, and August 20, 2025. The complete list of review agencies and Indigenous Communities who received a copy of the Draft ESR has been provided in **Table 3**. Responses were received regarding comments and questions related to the technical studies completed.

The Indigenous Communities, Provincial, and Municipal Review Agencies were asked to provide comments by August 28, 2025. Each comment was responded to via detailed comment/response tables that were prepared and are included within **Appendix B**. Chippewas of Rama First Nation indicated that they had no comments at this time, while Hiawatha First Nation responded that they would wait to provide comments (if any) once the Draft ESR Addendum was completed.

Table 3: Draft ESR Addendum Circulation

Review Agencies & Indigenous Communities	Draft ESR Addendum Issued	Response Received
Ministry of the Environment, Conservation, and Parks	August 14, 2025	September 19; November 26; December 23, 2025; April 1, 2026
Ministry of Transportation	August 14, 2025	October 3, 2025
Ministry of Natural Resources (MNR)	August 14, 2025	<i>No response received.</i>
Toronto and Region Conservation Authority (TRCA)	August 14, 2025	October 15, 2025
York Region	August 14, 2025	<i>No response received.</i>
City of Markham	August 14, 2025	September 3, 10 & 22, 2025; October 1, 2025
Chippewas of Rama First Nation	August 14, 2025	September 2, 2025 <i>No comments provided.</i>
Hiawatha First Nation	August 14, 2025	July 28, 2025 <i>No comments provided.</i>
Alderville First Nation	August 20, 2025	<i>No response received.</i>

A meeting with MECP's noise reviewer was scheduled on April 24, 2026, to discuss the remaining comments on the Noise Impact Assessment Report and seek resolution on outstanding technical matters. Discussion focused on clarifying the rationale provided in the comment responses, confirming there is no material change to predicted noise levels or assessment conclusions, and discussing how any further refinements (if any) could be addressed through detailed design, as appropriate.

A copy of the correspondence can be found in **Appendix B**.

2.7 Notice of ESR Addendum

A Notice of Addendum Completion was published and distributed to the study contact list on October 28, 2026, via email. The following platforms for publication have been updated to include the Notice of Addendum to ensure that interested members of the public are effectively reached and notified of their opportunity to review the ESR Addendum:

- The project website <https://yourvoicemarkham.ca/highway-404-ramp-extension-tsu>;
- The news and public notice section of the City's website www.markham.ca/economic-development-business/planning-development-services/engineering-services;
- The City's social media channels and community page; and,
- E-news article (emailed to residents, businesses, and community groups).

Interested persons are encouraged to review the ESR Addendum available on the project website and to provide comments by November 26, 2026. In addition, a request may be made to the Ministry of the Environment, Conservation and Parks for an order requiring a higher level of study (i.e., a Section 16(1) order which requires an individual/comprehensive EA approval before being able to proceed), or that conditions be imposed (e.g. require further studies), only on the grounds that the requested order may prevent, mitigate or remedy adverse impacts on constitutionally protected Aboriginal and treaty rights

Information about how to submit comments or questions on this ESR Addendum is included in the Notice of Addendum Completion in **Appendix B**.

3.0 CHANGES IN ENVIRONMENTAL SETTING

The following section describes changes to environmental conditions in the Study Area that have occurred since 2009.

3.1 Land Use & Socio-Economic

The 2009 ESR identified that lands within the Study Area, located at the northeast quadrant of Highway 404 and Major Mackenzie Drive, were vacant and undeveloped. The lands were approved for the development of the Cathedral District Community, and areas adjacent to Highway 404 were identified and designated as for industrial and commercial uses. The Highway 404 and Major Mackenzie Drive interchange is located within the Study Area.

Based on the 2009 ESR, land uses in the Cathedral District Community were designated as mixed residential and employment as shown in **Figure 8**. Residential development began in the northern portion of the lands in proximity to Elgin Mills Road and Woodbine Avenue. The development of the Cathedral District Community has provided approximately 4,100 homes and 310 hectares of community area.

As of today, the land use designations as described in the original 2009 ESR remain largely the same and the majority of the northeast quadrant of Highway 404 and Major Mackenzie Drive is still vacant and undeveloped. The land use designation in the Cathedral District Community now includes commercial land use in addition to mixed residential and employment. Mixed residential developments have been completed in the eastern portion of the Cathedral District Community from Woodbine Avenue to Victoria Square Boulevard, between Elgin Mills Road and Major Mackenzie Drive East. Commercial developments have also been completed in the northeast corner of Markland Street and Major Mackenzie Drive East.

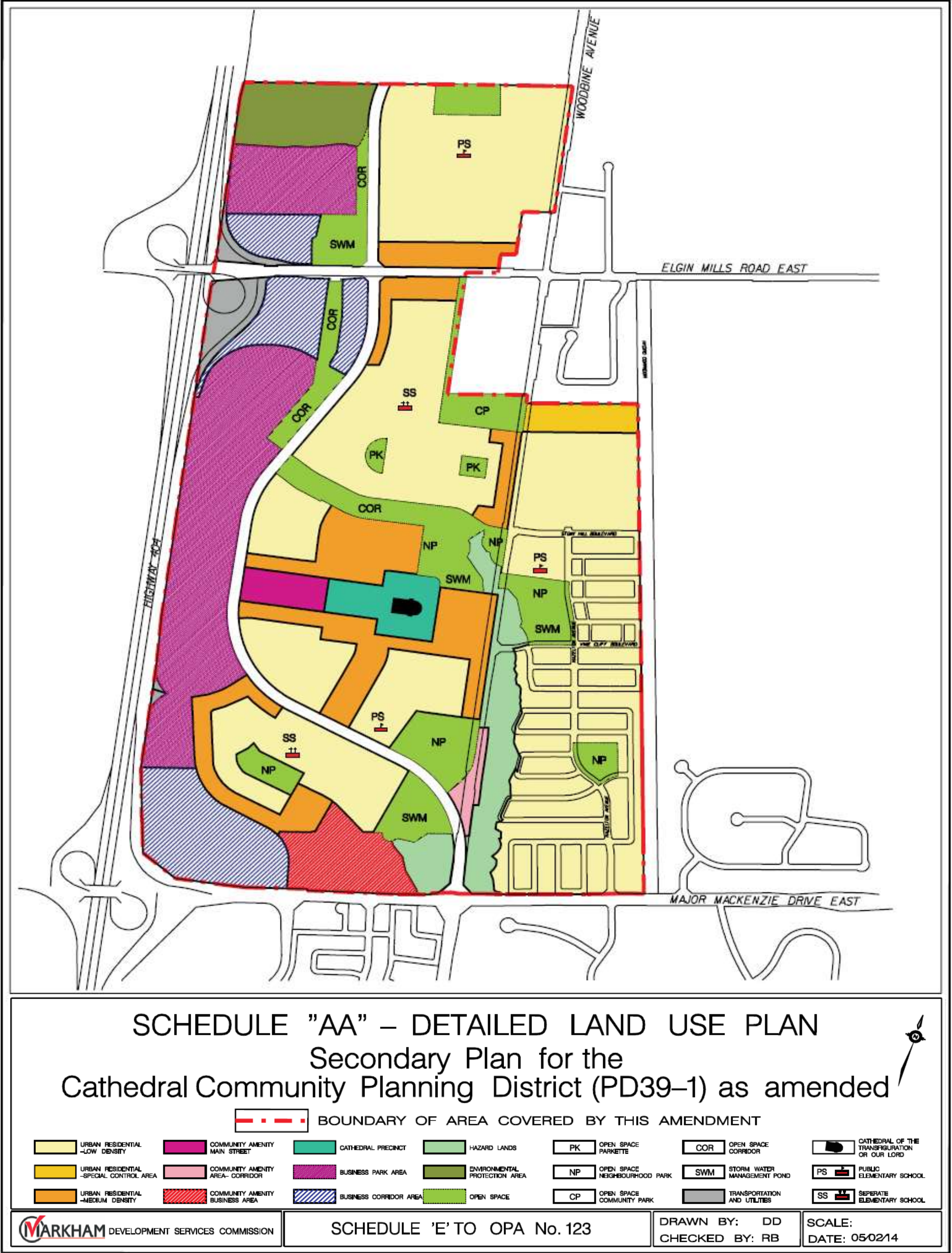


Figure 8: 2009 ESR Cathedral Community Planning District Land Use Plan

3.1.1 Active Development Applications

Active development applications located adjacent to the Study Area were identified using the City of Markham MappIT - Development Application Viewer and the York Region - Development Applications Status and Teams portal. The active development applications are illustrated in **Figure 9** and are listed in **Table 4**.

Since the completion of the 2009 ESR, there are new active development applications in various stages of approval at the time of writing this ESR Addendum.

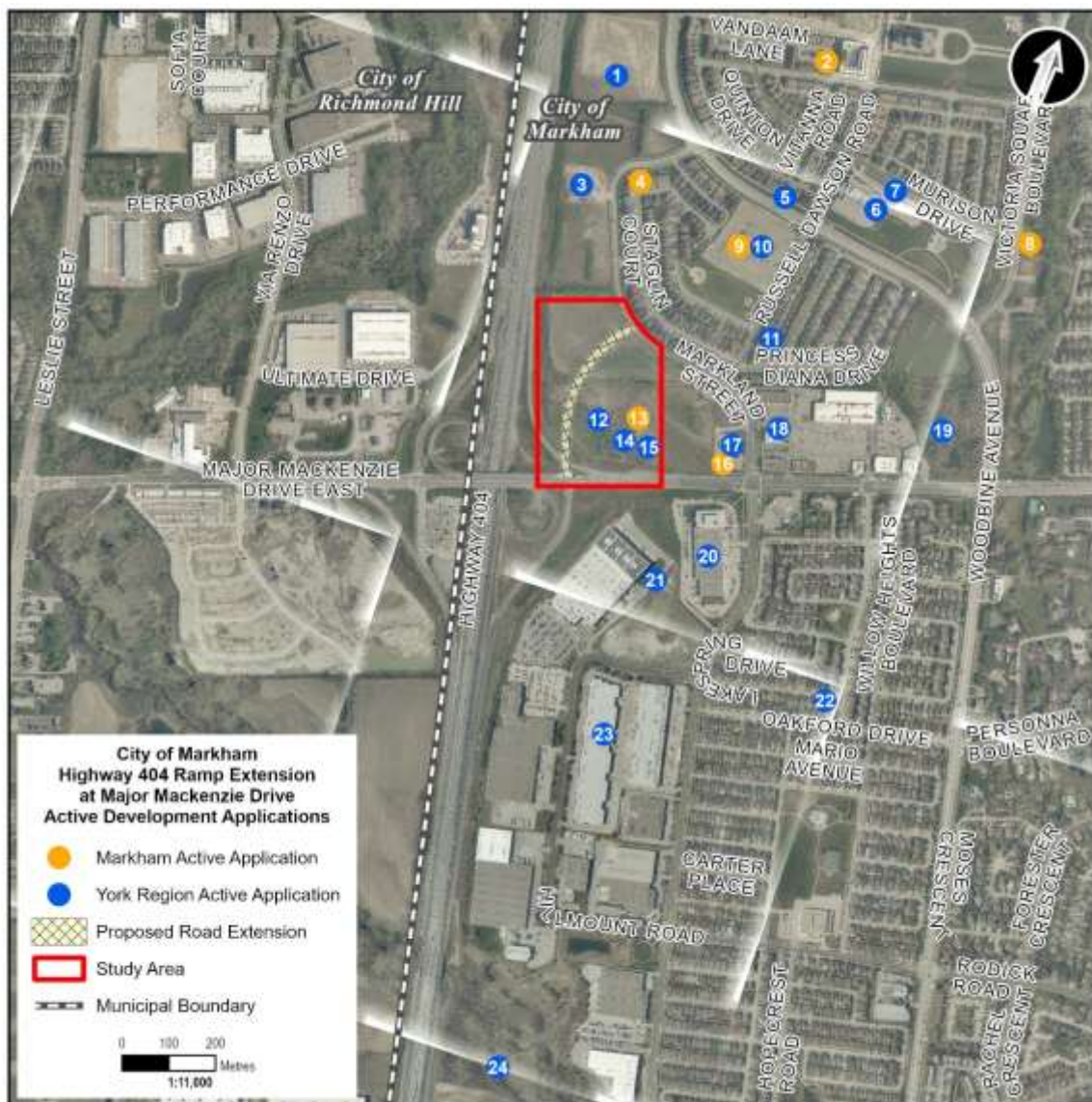


Figure 9: Active Development Applications (Dated: September 5, 2025)

Table 4: Active Development Applications

ID	Jurisdiction	Type	Status	Name	Number
1	York Region	Minor Variance Application	Response Provided	N/A	MVAR.23.M.0458
2	Markham	Minor Variance Application	Under Review	9 Ruskov Lane	2024 189564 000 00 MNV
3	York Region	Site Plan	SP/ENG Approval	UCAN Warehouse and Office	SP.22.M.0286
4	Markham	Minor Variance Application	Clearing Conditions	135 Staglin Court	2023 146761 000 00 MNV
5	York Region	Draft Plan of Subdivision	Draft Approved	N/A	SUBP.05.M.0018
6	York Region	Site Plan	SP/ENG Approval	York Region District School Board - Unnamed Cathedral West	SP.11.M.0029
7	York Region	Draft Plan of Subdivision	Preparing Conditions Letter	Bridle Walk Subdivision (Phase 3A) Larkin-Monarch Partnership	SUBP.02.M.0034
8	Markham	Minor Variance Application	Clearing Conditions	10197 Victoria Square Blvd	2023 143031 000 00 MNV
9	Markham	Site Plan	Endorsed	Woodbine Russell Dawson	2021 136186 000 00 SPC
10	York Region	Site Plan	SP/ENG Approval	Green City Development Group Inc.	SP.21.M.0227
11	York Region	Draft Plan of Subdivision	Draft Approved	N/A	SUBP.02.M.0019
12	York Region	Site Plan	SP/ENG Approval	404 Major Mac West Developments Limited - Phase 1	SP.24.M.0029
13	Markham	Site Plan	Endorsed	404 Major Mac West Developments Limited - Phase 1	2024 159325 000 00 SPC
14	York Region	Consent to Sever	Awaiting Approval	YRVEV Holdings Inc. (Peter Lupis)	CONS.14.M.0009
15	York Region	Zoning By-law Amendment	Awaiting Response	404 Major Mac West Developments Limited (Stephanie Volpentesta)	ZBA.23.M.0063

ID	Jurisdiction	Type	Status	Name	Number
16	Markham	Planning Project Application	Under Review	404 Major Mac West Developments Limited (Stephanie Volpentesta)	2023 116352 000 00 PLAN
17	York Region	Consent to Sever	Awaiting Approval	Loblaw Properties Ltd.	CONS.11.M.0003
18	York Region	Draft Plan of Subdivision	Preparing Conditions Letter	N/A	SUBP.01.M.0019
19	York Region	Site Plan	SP/ENG Approval	Fire Station 93	SP.08.M.0066
20	York Region	Consent to Sever	Awaiting Approval	Woodbine Cachet West Inc. c/o Metrus	CONS.11.M.0004
21	York Region	Site Plan	SP/ENG Approval	GE Commercial	SP.11.M.0030
22	York Region	Draft Plan of Subdivision	Draft Approved	N/A	SUBP.97.M.0011
23	York Region	Draft Plan of Subdivision	Draft Approved	N/A	SUBP.87.M.0104
24	York Region	N/A	N/A	Highway 404 Road Crossing Improvement Project	N/A

3.1.2 Recreational Amenities

There are five (5) parks, one (1) trail, and one (1) pond located in the vicinity of the Highway 404 Ramp Extension at Major Mackenzie Drive. The following figure shows recreational amenities that are located within 1 kilometre of the Highway 404 Ramp Extension at Major Mackenzie Drive, along with a table that describes each amenity.

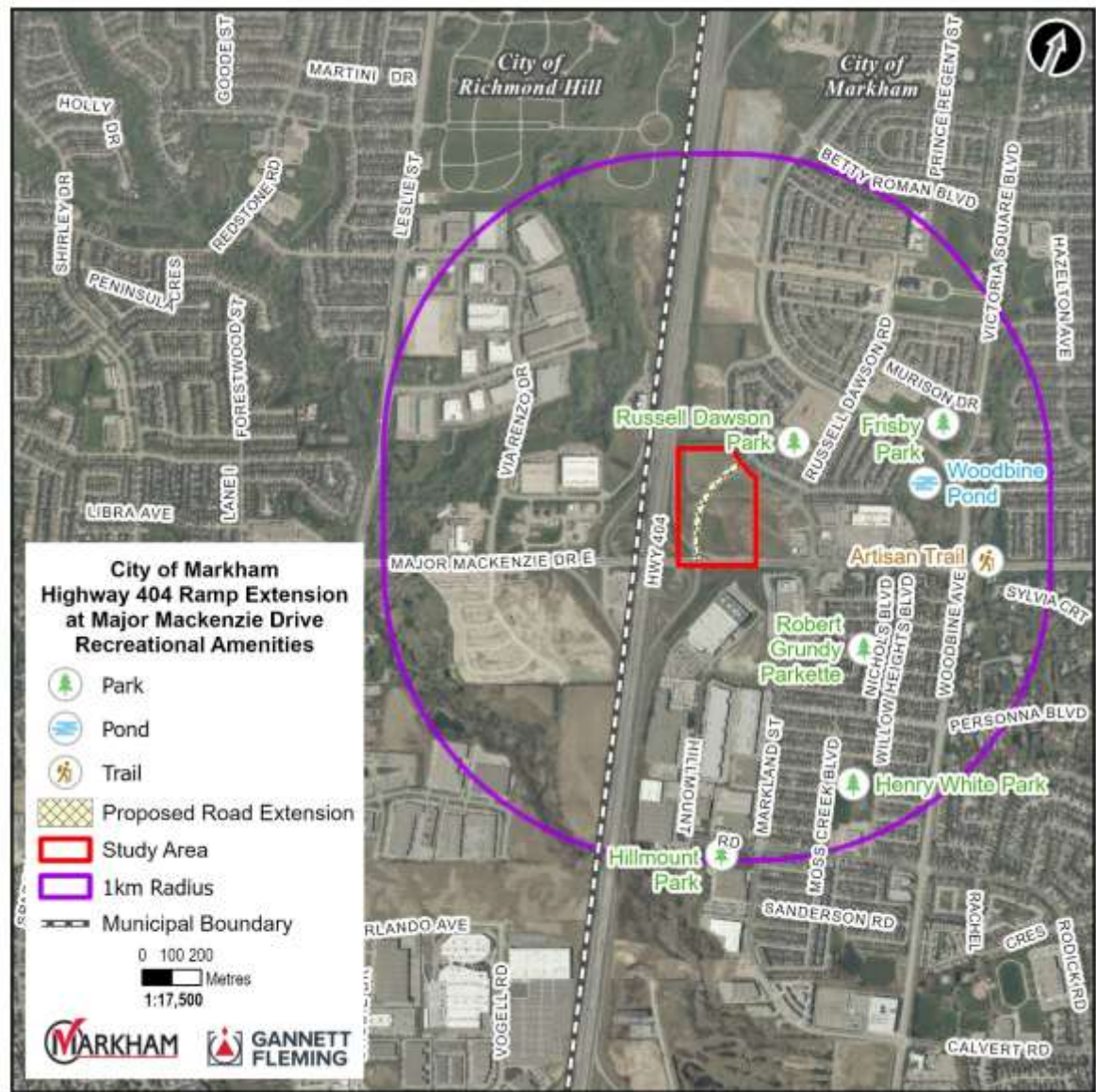


Figure 10: Recreational Amenities within 1 km of the Highway 404 Ramp Extension at Major Mackenzie Drive

Table 5: Recreational Amenities Within 1 km of the Highway 404 Ramp Extension at Major Mackenzie Drive

Type	Name	Address	Description	Approximate Distance from Highway 404 Ramp Extension at Major Mackenzie Drive
Park	Russell Dawson Park	Markham, ON L6C 0H2	Russell Dawson Park includes an open field and a playground.	185 metres
Pond	Woodbine Pond	Markham, ON L6C 0H2	Woodbine Pond is located along the corner of Woodbine Avenue and Victoria Square Boulevard.	550 metres
Park	Robert Grundy Parkette	8 Starhill Crescent, Markham, ON L6C 2Z3	Robert Grundy Parkette includes an open area and a playground.	625 metres
Park	Frisby Park	15 Murison Drive, Markham, ON L6C 0J4	Frisby Park includes a playground and a tennis court.	665 metres
Park	Henry White Park	135 Moss Creek Boulevard, Markham, ON L6C 2Z6	Henry White Park includes a playground, splash pad, soccer field, tennis court, and a basketball court.	940 metres
Trail	Artisan Trail	70 Heathfield Avenue, Markham, ON L6C 3C1	Artisan Trail is an 891 m moderately popular green mixed trail.	1 kilometre
Park	Hillmount Park	93 Hillmount Road, Markham, ON L6C 1Z7	Hillmount Park includes an open area and pond.	1 kilometre

3.1.3 Sensitive Facilities

There are five (5) schools, one (1) place of worship and one (1) firehall located within the vicinity of the Highway 404 Ramp Extension at Major Mackenzie Drive. The following figure shows sensitive facilities located within 1 kilometre of the Highway 404 Ramp Extension at Major Mackenzie Drive, along with a table that describes each facility.

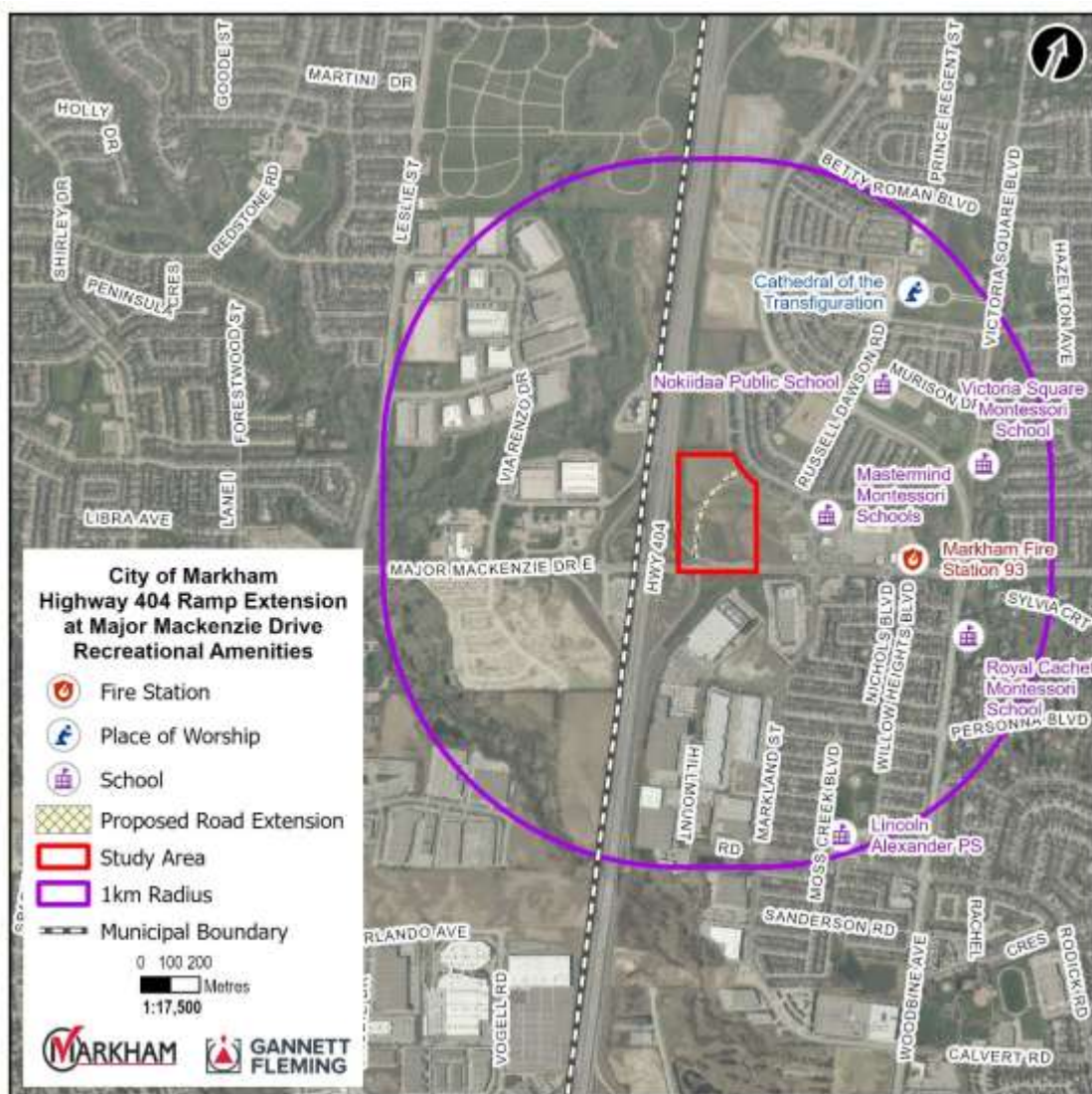


Figure 11: Sensitive Facilities within 1 km of the Highway 404 Ramp Extension at Major Mackenzie Drive

Table 6: Sensitive Facilities Within 1 km of the Highway 404 Ramp Extension at Major Mackenzie Drive

Type	Name	Address	Approximate Distance from the Highway 404 Ramp Extension at Major Mackenzie Drive
School	Mastermind Montessori Schools	735 Markland Street, Markham, ON L6C 0G6	325 metres
School	Nokiidaa Public School	45 Murison Drive, Markham, ON L6C 0J4	600 metres
Fire Station	Markham Fire Station 93	2930 Major Mackenzie Drive East, Markham, ON L6C 0J1	720 metres
School	Victoria Square Montessori School	10137 Victoria Square Boulevard, Markham, ON L6C 1J1	815 metres
School	Royal Cachet Montessori School	9921 Woodbine Avenue, Markham, ON L6C 1H7	905 metres
Place of Worship	Cathedral of the Transfiguration	10350 Victoria Square Boulevard, Markham, ON L6C 1H9	980 metres
School	Lincoln Alexander Public School	38 Hillmount Road, Markham, ON L6C 2H4	1 kilometre

3.2 Planning Policies

Environmental assessments support better decision making by considering how a project's design could be optimized to minimize or avoid negative impacts on the environment. The project is examined at different scales and through the lens of established provincial, regional, and municipal planning contexts and frameworks, which were considered for the Highway 404 Ramp Extension at Major Mackenzie Drive.

3.2.1 Provincial Planning Policy Context

Provincial Planning Statement (2024)

Since the writing of the 2009 ESR, the Provincial Planning Statement (PPS) was updated in 2014, 2020, and again in 2024. The PPS 2024 was issued under Section 3 of the *Planning Act* and provides overall policy direction on land use planning and development matters of provincial interest. The PPS contributes to the appropriate development of lands while protecting resources of provincial interest, public health and safety, and the natural and built environment. Policy themes include transportation systems which are safe, efficient, facilitate the movement of people and goods, and address projected needs. Applicable policies outlined in Chapter 3 of PPS that apply to the Project include:

- Chapter 3: Infrastructure and Facilities

- Policy 3.2.1 states *“Transportation systems should be provided which are safe, energy efficient, facilitate the movement of people and goods, are appropriate to address projected needs, and support the use of zero-and low-emission vehicles.”*
- Policy 3.2.2 states *“Efficient use should be made of existing and planned infrastructure, including through the use of transportation demand management strategies, where feasible.”*
- Policy 3.2.3 states *“As part of a multimodal transportation system, connectivity within and among transportation systems and modes should be planned for, maintained and, where possible, improved, including connections which cross jurisdictional boundaries.”*
- Policy 3.3.1 states *“Planning authorities shall plan for and protect corridors and rights-of-way for infrastructure, including transportation, transit, and electricity generation facilities and transmission systems to meet current and projected needs.”*

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

The Study Area was subject to the policies outlined in the A Place to Grow: Growth Plan for the Greater Golden Horseshoe (GGH). Since the original 2009 ESR, the Growth Plan has been revised multiple times with the most recent consolidation in 2020. Since the PPS has been updated by the Ministry of Municipal Affairs and Housing (MMAH) as updated in 2024, the PSS has effectively replaced the Growth Plan in a province-wide initiative to streamline land use planning policy frameworks. Among other changes, this has removed the requirement for municipalities to plan to specific population and employment targets for a horizon year in the future.

Connecting the GGH: A Transportation Plan for the Greater Golden Horseshoe (2022)

The GGH Transportation Master Plan was developed by the MTO to set out a long-term vision to 2051 which will address a variety of transportation issues including gridlock, improved transit connectivity, movement of goods, safe and inclusive transportation systems, electric and automated vehicle technologies and connecting communities beyond the GGH. The GGH Transportation Plan aligns with, and builds upon, other provincial initiatives including the PPS.

The 2051 network includes a new concept for an east-west higher order transit connection along Major Mackenzie Drive, from Leslie Street to Donald Cousens Parkway that would connect to future Bus Rapid Transit (BRT) lanes in York Region.

Greenbelt Plan (2017)

The Greenbelt Plan was established in 2005 under the *Greenbelt Act*, and most recently updated in 2017. The Greenbelt Plan area is comprised of several plan areas including the Niagara Escarpment Plan area, Oak Ridges Moraine Conservation Plan area, Parkway Belt West Plan area, and the Greenbelt Plan ‘Protected Countryside’ and ‘Urban River Valley’. Together with these plans, the Greenbelt Plan builds upon the PPS (2020) to provide a land use planning framework for the environmental and agricultural systems within the GGH.

The Study Area is located within a Settlement Area outside of designated Greenbelt areas.

3.2.2 Regional Planning Context

2022 York Region Official Plan

In 2021, York Region initiated a comprehensive review of its Regional Official Plan (the Plan), which was formally approved and adopted as official policy by the York Region Council in 2022. The updated York Region Official Plan provides strategic guidance for managing long-term growth while balancing the protection and enhancement of agricultural and natural systems. The Plan outlines York Region's growth and development strategy from now to 2051, ensuring sustainable and integrated community expansion. The key objectives are:

- Creating communities that provide convenient access to essential services, jobs, housing, transportation, public facilities, and greenspaces;
- Creating a sustainable natural environment and ensuring the protection and enhancement of the Region's natural systems;
- Urban intensification that supports residential and employment growth;
- Supporting and protecting agricultural systems; and,
- Providing quality services to maintain and improve quality of life and economic competitiveness.

The Study Area is located within the 'Employment Areas'. This designation is intended for employment uses for clusters of business and economic activities, as shown in **Figure 12**. This includes manufacturing, warehousing, industrial, offices, and associated retail, and ancillary facilities.

Policy 6.3.52 within the Plan states that *"To work with the Province, local municipalities, and surrounding jurisdictions to plan for, protect and promote an interconnected and efficient multimodal goods movement network that links local municipalities, Employment Areas and surrounding areas, utilizing Provincial highways, Regional streets and rail corridors to meet current and future needs."*

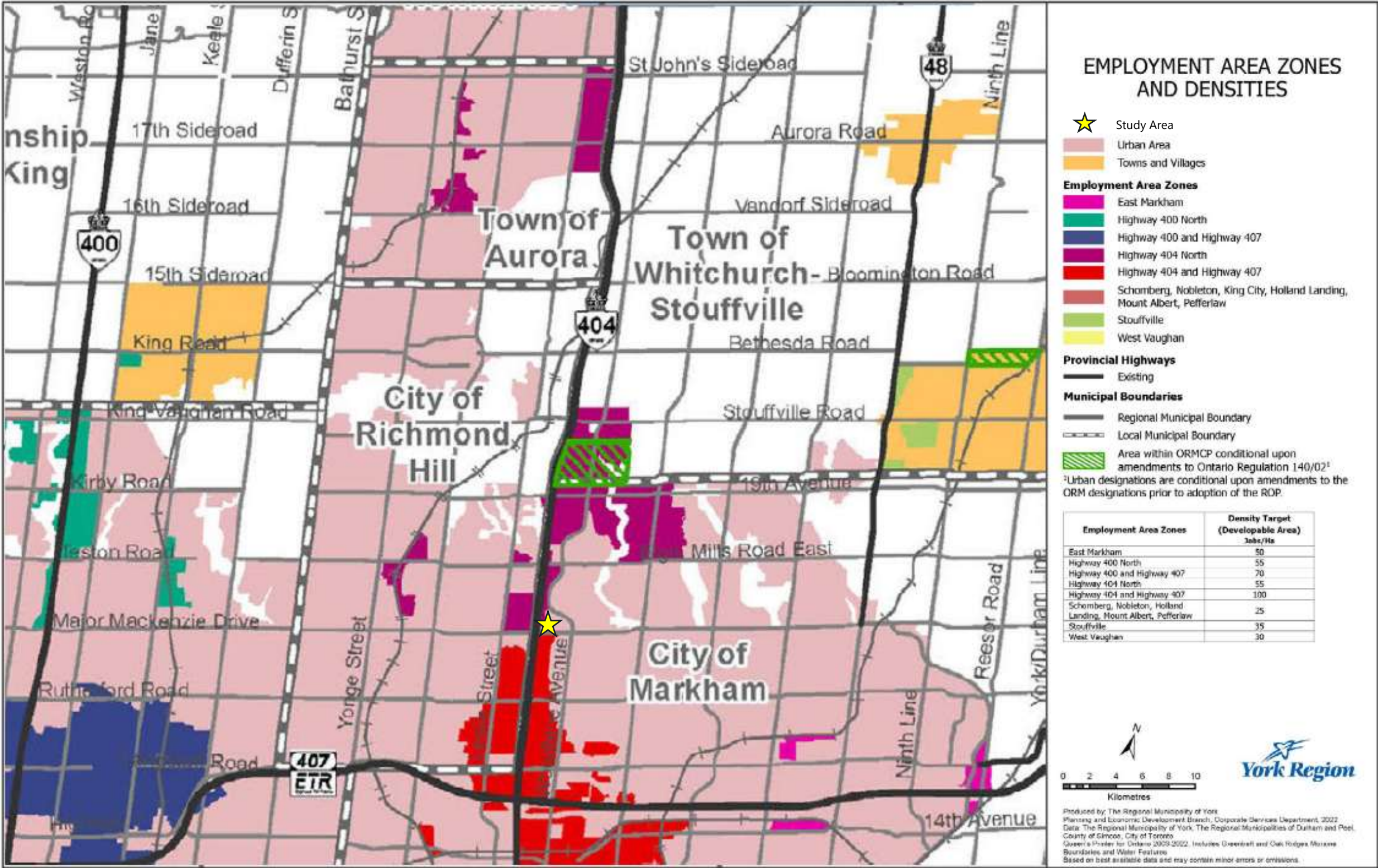


Figure 12: York Region Office Plan – Employment Area Zones and Density

2022 York Region Transportation Master Plan

The York Region Transportation Master Plan (TMP) outlines the policies, programs, and infrastructure modifications required to manage transportation demands to 2051 and beyond, while supporting development designated in the Region's Official Plan.

The TMP recognizes the Region, Province, and municipalities are continuing to review how to implement transit supportive, complete communities. The changing land use in these development areas requires future review of the transportation infrastructure needed to support the development needs.

By 2051, York Region's investment in active transportation, transit and road networks will:

- Implement road improvements considering the needs of the local community through context sensitive design solution; and,
- Prioritize road improvements in congested areas and growing communities.

This includes building on road segments that are needed to complete the rapid transit network of dedicated bus lanes, such as a bus rapid transit corridor on Leslie Street via Major Mackenzie Drive and/or Woodbine Avenue to support the employment lands in the Markham Innovation Exchange (MiX) district. The recommended 2051 network also focuses on improving roads located near new development areas, such as Major Mackenzie Drive (as shown in **Figure 13**).

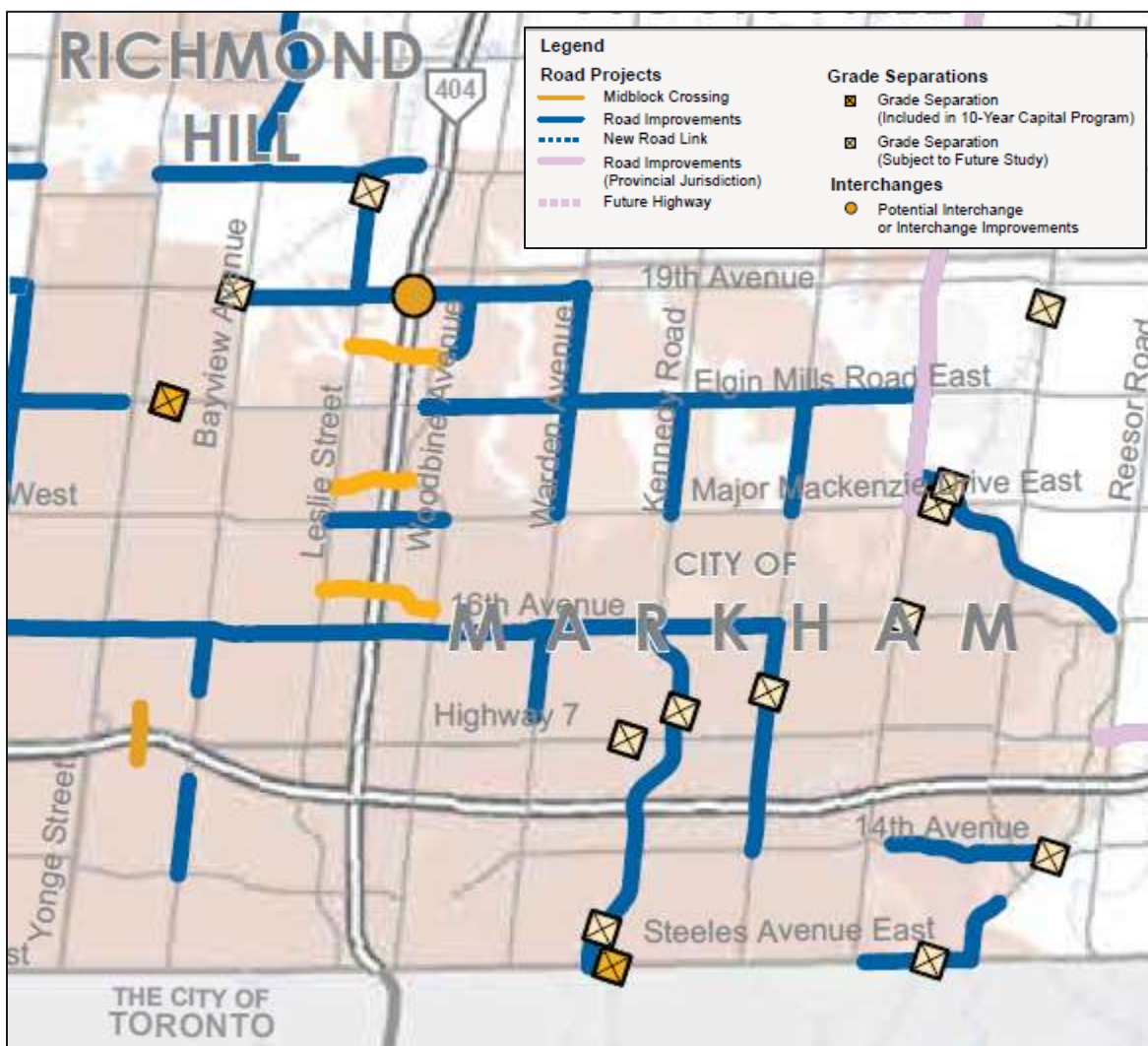


Figure 13: Excerpt of 2022 York Region Transportation Master Plan - Map 4 2051 Road Network

3.2.3 Municipal Planning Context

Cathedral Community Secondary Plan (1997)

The Cathedral Community Planning District is located by Major Mackenzie Drive on the south, Highway 404 on the west, hydro corridor east of Woodbine Avenue on the east, and one and one-half concession lots north of Elgin Mills Road on the north. The Cathedral Community Secondary Plan provides a detailed land use and transportation plan, as well as detailed policies for future developments on the subject lands.

Markham Transportation Planning Study (2002)

The Markham Transportation Planning Study (MTPS) provides a blueprint of the overall transportation network planning, up to the year 2021. The MTPS recognizes the projected transportation need in the former Town of Markham as a result of population and employment

growth. It is expected that Markham's residential and employment levels will almost double from 1991 levels by 2021. The Town's "Four-Point Plan" addresses key transportation issues including:

1. Rapid transit:
 - Rapid Transit Corridors are planned for the Markham area.
2. Road network:
 - The Road Improvement plan focuses on high-volume routes;
 - The efficiency of existing roadways will be improved;
 - A modified 10-Year Capital Plan is being pursued with the Region of York; and,
 - MTPS-2002 addresses environmental, heritage, and new development issues.
3. Policy initiatives:
 - Amendments to the Official Plan are required;
 - Markham Centre will be a catalyst for urban developments that balance residential and employment uses;
 - New urban design guidelines will promote non-automotive modes of travel; and,
 - A Parking Authority will be established.
4. Education and support programs:
 - Information sessions, public relations and marketing initiatives will raise public awareness;
 - Travel demand management strategies will help to reduce traffic volumes; and,
 - Transportation Management Associations will maintain a local focus.

City of Markham Official Plan (2014 Consolidation)

The original Town of Markham Official Plan (OP) was adopted by the Council in 1976 and approved by the Regional Municipality of York in 1978. A partial update of the Plan was adopted in 1987 and approved in 1993, and numerous amendments to the Plan have been adopted since then. It was most recently consolidated in June 2014 and sets out to establish a set of policies and guidelines for land use planning in the City of Markham to 2031.

The Study Area is located within the land use designations for 'Business Park Employment', 'Service Employment', and 'Commercial' areas. These designations play a vital role in developing an effective, integrated, and sustainable network of highways and arterial roads to facilitate the efficient movement of goods and services.

The City of Markham's policies seek to create complete communities with compact urban development, accommodating a variety of housing options and jobs supported by an efficient transportation system.

Section 7.1.1.1 of the OP indicates that the City intends to develop a sustainable transportation system that effectively and safely accommodates the demand for person trips within and beyond Markham and increases travel choices, supports an efficient, safe, and integrated road network for goods movement and service delivery; and supports energy efficient means of travel.

The City of Markham's Road Network policies (Section 7.1.3.6 of the OP) aim to design and construct all new roads by applying appropriate design standards to:

- balance the safety, accessibility, convenience, and comfort of all street users, and to provide a full range of travel choices.
- encourage a more compact and sustainable urban form to reduce average trip lengths.
- transform the functioning of the road network by placing the overall emphasis on the movement of people.

Special Policy Area - Cathedral District

The City of Markham has developed areas and sites that require special policies that vary from one or more provisions of the OP. The Cathedral District (**Figure 14**) is subjected to site specific policies with land use objectives that build upon the presence of the Cathedral of the Transfiguration. The vision is to create a unique and balanced community of pedestrian-oriented districts and neighbourhoods containing a mix of land uses, including residential, commercial, office and retail and prestige industrial, open space and recreational, cultural and institutional facilities. A connecting road will provide direct access from the Highway 404 interchange at Major Mackenzie Drive to Cathedral District.



Figure 14: Cathedral District

3.3 Natural Environment

The 2009 EA Study found no significant natural heritage features within the Study Area, which showed signs of previous disturbance from road construction, logging, and agricultural use. It confirmed the absence of Provincially Significant Wetlands, Areas of Natural Concern, Areas of Natural and Scientific Interest, significant ecological areas, other provincially significant features, and any recorded Species at Risk (SAR). However, the legislative, regulatory and policy context governing the protection of the natural environment has changed since the original 2009 ESR (e.g., Provincial Planning Station (2024), York Region Official Plan (2022), City of Markham Official Plan (2018 Consolidation), and Migratory Bird Regulations (2022)). For this reason, an updated background review and field investigation were conducted to document

any changes to conditions in the Study Area, as well as to address any new regulatory or policy requirements.

Sources consulted for the background review include satellite imagery, the Ministry of Natural Resources and Forestry (MNR), Natural Heritage Information Centre (NHIC) database, Bumble Bee Watch, eBird, the Ontario Butterfly Atlas, the Ontario Breeding Bird Atlas, the Ontario Reptile and Amphibian Atlas, the Ontario Mammal Atlas, Toronto and Region Conservation Authority (TRCA) resources, York Region Official Plan, City of Markham Official Plan, and iNaturalist.

Field investigations were completed on August 24, 2023, to identify natural heritage features and general characteristics of the Study Area. Field investigations included documentation of vegetation, including Ecological Land Classification (ELC), and incidental wildlife observations. Further details can be found in the Natural Environment Impact Assessment Report provided in **Appendix C**.

3.3.1 Wetlands

Mapping from Map 4 of the 2022 York Region Official Plan, TRCA Regulation Mapping and NHIC notes the presence of the unevaluated wetland within the Study Area (see **Figure 15**). Per the Ecological Land Classification, the wetland feature is composed of a single community classified as a Mixed Graminoid Mineral Meadow Marsh.

Based on investigations completed during site visits, the wetland does not meet criteria for significance under the Ontario Wetland Evaluation System-Southern Manual (2022), as the wetland is less than 2 hectares in size, is isolated, does not include any rare or sensitive species and is not hydrologically connected to any other wetlands or Provincially Significant Wetlands.

As a result, it would not be considered significant under the Ontario Wetland Evaluation System (OWES).



Figure 15: Natural Heritage Features – Wetland Limit

3.3.2 Wildlife

In 2009, the Study Area was largely a rural agricultural setting with scattered field hedgerows, small wet pockets and meadow marsh, and a small remnant upland vegetation feature of poor condition. Due to the long history of agricultural land use and associated disturbance in the area, natural features are largely fragmented. As such, wildlife habitat quality and quantity is limited.

With further guidance from the Significant Wildlife Habitat Technical Guide (2000) and the Significant Wildlife Habitat EcoRegion Criterion Schedule 7E (2015), candidate Significant Wildlife Habitat (SWH) in the form of Special Concern & Rare species was identified for Monarch, American Bumble Bee, and Yellow-banded Bumble Bee within the Goldenrod Forb Meadow. SWH has been assumed present within the Goldenrod Forb Meadow as it contains suitable feeding habitat for Monarch, American Bumble Bee, and Yellow-banded Bumble Bee.

Incidental observations of mammals, birds, amphibians, and reptiles were recorded during the field investigations of August 2023. Observations of single individuals included:

- Common Eastern Bumble Bee (Insect);
- Eastern Kingbird (Bird);
- Indigo Bunting (Bird);
- American Robin (Bird);
- Mourning Dove (Bird);
- Grey Catbird (Bird); and,
- Striped Skunk (Mammal).

3.3.3 Vegetation

Vegetation communities identified in the 2009 ESR were documented to establish baseline ecological conditions within the Study Area. At that time, the area included a small natural feature at the northeast corner of Highway 404 and Major Mackenzie with adjacent agricultural fields to the north and east. A wet pocket was located adjacent to Highway 404 at the northern end of the Study Area, and two hedgerows. The vegetation communities show evidence of previous disturbances from road construction and logging, pasture/agriculture and were comprised of a large number of early successional and disturbance tolerant species. Community types recorded in 2009 include: Cultural Meadow, Deciduous Forest, Cattail Marsh, Cultural Thicket, Meadow Marsh, and hedgerows. See **Figure 16** below.

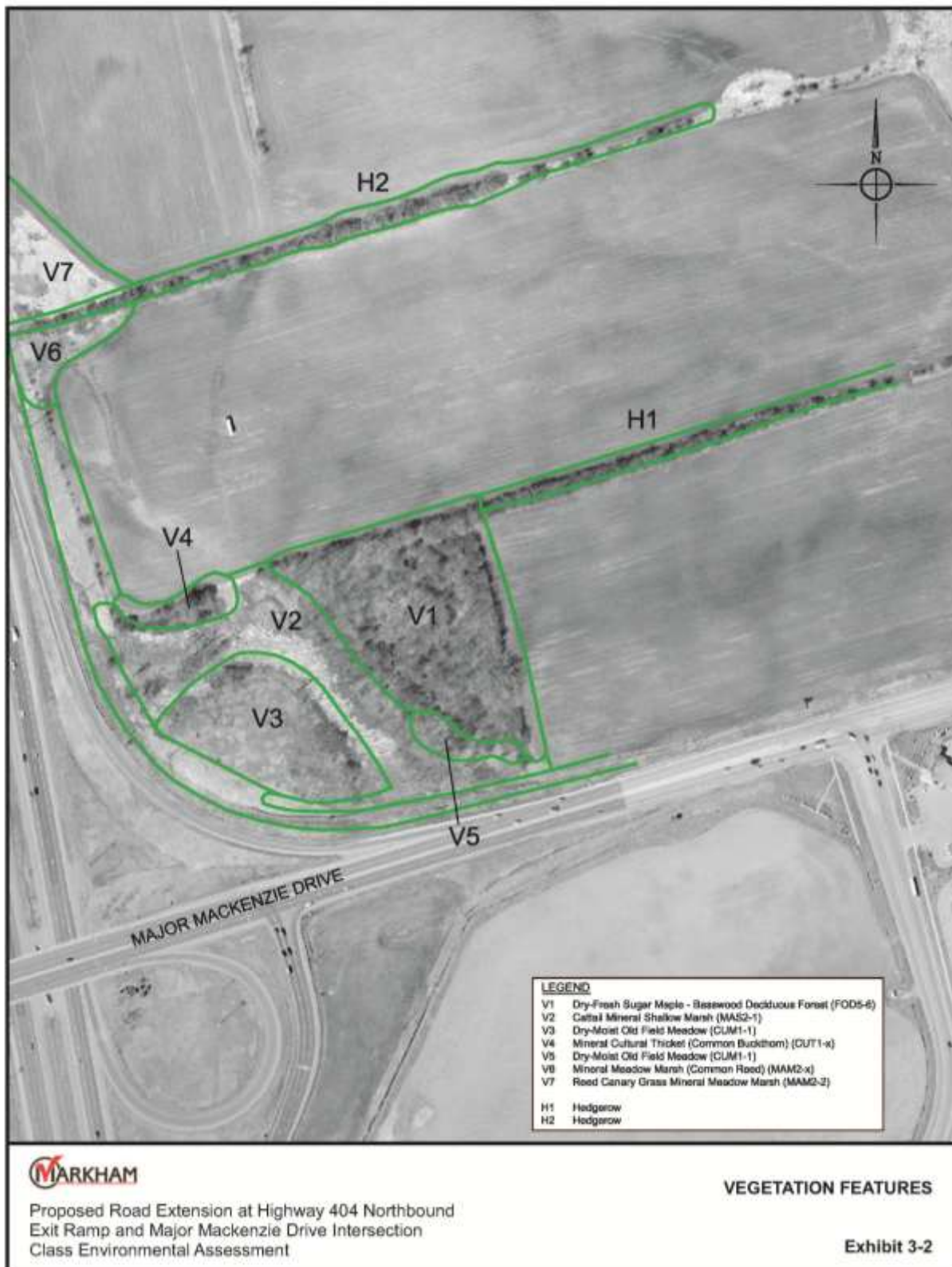


Figure 16: 2009 ESR Vegetation Communities

As part of the updated study, vegetation communities were identified during the Ecological Land Classification (ELC) survey and are summarized in **Table 7** and presented in **Figure 17**.

Table 7: Ecological Land Classification

ELC Code	Vegetation Type	Current Community Description
Residential (CVR)		
CVR_3	Single Family Residential	Occurs to the north of Markland Street. It consists primarily of single-family residential dwellings with some townhomes.
Marsh (MAM)		
MEMM3	Mixed Graminoid Mineral Meadow Marsh	This wetland community is located centrally within the Study Area, between the lowland deciduous forest and the Goldenrod Forb Meadow. The canopy and subcanopy are sparse but include species such as American Elm, Black Willow, and Manitoba Maple. The understorey is quite dense, consisting primarily of European Reed and Narrow-leaved Cattail, with Red Osier Dogwood and Highbush Cranberry throughout. The ground layer is comprised of forb species including Swamp Aster, Spotted Joe Pye Weed, Colt's-foot, and Purple Loosestrife.
Meadow (ME)		
MEFM1-1	Goldenrod Forb Meadow	This meadow community is located immediately north of Major Mackenzie Drive East being bound by the Highway 404 on-ramp to the west and the Graminoid Mineral Meadow Marsh to the north and east. The community does not have a canopy layer, however, Black Cherry (<i>Prunus serotina</i>), Black Willow, Black Walnut, and Hawthorn species were observed in low quantities within the sub-canopy. The understorey includes Red Osier Dogwood, Choke Cherry, and Common Buckthorn, while the ground layer is comprised primarily of Canada Goldenrod and Eastern Late Goldenrod, with a Bluegrass species and Canada Thistle.
ME	Meadow	This community is located at the northern limit of the Study Area, west of Markland Drive. Based on observations from the property limit, it had been recently disturbed. Due to access being restricted a full inventory was not able to be completed. Street trees along the outer limit of this community consist of White Oak, Swamp White Oak, and Kentucky Coffeetree.
Open Agriculture (OAG)		
OAGM1	Annual Row Crop	This community is located immediately southwest of Markland Drive. During the 2023 field studies, it consisted of Soy Bean.

ELC Code	Vegetation Type	Current Community Description
Deciduous Forest (FOD)		
FODM11	Naturalized Deciduous Hedgerow	Two hedgerow communities are present within the Study Area. The first is near the northern limit and separates the existing Row Crop Agriculture from a recently disturbed meadow community, while the second bisects the Study Area, separating the Row Crop Agriculture from the existing wetland and wooded features. The canopy is comprised of Large-tooth Aspen, American Basswood, White Oak, and Sugar Maple. The sub-canopy consists mainly of Common Buckthorn, with American Elm, Common Apple and Balsam Poplar as associate species. Similar to the sub-canopy the understorey is primarily Common Buckthorn, but also includes Riverbank Grape, Tartarian Honeysuckle, and Heart-leaved Willow. The ground layer is also dominated by Common Buckthorn seedlings with Wild Carrot, Common Dandelion, and White Clover.
FODM6	Fresh- Moist Sugar Maple Deciduous Forest	This community is located immediately east of the Graminoid Meadow Marsh along the eastern limits of the Study Area. Species within the canopy include American Elm and Sugar Maple, while the sub-canopy is more diverse with species such as Common Buckthorn, Sugar Maple, Eastern Hop-hornbeam, and Black Maple. The understorey is comprised of Common Buckthorn, Choke Cherry, and Riverbank Grape, with the ground layer consisting of Common Buckthorn, Virginia Creeper, Wild Strawberry, and Upright Yellow Wood-sorrel. As of now, this vegetation community has been removed and is no longer present within the Study Area. An inclusion consisting of a Fresh- moist deciduous thicket is present along the southwestern limit of the community immediately adjacent the Graminoid Meadow Marsh. This area has few trees in the canopy and sub-canopy and is dominated by Common Buckthorn. Soil samples were taken within both the Forest and Thicket communities with TRCA staff to ensure they did not meet wetland standards. Neither mottles nor gley were detected within the first 20cm of the soil samples.

Within TRCA jurisdiction, the TRCA Flora Species – Scoring and Ranking (2023) provides ranking for local species and their levels of conservation concern. Five (5) species are considered species of regional conservation concern. They are:

- Ground Juniper;
- Black Willow;
- Heart-leaved Willow;
- Highbush Cranberry; and,
- White Oak.

The identified Ground Juniper species is located within the Goldenrod Forb Meadow community, while Black Willow and Highbush Cranberry were identified in the Graminoid Mineral Marsh and Heart-leaved Willow and White Oak were observed in the Naturalized Deciduous Hedgerow community.

3.3.4 Designated Areas

The 2009 ESR confirmed that there are no provincially designated natural features including Areas of Natural and Scientific Interest (ANSI), Provincial Parks, or Conservation Areas. There are no other locally significant natural features including Greenlands, Forest Resources, and Environmental Policy Areas (EPAs).

Map 5 of the City of Markham Official Plan (2018 Consolidation) indicates lands designated as Greenway System and Woodlands to be present within the Study Area, however, through analysis of 2024 aerial imagery, the woodland feature has since been removed.

OP Section 8.6.1.2 states it is the policy of Council to:

"Provide for the following uses on lands designated as 'Greenway':

... j) transportation, servicing or utility infrastructure in accordance with Section 3.1.2 and 7.1.1.7, which receives environmental approval under provincial or federal authority, subject to the requirements of the Oak ridges Moraine Conservation Plan and the Greenbelt Plan where applicable;"

3.3.5 Tree Inventory

A total of 51 trees with a diameter at breast height (DBH) of 10cm or greater were inventoried within 6m of the preferred alignment by an ISA Certified Arborist on August 8, 2023. The specific data for each individual tree is provided in **Appendix C**, including species, overall condition and estimated crown reserve were collected for each tree.

A total of 11 species were identified during the tree inventory, of those species Black Willow was the most abundant (33%), followed by Russian Olive, White Elm and Black Cherry (each comprising 13%. With the remaining 28% comprised of seven species with one to three individual trees.

3.3.6 Species at Risk

Per the 2009 ESR, there were no species of conservation concern within the Study Area including federally and provincially designated species at risk and provincially rare species at the time.

Today, there is one species, the Kentucky Coffeetree, that is listed as Threatened under the *Endangered Species Act, 2007* (ESA) and *Species at Risk Act, 2002* (SARA). The individuals observed were planted along the western edge of Markland Street, as shown in **Figure 17**.

A thorough review of background documents was conducted to compile a master list of all Species at Risk, and species with conservation designations that may occur in the Study Area. Based on the background review and site investigations, no suitable habitat for SAR listed as Endangered or Threatened was identified within the Study Area, where access was permitted.



Figure 17: Natural Heritage Features – Existing Conditions

3.4 Cultural Heritage Landscapes and Built Heritage Resources

Cultural heritage and built heritage resources were assessed in the original 2009 ESR and results found that the area to be impacted by the proposed ramp extension was vacant undeveloped land. There were no built heritage features within the Study Area.

Given that the lands are still vacant and there are no built heritage resources (BHRs) or cultural heritage landscapes (CHLs) located within the Addendum Study Area, no further cultural heritage assessments were conducted.

3.5 Archaeological Resources

A Stage 1-2 Archaeological Assessment was completed in 2007 by New Directions Archaeology to support the 2009 ESR. Findings from the review noted that the area north of Major Mackenzie Drive and east of Highway 404 had been intensively disturbed during the construction of the Highway 404 and Major Mackenzie Drive interchange and no further archaeological assessments are required. Further details can be found in the Stage 1-2 Archaeological Assessment Report provided in **Appendix D**.

As part of the work completed for this Addendum, it was confirmed by the Ministry of Citizenship and Multiculturalism (MCM) Archaeology Program Unit on May 19, 2023, that no update to the assessment is required with the limits of the Study Area remaining the same. A copy of this correspondence can be found in **Appendix D**.

3.6 Noise

A noise analysis was not carried out as part of the original 2009 ESR as there were no existing residential developments in the proximity of the proposed road extension (i.e., no noise sensitive areas) at the time. Due to changes in the study environment from development in the area and a lapse of over 10 years since the completion of the 2009 ESR, a Noise Impact Assessment has been undertaken as part of this Addendum. The study reviewed current noise and vibration conditions and potential noise impacts from the preferred alignment based on updated traffic volumes and surrounding environment. Further details can be found in **Section 5.5** and contained in **Appendix E**.

3.6.1 Noise Guidelines & Policies

The noise impacts of the proposed extension have been evaluated based on the following noise guidelines and policies:

- Ontario Ministry of Transportation's (MTO) Environmental Guide for Noise (2006); and,
- City of Markham's Engineering Design Criteria Guidelines Section 'O'¹.

The MTO noise guide compares the future daytime (0700–2300) equivalent sound levels (16-hour L_{eq}) at a sensitive receptor under two different scenarios, typically 10 years after the construction of the project. The comparison is between the sound levels that would be present under the following scenarios:

- Future No-Build – Future sound levels without the project

¹ Section 'O' applies to new residential construction built adjacent to City roads and does not contain any guidelines relating to the noise generated by new roadways.

- Future Build – Future sound levels with the project

The MTO noise guide outlines that construction activities should abide by municipal by-laws. Generally, municipal by-laws prohibit or limit noisy activity in residential areas during sensitive time periods such as weekends, holidays, and nighttime. For construction related noise, the City of Markham's Noise By-law would apply.

The Ministry of the Environment, Conservation and Parks (MECP) does not promulgate construction noise or vibration limits at receptors. Instead of receptor-based limits, MECP provides equipment-based limits in NPC-115 and NPC-118. These documents outline sound level requirements for individual pieces of construction equipment.

3.6.2 Noise Sensitive Areas

There are no existing residences or other sensitive receptors immediately adjacent to the roadway extension. A Noise Sensitive Area (NSA) has been identified north of Markland Street; the area consists of a low-rise residential subdivision. The closest sensitive receptors in the NSA to the Study Area are located immediately north of Markland Street and have their backyards bordering Markland Street. Locations of noise sensitive receptors are shown in **Figure 18** below.



Figure 18: Noise Receptor Locations

3.7 Air Quality

An air quality analysis was not carried out as part of the original 2009 ESR. Due to changes in the study environment from development in the area and a lapse of over 10 years since the completing the 2009 ESR, an Air Quality Assessment has been undertaken as part of this Addendum. The study assesses current air quality conditions and local air quality impacts due to the proposed Highway 404 and Major Mackenzie Drive improvements and also includes an overview of construction impacts and a screening level assessment of greenhouse gases (GHG). Further details can be found in **Section 4.6** and the Air Quality Assessment Report contained in **Appendix F**.

3.7.1 Applicable Guidelines

Ambient background concentrations have been compared to the following guidelines established by government agencies and organizations:

- MECP Ambient Air Quality Criteria (AAQC);
- Health Canada/Environment Canada National Ambient Air Quality Objectives (NAAQOs); and,
- Canadian Council of Ministers of the Environment (CCME) Canadian Ambient Air Quality Standards (CAAQS).

3.7.2 Sensitive Receptors

Based on existing conditions, twenty-two (22) sensitive receptor locations were selected to be representative of potential impacts within the Study Area. They include existing residential houses and future residential developments in close proximity to Highway 404 and Major Mackenzie Drive.

The following sensitive receptors were identified for evaluating potential air quality effects:

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

Locations of sensitive receptors are shown in **Figure 19** to **Figure 21**.



Figure 19: Sensitive Receptor Locations (R1 – R14)

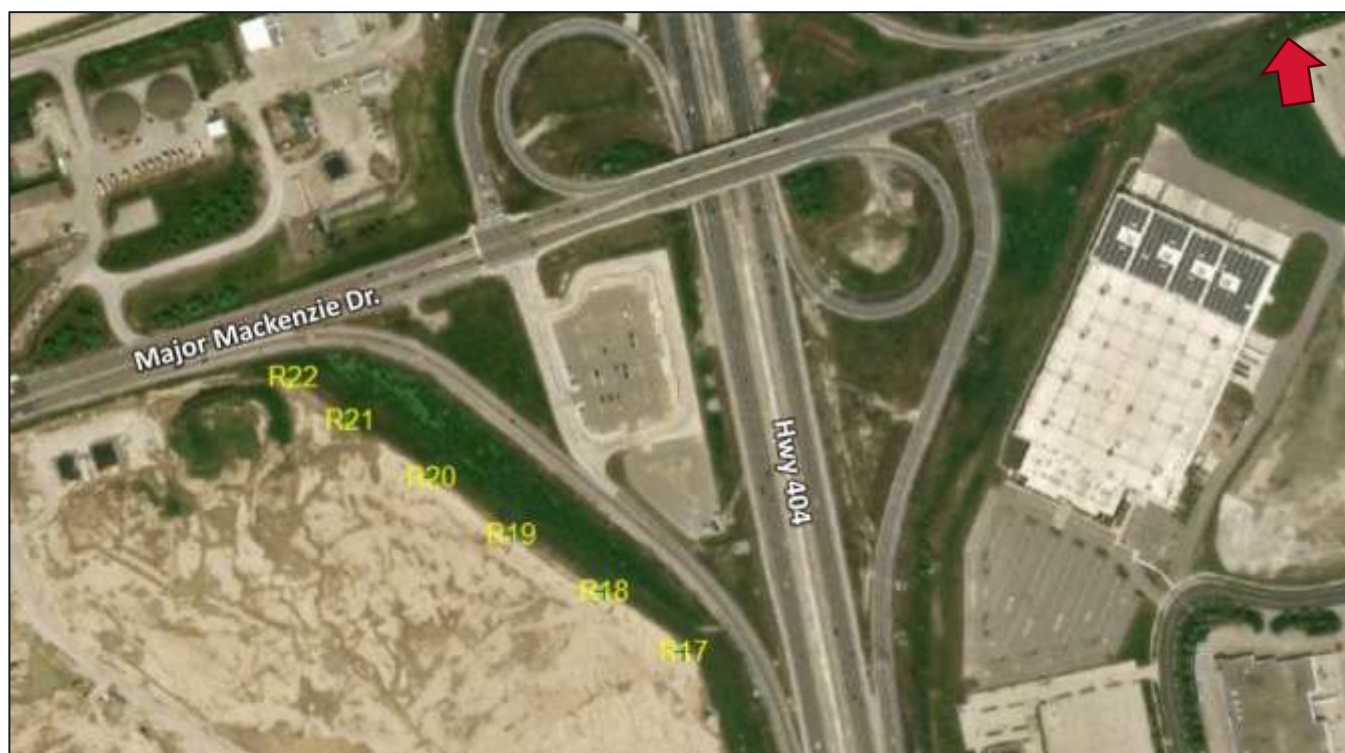


Figure 20: Sensitive Receptor Locations (R15 & R16)

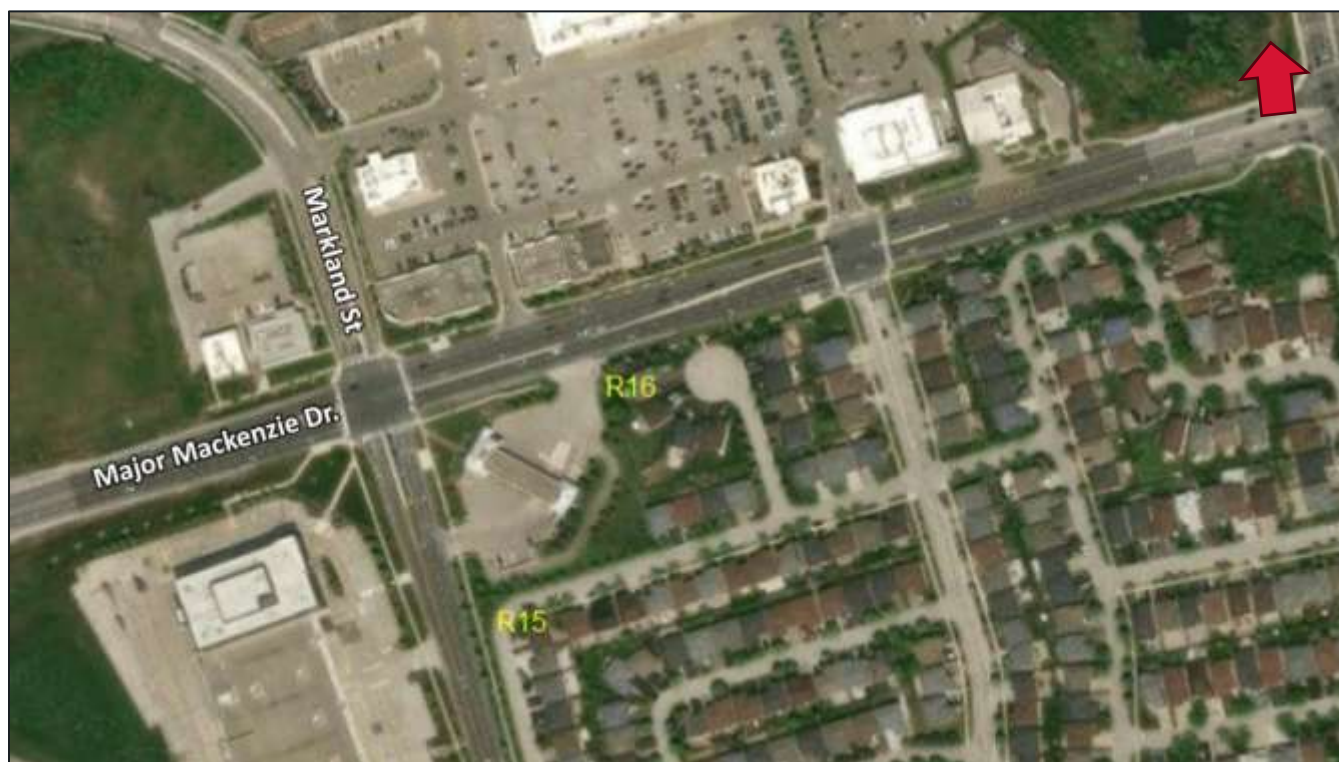


Figure 21: Sensitive Receptor Locations (R17 – R22)

3.8 Geotechnical

A geotechnical analysis was not carried out as part of the original 2009 ESR. Due to changes in the study environment from development in the area and a lapse of over 10 years since the approval of the 2009 ESR, a Geotechnical Site Investigation was undertaken. The purpose of the preliminary geotechnical investigations was to identify the general subsurface soil and groundwater conditions.

Field investigations were carried out on May 27 and 28, 2024, at which time two (2) boreholes were advanced to an approximate depth of 9.6m below the ground surface. Following completion of the drilling, soil samples were returned to the laboratory for further examination. Standard Penetration Tests (SPT) were carried out in the boreholes to determine particle size. Locations of the boreholes are shown on **Figure 22**. Further details can be found in the Geotechnical Report contained in **Appendix G**.



Figure 22: Borehole Locations

3.8.1 Site Geology

The Study Area is within a physiographic region known as the Peel Plain. The Peel Plain lies within the South Slope and consists of a level to undulating tract of clay soils, underlain by a till containing large amounts of shale and limestone. Fill materials associated with the development of the area and construction of existing roadways/highways/ramps are present within the Study Area.

3.8.2 Subsurface and Groundwater Conditions

Subsurface conditions underlying the pavement structure (i.e., asphalt surface and granular fill material) consist of fill materials, underlain by native interlayered sand and silty sand, and (predominantly) silty clay and organic silty clay deposits, all underlain by a silty sand till deposit.

Fill Material

Fill materials were encountered in both boreholes at existing ground surface and generally consist of silty clay, some sand to clay, and trace amounts of gravel. One borehole sample noted non-cohesive granular materials (sand and gravel, some silt) and it inferred to be part of the pavement structure of the ramp shoulder.

Groundwater Levels

Both boreholes were noted to be dry upon completion of drilling; however, this condition is not considered to be a stabilized groundwater condition, and the groundwater levels should be expected to fluctuate. Groundwater levels may be higher during wet periods of the year such as the early spring or following a period of precipitation.

3.9 Drainage & Stormwater Management

Hydrologic and hydraulic assessments were carried out during the 2009 ESR to determine the change in peak flow resulting from the proposed Highway 404 E-N ramp realignment and the proposed road extension. The results of the hydrologic modelling analysis indicated that the increase in total peak flow to the Study Area as a result of the proposed works is negligible, and therefore there is no increase in erosion potential or flood risk as a result of the proposed works. Vegetated embankments were recommended to mitigate the effects of the small increase in peak flows resulting from the increase in impervious area.

Due to changes in the study environment from development in the area and a lapse of over 10 years since the completion of the 2009 ESR, a Drainage & Stormwater Management Report was completed to review the background information from the 2009 ESR and refine the new preliminary design. The Drainage & Stormwater Management Report can be found in **Appendix H**.

3.9.1 Site Characteristics

During the 2009 ESR, the pervious areas within the study consisted of grassed lots and wooded areas. The impervious areas through the Study Area included nearby urban residential properties and the existing right-of-way (ROW) for the roads noted above. More recent site plan developments at 770 Markland Street have been submitted east of the Study Area, including a 5.4-acre Site A (building and parking lot alongside an 8.29-acre future commercial development).

The existing drainage features include ephemeral drainage ditches along the Highway 404 interchange ramp which drains in a southeastern direction through the site to the existing Highway 404 Culvert and ultimately to the Major Mackenzie Drive culvert. This surface water drainage previously originated west of Highway 404 in the Town of Richmond Hill, formerly known as Applewood Creek and is now piped for most of its length starting at Major Mackenzie Drive. See **Figure 23** for the existing catchment plan.

The study limits contain three (3) distinct outfalls at the Highway 404 On-ramp (OF1), Markland Street (OF2), and Major Mackenzie Drive Culvert (OF3). Within the study limits, there are no existing stormwater management (SWM/ low impact development (LID) features.

Highway 404 On-ramp Outfall (OF1):

- 300mm PVC outfall at the southern ditch of the north Highway 404 On-ramp.
 - Stormwater collection and conveyance through road gutter catchbasins.

Markland Street Stub (OF2):

- 750mm bulkhead from Markland Street's existing storm sewer network.
 - Stormwater collection and conveyance through existing roadway catchbasins to the 1200mm concrete storm mainline.
 - Storm sewer flows from 770 Markland Street will ultimately convey to Woodbine Pond.

Major Mackenzie Drive Culvert (OF3):

- Existing 2500mm*1500mm Concrete Box Culvert conveying rural overland flow to the south project limits.
 - Stormwater collection and conveyance through the Highway 404/MTO Ditch.
 - Site A roof and parking lot drainage from the 770 Markland Street developer to be conveyed to a UGS for site quantity control, ultimately to the existing Major Mackenzie culvert.

3.9.2 Soil and Groundwater Conditions

The groundwater level within the project limits is reported to be dry upon completion of drilling, but this condition is not considered to be a stabilized groundwater condition and is expected to fluctuate. It is noted groundwater levels may be higher during wet periods of the year such as early spring or following periods of precipitation.

With the limited information available, prior to incorporating any LID infiltration facilities, it is recommended that additional monitoring is performed during the detailed design stages of the project to capture seasonal groundwater fluctuations and to confirm the suitability of any LID approaches.

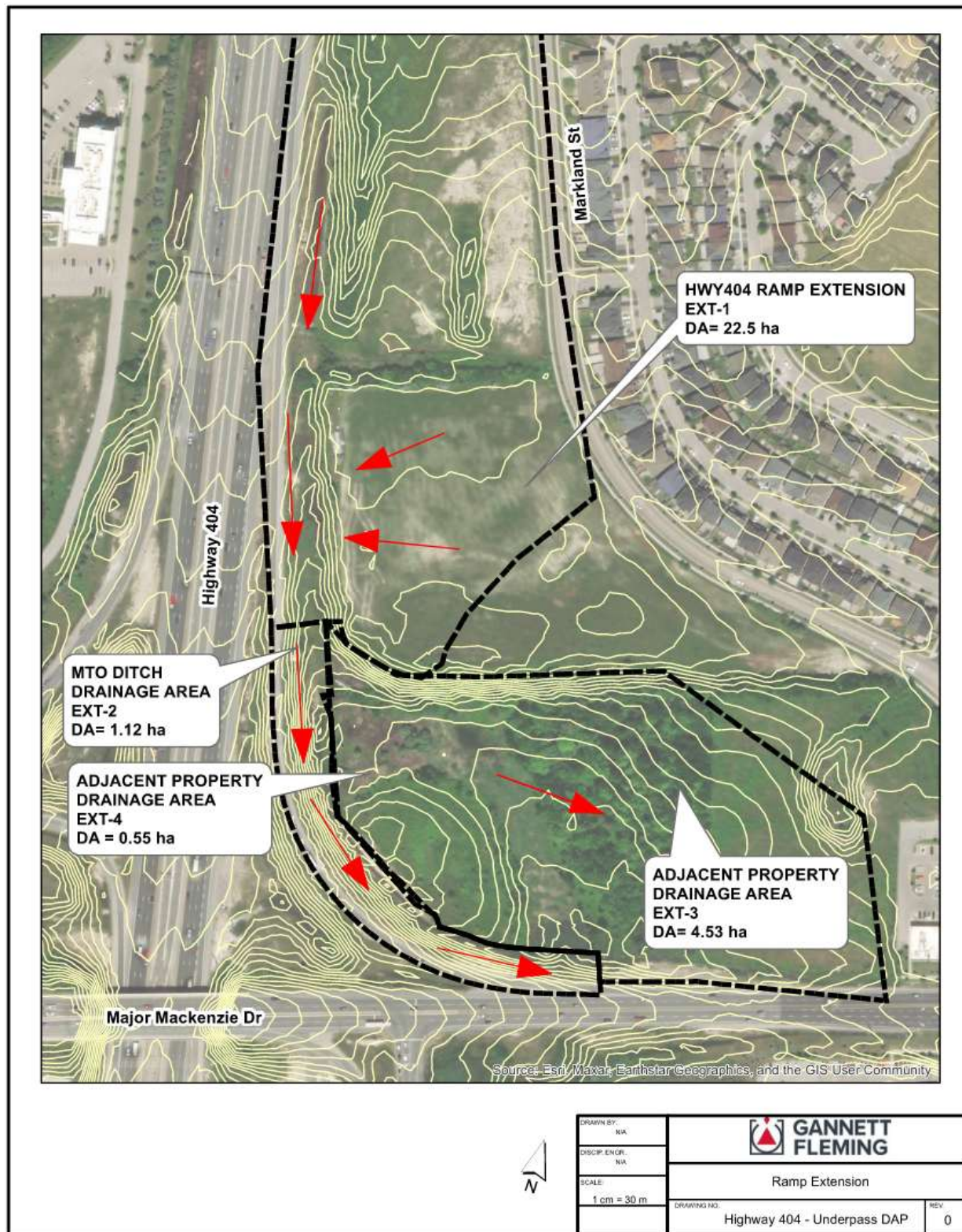


Figure 23: Existing Catchment Plan

3.10 Transportation & Traffic

The 2009 ESR concluded that the preferred alignment of the proposed extension provides a connection to the Cathedral District Community directly from the Highway 404 northbound exit terminal at Major Mackenzie Drive. The ramp provides another gateway to the Cathedral District Community in addition to the Markland Street extension. It is expected to improve the overall traffic operations (i.e. LOS and time delay) along the Major Mackenzie Drive corridor between Highway 404 and Woodbine Avenue.

Due to changes in the study environment from development in the area and a lapse of over 10 years since the completion of the 2009 ESR, an updated Transportation Study has been undertaken. The study update reviewed current existing traffic conditions and reassessed the need for the Highway 404 northbound off-ramp road extension from Major Mackenzie Drive to Markland Street and reviewed the validity of the approved design and its ability to meet future travel demands.

This report investigates the future (2051 horizon year) traffic pattern changes and the resulting traffic operations in the project Study Area based on future traffic growth, background development activity, implementation of a six-lane cross section widening of Major Mackenzie Drive (rapid transit lane), and a Highway 404 mid-block crossing north of Major Mackenzie Drive from Leslie Street to Markland Street.

This report considers future road configuration and background traffic growth in the area developed from the York Region Activity Based Model (ABM).

Field investigations were conducted on Thursday, February 8, 2024. Further details can be found in **Section 5.9** and the Transportation Study Update contained in **Appendix I**.

3.10.1 Existing Road Network

The existing road network characteristics within the Study Area are summarized in **Table 8**. On-street parking is prohibited on all streets listed below.

Table 8: Traffic Control and Lane Configuration

Street Name	Jurisdiction	Class	Orientation	Road Width (Lanes)	Traffic Direction	Speed Limit
Major Mackenzie Drive	York Region	Major Arterial	East/West	4	Two-Way	70 km/h
Woodbine Avenue	York Region	Major Arterial	North/South	4	Two-Way	60 km/h
Markland Street	Markham	Collector	North/South	2	Two-Way	50 km/h
Russell Dawson Road	Markham	Local	North/South	2	Two-Way	40 km/h
Nichols Boulevard	Markham	Local	North/South	2	Two-Way	40 km/h

Street Name	Jurisdiction	Class	Orientation	Road Width (Lanes)	Traffic Direction	Speed Limit
Highway 404 NB Off-ramp	MTO	Freeway	North/South	3	One-Way	60 km/h advisory
Highway 404 SB Off-ramp	MTO	Freeway	North/South	3	One-Way	60 km/h advisory

3.10.2 Transit Network

The Study Area is directly served by York Region Transit (YRT) routes 4 and 25, which provide east/west services on Major Mackenzie Drive East. Additionally, the Study Area is served by Route 24 which provides north/south service on Woodbine Avenue.

Regarding the regional transit services, the Major Mackenzie Drive East at Highway 404 Park 'n' Ride is located in the Study Area and facilitates connections between YRT and GO Transit. Transit services in the Study Area are shown in **Figure 24**.

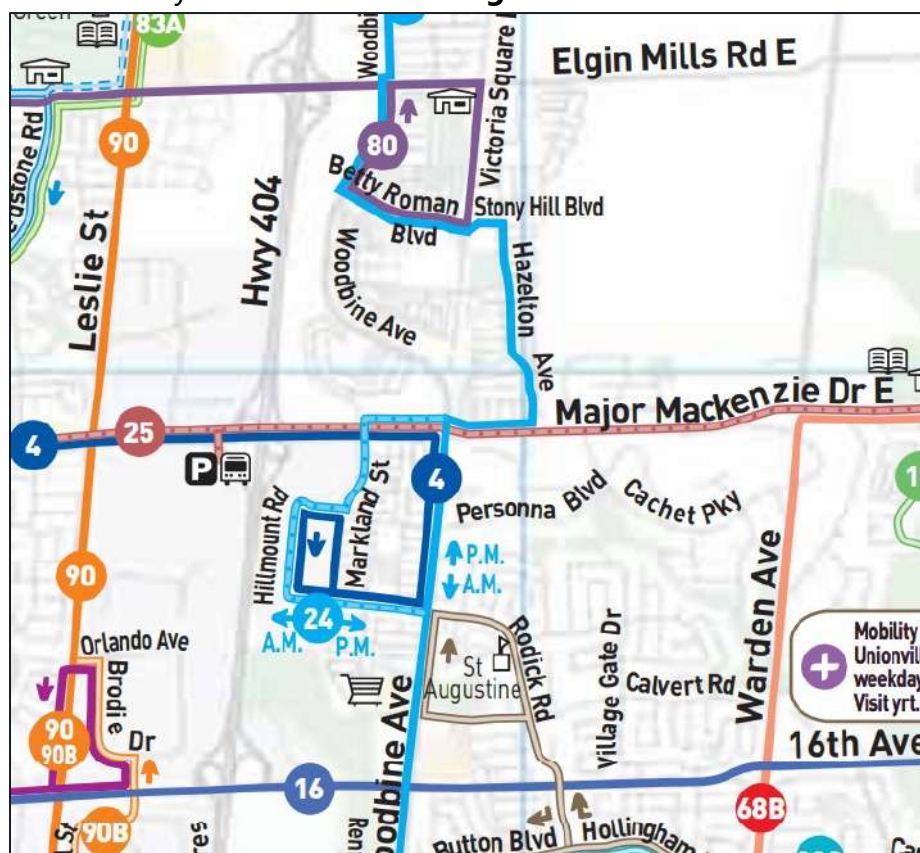


Figure 24: Nearby Transit Services

The location of York Region Transit bus stops in the Study Area and GO Transit stations are shown in **Figure 25**.



Figure 25: Bus Stops and GO Station Locations

3.10.3 Active Transportation

Pedestrian sidewalks are provided on either side of the roadway along Major Mackenzie Drive, Woodbine Avenue, Markland Street, Nicholas Boulevard, and Russell Dawson Road.

Figure 26 depicts existing pedestrian facilities in and around the Study Area.



Figure 26: Existing Pedestrian Facilities

The pedestrian counts at Study Area intersections were observed during field investigations. Pedestrian volumes in the Study Area are relatively low. However, as the counts were conducted in the winter, it is expected that pedestrian counts would be higher in the warmer seasons.

3.10.4 Cycling

The City of Markham Pathway and Cycling Map demonstrates the existing cycling infrastructure in the Study Area as shown in **Figure 27**. The City of Markham Active Transportation Master Plan (2021) identifies installing a cycle track along Victoria Square Boulevard from Woodbine Avenue to Elgin Mills Road in its 5-year priority network. Additionally, a 1.5-metre separated cycling track along the expanded section of Major Mackenzie Drive from Leslie Street to Woodbine Avenue is proposed in the 2051 Regional Road Cycling Network in the York Region Transportation Master Plan.

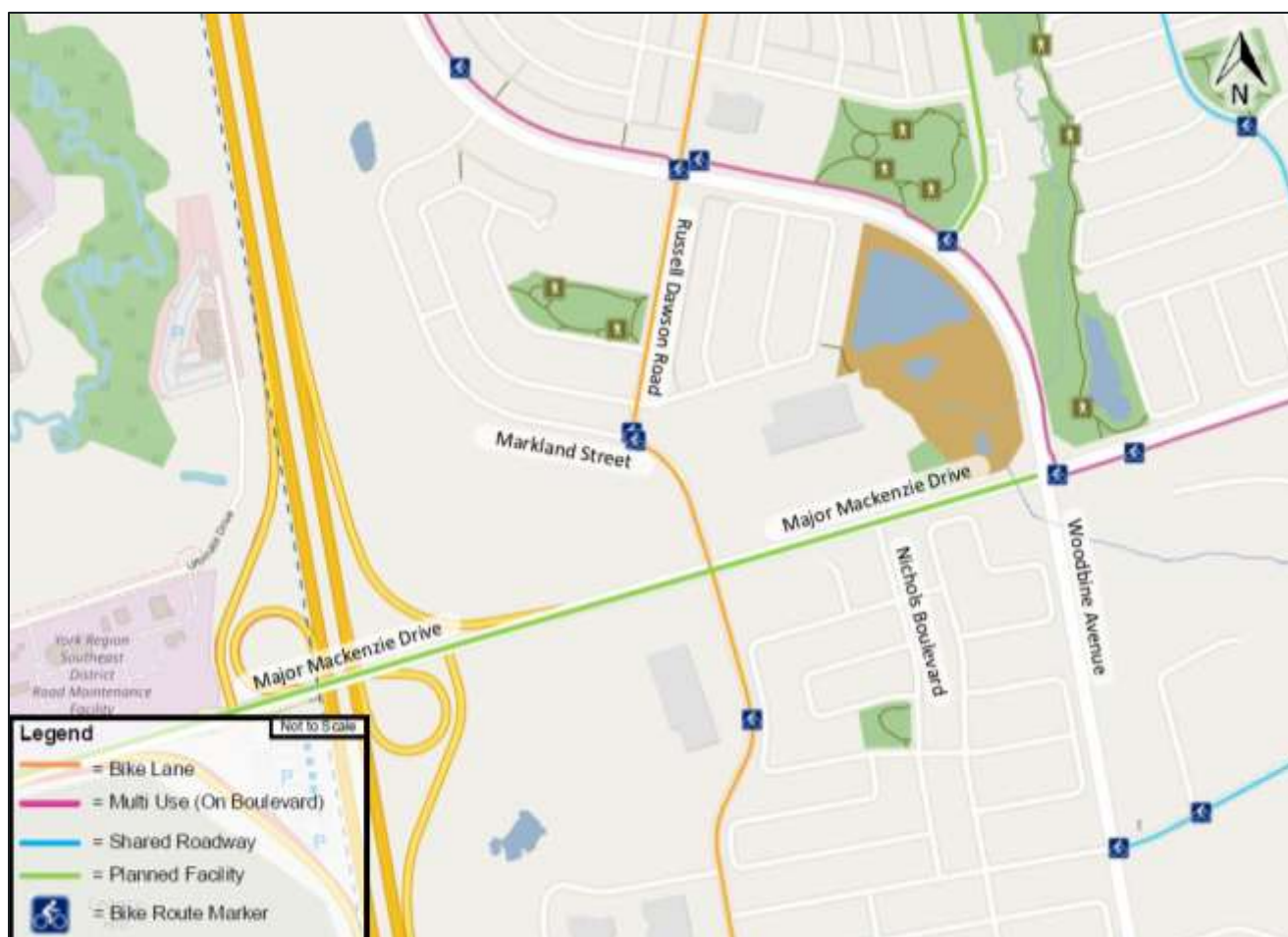


Figure 27: Cycling Network Plan

The bicycle traffic counts at Study Area intersections were observed during field investigations. There were no cyclist volumes recorded in the Study Area; however, as the counts were conducted in the winter, it is expected that cyclist counts would be higher in the warmer

Existing traffic turning movement counts were commissioned by Arcadis and conducted by Ontario Traffic Inc. 2-hour counts were conducted on Thursday, February 8, 2024, from 7:00 – 9:00 and from 16:00 – 18:00. For the purposes of data collection, the AM peak period is 07:45-08:45 and the PM peak hour period is 17:00-18:00. A summary of the 2024 existing conditions vehicles volumes is presented in **Figure 28**.



- During the weekday AM peak hour:
 - The southbound right turn exceeds capacity and experiences a delay of 168.6 seconds.

- During the weekday PM peak hour:
 - The eastbound left turn exceeds capacity and experiences a delay of 153.4 seconds. Additionally, the 95th percentile queue length exceeds the available storage length by approximately three car lengths.
 - The northbound left turn exceeds capacity and experiences a delay of 112.9 seconds.

The specific movements at the Woodbine Avenue and Major Mackenzie Drive intersection that are experiencing capacity constraints:

- During the weekday AM peak hour:
 - The westbound through movement exceeds capacity and experiences a delay of 96.5 seconds.
 - The northbound left turn exceeds capacity and experiences a delay of 168 seconds.
- During the weekday PM peak hour:
 - The westbound left turn exceeds capacity and experiences a delay of 121.7 seconds.
 - The northbound left turn exceeds capacity and experiences a delay of 131.9 seconds.
 - The northbound right turn 95th percentile queue length exceeds the available storage length by approximately three car lengths.

The full results of the 2024 existing conditions traffic operations analysis for signalized intersections and Synchro model traffic operations data outputs are captured the Transportation Study Update contained in **Appendix I**.

Unsignalized Intersections

During the weekday AM peak hour, the eastbound through and southbound left turn movements experience some congestion at the Markland Street and Russel Dawson Road intersection.

3.11 Utilities

As indicated in the 2009 ESR, there is a buried natural gas pipeline operated by Enbridge Gas along the north side of Major Mackenzie Drive. There were no existing overhead utilities (i.e. Bell, cable, hydro) in the study area and additional utilities were expected as the area develops.

A Subsurface Utility Engineering (SUE) Quality Level C Investigation was completed in accordance with CI/ASCE Standard 38-02: Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data. The following utilities were identified, mainly at the proposed intersections at Major Mackenzie Drive and Markland Street:

- Enbridge Gas;
- Bell and Rogers Telecommunications;
- Alectra Hydro;
- City of Markham Sanitary and Storm;
- City of Markham Water;
- Region of York Storm; and,
- Region of York Street lights and Traffic signal.

4.0 THE PREFERRED DESIGN CONCEPT

4.1. Validation of the Preferred Design Concept

In the 2009 ESR, Alternative A2 (which includes the proposed road extension and realigned E-N ramp) was identified as the preferred design concept to proceed to detail design. As part of this Addendum, modifications have been made to the preferred design concept to reflect updated technical, environmental, and planning considerations.

As described in **Section 2.5.2**, while the City's preferred design includes a 3:1 slope, as it is considered stable, maintainable, and appropriate for use within the public right-of-way. Due to the approximately 4-metre elevation difference between the road extension and the adjacent private lands, applying a standard 3:1 slope from the road down toward the development on 770 Markland Street would extend significantly into the property. This would affect the 770 Markland Street site grading and limit the developable area. Since lowering the road is not technically feasible, and a standard 3:1 slope would encroach onto 770 Markland Street. As the Owner has commenced construction activities on 770 Markland Street, it is now necessary to confirm and implement appropriate mitigation measures to address the interface between the road works and the advancing site grading. Therefore, the recommended design includes a retaining wall.

In parallel, the City of Markham is working to secure the lands required to accommodate a 3:1 side slope and a 4-metre-wide easement buffer to future-proof the design, given this is the City's preferred design concept. Details of the 3:1 alternative design option are provided in **Appendix A**.

4.2 Further Identification of the Recommended Design Concept

A comparison of the 2009 Alternative A2 design concept and the recommended design concept through this Addendum is provided in **Table 9**. This table outlines key factors such as property impacts, ramp geometry, and environmental considerations to illustrate the differences between the original and updated design concepts. The currently recommended road extension would extend northerly from Highway 404 northbound exit ramp at Major Mackenzie Drive and connect to the future Markland Street extension in the Cathedral District Community. The road extension would be grade separated from the E-N ramp just north of Major Mackenzie Drive on a tangent. The grade separation structure is approximately 20.5 m in length. From the grade separation structure, the road extension would continue northerly for approximately 27 m on a tangent, and would turn northeast through a 210 m radius curve (approximately 200 m in length). The road extension would continue on a tangent for approximately 60 m and intersect with Markland Street as a T-intersection.

The intersection of the proposed road extension and Major Mackenzie Drive would be signalized. The road extension would have a 2-lane cross section (one northbound lane and one southbound lane) and could be accessed from westbound Major Mackenzie Drive or from the Highway 404 northbound exit terminal. The southbound lane would be a right turn only lane from the road extension to Major Mackenzie Drive (i.e. left turns would not be permitted). It will be a stop-controlled intersection at Markland Street as a T-intersection with one left turn lane and one right turn lane.

The proposed Active Transportation (AT) facilities on the extension road are not intended for immediate construction. Instead, they would be phased in and built in alignment with the future widening of Major Mackenzie Drive (MMD) and the addition of cycle tracks along MMD. Since the Region has not yet conducted an Environmental Assessment (EA) for the widening of

MMD to accommodate rapid transit and cycling infrastructure, this EA Addendum's preliminary design shows the widened MMD for illustrative purposes only, without details for transit, cycle tracks, or sidewalks. Additionally, Markland is not currently a shared route. Connections along Markland St. to a future Hwy 404 mid-block crossing are being contemplated as part of the on-going Markham Transportation Master Plan.

In developing the recommended design concept, the Project Team reviewed a design speed of 70km/h for the on-ramp. The main difference between a design speed of 80km/h vs. 70km/h, is that 80km/h is a higher design speed which uses a flatter horizontal curve that results in a better sight distance for safety (desirable by MTO). Whereas, the 70km/h design speed allows the on-ramp to tie-into the existing ramp sooner, which reduces the limit of impact to the exiting ramp. The 70km/h alternative design option can be found in **Appendix A**.

The recommended design concept layout is provided in **Figure 29** and preliminary drawings are included in **Appendix A**.

The recommended design concept includes a retaining wall to accommodate the development at 770 Markland Street. This is necessary because construction has already commenced on their site, despite the elevation difference between the EA road profile (approximately 213m–215m, consistent with the 2009 EA) and their site (approximately 210m–211m). The original site plan did not accommodate a 3:1 slope as part of the 2009 approved design. The property owner would be responsible for all costs associated with the design and construction of the retaining wall or other alternative solution. The final size and location would be confirmed during detailed design, in consultation with the property owner.

Table 9: Updated Analysis of Alternative Summary

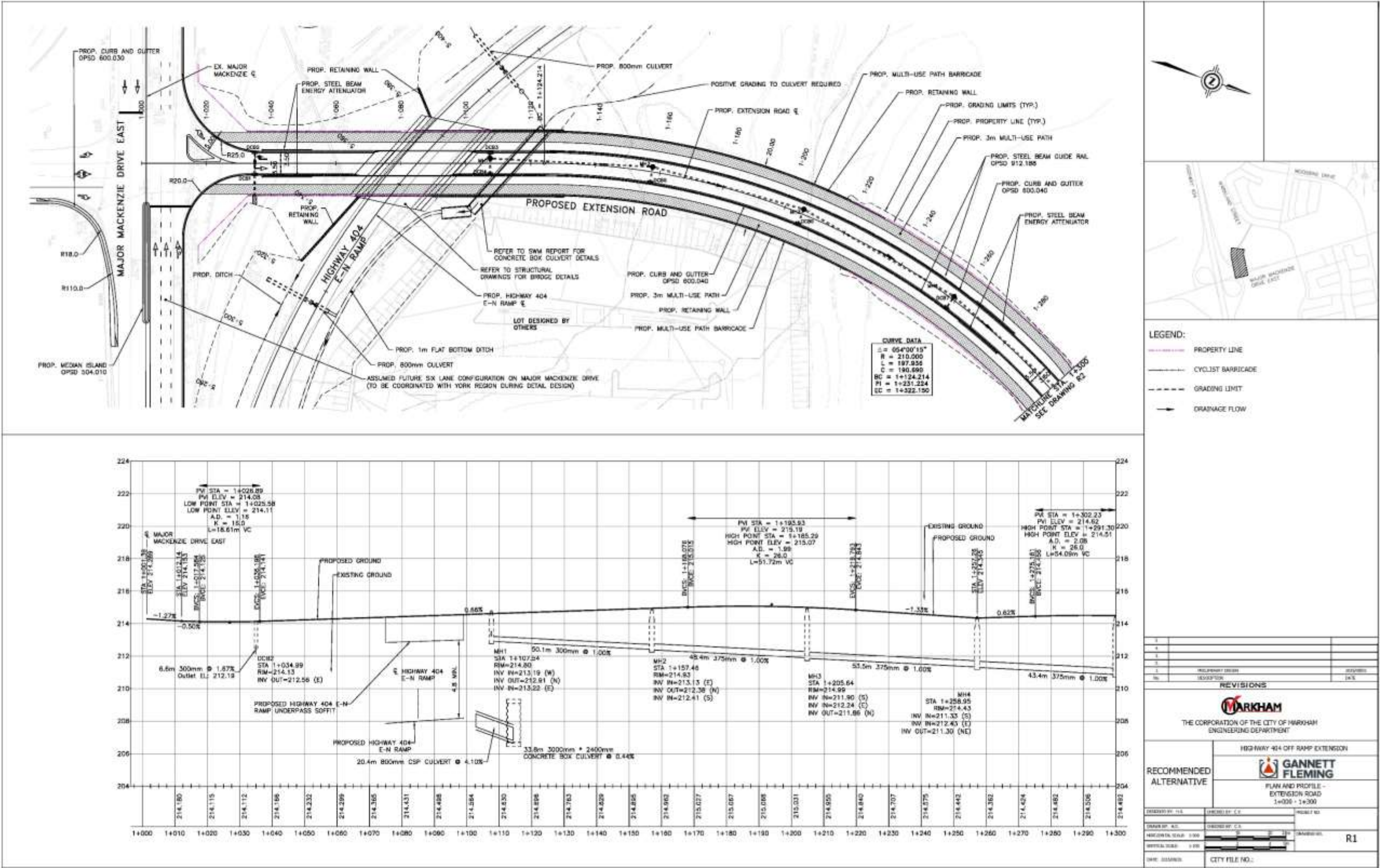
Grouping	Factors	Alternative A2 per 2009 ESR	Modified Recommended Design (Current)
Socio-Economic Environment	Property Effects	Project site is vacant. Therefore, no impacts are anticipated to existing residences or business.	The project site is currently vacant; therefore, no impacts are anticipated to existing residences or businesses. However, it is noted that the adjacent property at 770 Markland Street is presently under construction, and the preferred 3:1 slope may have potential impacts on that property, therefore a retaining wall has been recommended.
	Land Use Compatibility	This Alternative is anticipated to impact the Loblaws and Majorwood properties. The Alternative will accommodate Loblaws' proposed future development.	No permanent property acquisition is anticipated as nearby developments are conserving space for the proposed ramp extension.
		Compatible with the future business land use in the Study Area, and provides an opportunity to provide access to future development. The Town supports future access to the adjacent properties along the proposed Highway 404 exit ramp extension, the details of future access will be finalized during the Site Plan approval process and is subject to MTO approval.	The road extension is compatible with existing and planned land uses by providing access to essential services, jobs, housing, transportation, and public facilities within the City of Markham. The operation of the road is not anticipated to restrict future development.
		Does not require MTO property.	Does not require MTO property.
Natural Environment	Fisheries and Aquatic Habitat	Crosses the Applewood Creek, however, while the Creek display some physical characteristics of a natural drainage feature, a significant portion of the creek downstream (south of Major Mackenzie Drive) has been completely piped. No fish habitats were observed during the field review given that the downstream of the Applewood Creek.	No fish or fish habitat present in the Study Area.

Grouping	Factors	Alternative A2 per 2009 ESR	Modified Recommended Design (Current)
		There is little likelihood that Applewood Creek in the Study Area supports fish or fish habitat. Consultation with TRCA confirmed that the Applewood Creek is not considered a watercourse and does not fall within any TRCA regulated areas.	
	Vegetation	Dominated by culturally-influenced regenerating vegetation communities and agricultural lands. As a result, impacts to these communities will be minor.	The ramp extension bisects the Graminoid Mineral Meadow Marsh and Goldenrod Forb Meadow communities and will require removal of these vegetation communities, approximately 0.34 ha and 0.43 ha, respectively. The ramp will not result in negative impacts to the vegetation communities provided mitigation measures are followed.
	Wildlife	Wildlife habitat quality and quantity is limited due to long history of agricultural land use and associated disturbance in the area. Therefore, potential impacts on wildlife would be limited.	Wildlife habitat for Monarch (butterfly), American Bumble Bee, and Yellowbanded Bumble Bee is available within Goldenrod Forb Meadow (vegetation community). The proposed alignment for the ramp extension bisects Goldenrod Forb Meadow and will require removal of 0.43 ha of existing vegetation.
	Wetlands	There are no provincially designated natural features including Provincially Significant Wetland.	Approximately 0.34 hectares (27%) of a Provincially Significant Wetland (PSW) will need to be removed in order to accommodate the ramp extension. A permit was issued by the TRCA on May 13, 2025, which grants permission to undertake works within the TRCA's Regulated Area, including the interference with or alteration of the wetland, to facilitate the construction of the ramp extension.

	Factors	Alternative A2 per 2009 ESR	Modified Recommended Design (Current)
			Ongoing coordination between the City of Markham and TRCA will be required to ensure continued compliance with permit conditions.
Transportation	Level of Service (LOS)	Would improve LOS at Major Mackenzie Drive intersections with Highway 404 southbound ramp terminal, Markland Street, and Nichols Drive.	The off-ramp extension would maintain existing operational LOS at the Markland Street and Major Mackenzie Drive intersection in 2051. At the Woodbine Avenue and Major Mackenzie Drive intersection, peak hour operations will experience congestion. At the Markland Street and Russell Dawson Road unsignalized intersection, the extension would provide congestion relief for both AM and PM peak periods. Compared to Alternative A2, the current preliminary design provides operational benefits by maintaining LOS at key intersections and reducing congestion at Russell Dawson Road.
	Geometry	70 km/h design speed and 190 m radius curve were used. The greater radius is more desirable in terms of road geometry.	Reduced speed limit of road extension to 50 km/hr to provide a more uniform expected operating speed as drivers travel through the surrounding urban areas, while the on-ramp has a proposed speed of 80km/h. The proposed radius of the new alignment is 210 m.
	Network Compatibility	This alternative would provide an opportunity for access to the future development in the Loblaws property and would connect to Markland Street, a collector road that serves the future employment area in the Cathedral community.	The road extension would provide access to the Cathedral Community directly from Highway 404 by connecting to Markland Street and providing an opportunity for access to existing and future developments. The road extension will also provide a more integrated active transportation network, as Multi-Use Paths are recommended.

Grouping	Factors	Alternative A2 per 2009 ESR	Modified Recommended Design (Current)
Cost	Construction Cost	\$4.4 M	The preliminary cost estimate is based on the 30% design and includes the following breakdown: • Roadway: \$4,000,000 • Drainage and Stormwater Management: \$900,000 • Structural Bridge and Foundations: \$7,500,000 • Structural Retaining Wall: \$1,200,000 • East-side retaining wall/grading solution: \$2,000,000 • Electrical: \$650,000 • Utility Protection and Relocation: \$500,000 • Environmental Mitigation: \$350,000 • Traffic Staging: \$800,000 • Other (mobilization, insurance, etc.): \$600,000 The total is approximately \$18.5M². This cost is subject to further refinements as the project proceeds to detail design.

² The future projected cost is approximately \$30M, which includes escalation to 2030, soft costs, and its indexes.



Following the selection of the **Alternative A2** alignment for the Highway 404 northbound off-ramp extension, additional studies have been undertaken to further define and support the recommended design concept. This section outlines the results of the studies listed below which supports the development of the recommended design concept, including the retaining wall.

4.2.1 Structural

The proposed new bridge will carry the new road over the realigned E-N ramp. A single-span reinforced concrete rigid frame structure is proposed. In addition, mechanically stabilized earth (MSE) retaining walls are proposed at the four corners of the bridge, to support the embankments adjacent to the realigned ramp. **Table 10** documents updated preliminary design elements.

Although the 3:1 slope is the City’s preferred design option, given the reasons and history noted in Section 4.1 above, retaining wall(s) along the road extension are proposed to keep the road embankment from encroaching on existing developments to the east and planned developments to the west. The retaining wall(s) prevent soil erosion by stabilizing slopes and preventing soils from washing away due to rain, help control water drainage by redirecting runoff away from the bridge structure, thus reducing the risk of flooding, create flat suitable areas for gardens or other landscaping, and protect nearby infrastructure from potential damage caused by shifting soil or erosion. The exact size and location, which will be located on the 770 Markland Street property, will need to be confirmed during detailed design.

Table 10: Structural Design Elements

Element	Highway 404 E N Ramp	New Road
Horizontal and Vertical Alignment	The horizontal alignment of the E-N ramp will be shifted to the north of the existing ramp, on a new alignment. The proposed radius of the new alignment is 210 m, and the proposed vertical profile is on a constant grade of 0.90% at the bridge.	The horizontal alignment of the new road will be tangential at the bridge, and the proposed vertical profile is on a constant grade of 0.66% at the bridge.
Cross-Sections	The realigned E-N ramp will have a lane width of 4.75 m. On the south side of the ramp lane, a 1.0 m wide shoulder is provided, along with a concrete barrier (0.4 m width) cast against the abutment and retaining walls. On the north side of the ramp lane, a 2.5 m wide shoulder is provided. In addition, a horizontal clearance of at least 8.4 m is provided from the edge of the ramp lane to the abutment and retaining walls, in order to satisfy stopping sight distance requirements.	The new road extending from the ramp terminal will have one northbound lane and one southbound lane over the new bridge, along with multi-use paths (MUPs) and associated elements.

Considering that this bridge will require relatively high abutments and access below the bridge is available for falsework, the most appropriate and cost-effective structure type for this site is a

reinforced concrete rigid frame structure on spread footings. This structure type will provide optimal long-term durability (no expansion joints or bearings, which are a common source of rehabilitation and maintenance needs).

The span length of the new structure is 20.5m measured parallel to the new road alignment, with the new road alignment on a skew of approximately 42° to the bridge abutments. In order to reduce the skew angle for the structure, the structure will be 'overbuilt' to allow a skew angle of 30° and a span length of approximately 17.6m.

4.2.2 Geotechnical

Foundations

Both shallow and deep foundation options are considered feasible. Depending on the final geometry of the ramp extension, temporary protection systems will likely be required to facilitate construction.

Pavement Structure

The preliminary geotechnical investigation has evaluated the pavement structure for the extension road in comparison with City of Markham standards. The recommended pavement structure which has been carried through the preliminary design is:

- 40mm HL3
- 75mm HL8
- 150mm Granular 'A'
- 300mm Granular 'B' Type II
- Prepared and approved subgrade

During the detailed design phase additional boreholes will be required for the pavement design of the new on-ramp following MTO standards and additional boreholes for the extension road to confirm the findings.

Following the soil and groundwater conditions from the geotechnical investigations (GEMTEC, 2024), it is recommended that additional monitoring is performed during the detailed design stages of the project to capture seasonal groundwater fluctuations and confirm the suitability of any LID approaches.

4.2.3 Drainage and Stormwater Management

The proposed SWM conditions will provide recommendations for the outfall (OF) improvements, storm drainage system and the stormwater management infrastructure to meet the City and TRCA requirements.

Receiving Outfalls

Based on field investigation, survey data, and proposed design strategy, the following are the recommendations for each outfall (see **Figure 30**):

- OF1
 - Maintain existing outfall.
 - Limit drainage area to confined low point.
 - Daylight lateral sewer along embankment to existing ditch with proposed riprap / erosion protection downstream of the pipe outlet.

- OF2
 - Maintain existing outfall.
 - Maintain connection to Markland Street (provided 600mm stub connection).
 - Implement Best Management Practices where feasible prior to connection.
- OF3
 - Maintain existing flow paths to OF3.
 - Provide safe conveyance of flow to OF3 with the new overpass.
 - Implement crossing culvert(s) at the proposed overpass that meet MTO Highway Drainage Design Standards (HDDS) criteria.

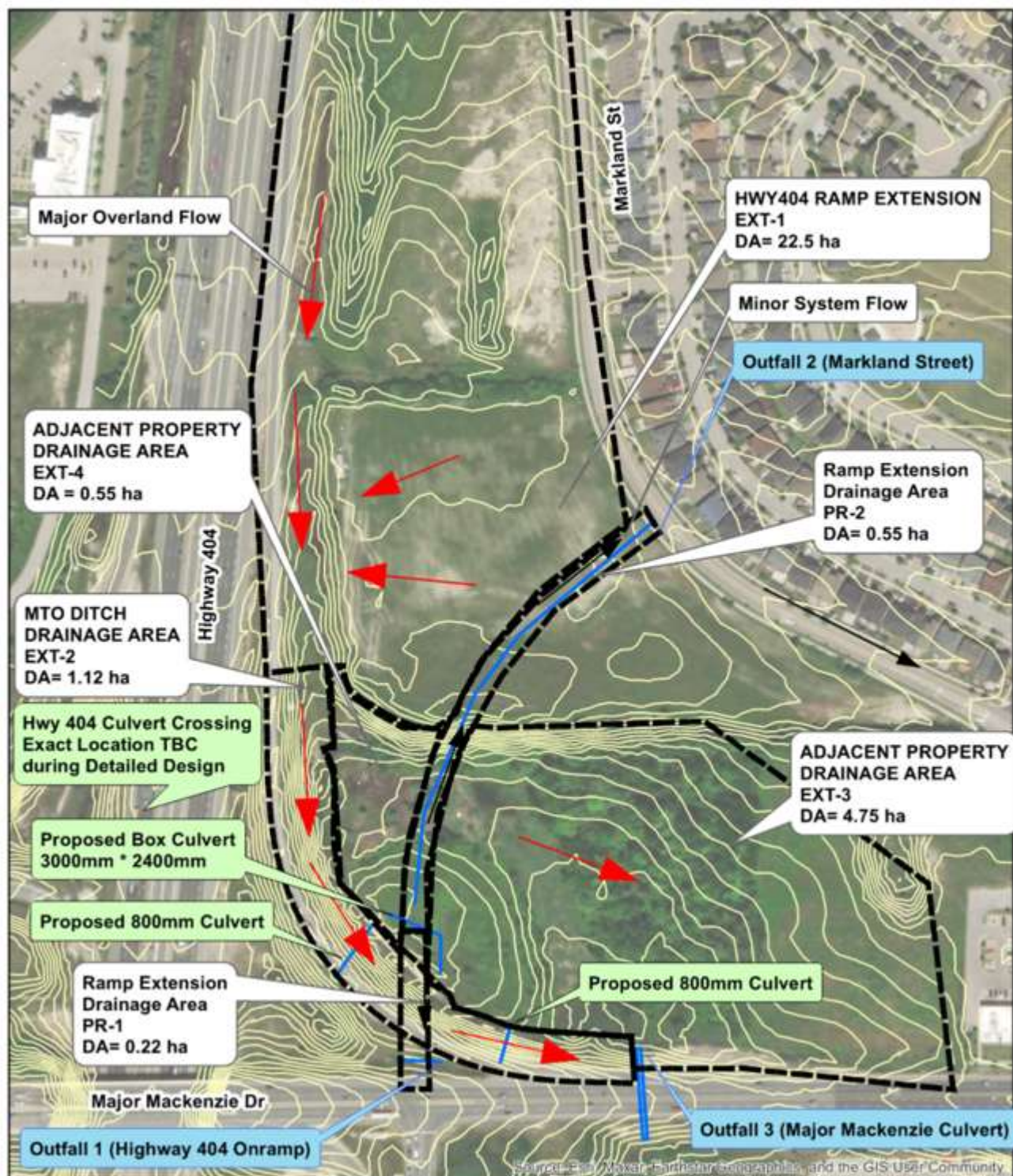


Figure 30: Proposed Catchment Plan

Minor System Conveyance - Storm Sewers

The Highway 404 Road extension improvements will require implementing a new storm sewer system. The following are the proposed Highway 404 Road Extension storm network features:

Storm Sewer to OF1

- 20m of 300mm storm sewer catchbasin leads conveying runoff to the southern Highway 404 On-ramp.
 - Quality Control Requirements (i.e OGS units) are not being provided due to the small catchment area. It is unknown at this stage of the ultimate discharge point and if any existing quality control measures are available.
 - Recommended during the detailed design stage of the project to pursue further investigations are undertaken to ensure quality control measures are being instituted.

Storm Sewer to OF2

- 307m of 300 - 375mm storm sewer conveying runoff towards Markland Street.
 - Connection point at the 600mm Stub (OF2) via the existing STM MH R803.
 - Sewer network ultimately discharges to Woodbine Pond.
 - The City has confirmed half of the OF2 drainage area of the proposed road alignment has been accounted for in the drainage area of the Woodbine Pond. The downstream Woodbine Pond can accommodate the additional drainage area, provided that the downstream sewer capacity assessment be completed prior to tying into the existing 600mm stub.

LID Controls

The roadway improvements from the Highway 404 Ramp Extension will capture and convey runoff to the proposed storm sewers. As part of the improvements, SWM and LID features have been considered to satisfy the increase in impervious levels for the new ROW. Further verification of the water quality treatment provided by Woodbine Pond is required during detailed design. As an option to provide pre-treatment, infiltration trenches along the corridor and OGS units are recommended to provide filtration prior to discharging to OF2 (Markland Street) and meet servicing requirements for water quantity, quality and balance.

Water Quantity

Visual OTTHYMO was used to control post-development peak flows to pre-development levels for all storms up to and including the 100-year storm for OF2. A storage requirement of approximately 222 m³ is required to control the 100-year post development peak flow to pre-development levels.

As a result of the Visual OTTHYMO modelling and the MOE SWM Planning and Design Manual (2003) design criteria, infiltration trenches have been proposed along the ROW of the Highway 404 Ramp Extension near the Markland Street intersection. See **Table 11** below.

Table 11: Proposed Low Impact Development (LID) Locations and Dimensions

Outfall	LID #	Location	Approx Station [m]	Dimensions			Void Ratio	Volume [m3]	Total Volume [m3]
				Length [m]	Width [m]	Depth [m3]			
Outfall 2	1	Hwy 404 Ramp Extension near Markland Street. East Boulevard.	1+316 to 1+367	50	2.9	2	0.4	116	232
	2	Hwy 404 Ramp Extension near Markland Street. West Boulevard.	1+317 to 1+367	50	2.9	2	0.4	116	

The City of Markham has provided confirmation that the downstream Woodbine Pond can accommodate half of the additional drainage area at OF2. Following the soil and groundwater conditions from the geotechnical investigations, it is recommended that additional monitoring is performed during the detailed design stages of the project to capture seasonal groundwater fluctuations and confirm the suitability of any LID approaches. During detailed design, further review of the applicability of other quantity control practices (i.e., super pipes) shall be undertaken to address the additional drainage outside of the Woodbine Pond capacity.

Due to the small drainage contributing drainage area from OF1, there is a negligible increase in flows to the outfall. Additionally, as OF3 has no increase to the existing contributing drainage area outletting to the Major Mackenzie Drive Culvert, the proposed design has no significant increase on the flows, and the discharge is expected to continue as under existing conditions. Thus, water quantity control measures are not required for OF1 and OF3.

Water Quality

The roadway improvements along the proposed Highway 404 Extension Road will capture and convey runoff through the proposed storm sewers to Markland Street for OF2. The improvements:

- Provide a long-term average removal of 80% of total suspended solids (TSS) from the storm runoff of additional impervious areas (TRCA Guidelines).
- Storage requirements to achieve Enhanced level of protection (80% TSS Removal) is based on the Water Quality Sizing Criteria from Table 3.2 of the Stormwater Management Planning and Design Manual (MOE, 2003).

The infiltration trenches sized in **Table 11** meets 80% TSS removal based on the MOE water quality criteria. Additionally, OGS units are recommended to provide pre-treatment prior to discharging to OF2 (Markland Street). Preliminary sizing using Stormceptor® EFO series has been completed for the pre-treatment of long-term annual sediment load reduction estimates at OF2. Recommendations are summarized in **Table 12**.

Table 12: Annual TSS Removal Performance

Discharge Outfall	Drainage Area (ha) / % Impervious	Target TSS Removal (%)	Estimated Net Annual Sediment Load Reduction (%)	Water Quality Runoff Volume Capture (%)	Recommended Stormceptor Model
OF2 (Markland Street)	0.55 / 100	60	62	>90	EF6

Proposed Culvert

Expanding from the 2009 ESR, a hydraulic assessment was carried out for the proposed Highway 404 E-N ramp realignment and the proposed road overpass. The 100-year peak flows within the Study Area were adopted from the 2009 ESR to perform analysis on the proposed concrete box culvert located where the realigned 404 ramp crosses below the proposed road overpass.

From the 2009 ESR, the 10-year storm event flow is 2.278 m³/s and the 100-year storm event flow is 6.53 m³/s. The preliminary design of the culvert conveyed along the Highway 404 Ramp to Major Mackenzie Drive is the 100-year storm event. The proposed approach within the 2009 ESR was to manage the flows within 2 separate systems, a proposed box culvert receiving 4.251 m³/s (100-year storm event) and a new proposed storm sewer receiving 2.278 m³/s (10-year storm event). However, upon review of the system, it was determined the implementation of a proposed storm sewer would require work outside the site limits along the Highway 404 Ramp and Major Mackenzie Drive which was not within the site limits. It was therefore determined the best course of action would be to implement a crossing culvert across the proposed overpass to convey flows along the re-aligned Highway 404 Ramp.

Hydraulic analysis using HY-8 modelling software determined that a 3000mm * 2400mm concrete box culvert would be required to convey the design flow and provide 1.0m freeboard with the edge of the Highway 404 ramp. The criterion for assessment is per the MTO Highway HDDS and results are demonstrated in **Table 13** and **Table 14**.

Table 13: Hydraulic Parameters – Proposed Culverts

Characteristic	Proposed Extension Road Culvert	Proposed 800mm West On ramp Culvert
Crest Elevation (m) (Top of Road)	214.934	208.668
Edge of Pavement Elevation (m)	215.220	208.479
Upstream Invert (m)	206.750	207.645
Downstream Invert (m)	206.560	206.800

Table 14: Hydraulics Details – Proposed Culverts

Result	Proposed Extension Road Culvert		Proposed 800mm West On ramp Culvert	
	10 Year Storm	100 Year	10 Year Storm	100 Year
Peak Flow (m ³ /s)	2.28	6.53	0.05	0.08
Water Surface Elevation (m)	207.41	208.09	208.09	208.09
Freeboard (m)*	7.81	7.13	0.39**	0.39**
Headwater-Depth Ratio (HW/D)	0.28	0.56	0.56	0.56
Velocity (m/s)	1.35	2.4	0.10	0.15

Based on the hydraulic analysis, the proposed extension road culvert and on-ramp culvert meet the MTO HDDS criteria for a minimum freeboard of 1 meter to the traveled lane. The analysis of the proposed condition indicates that the proposed culvert satisfies all MTO HDDS criteria, including freeboard, flow depth, HW/D ratio, and flow containment. Additionally, as velocities exceed maximum permissible velocity of 1.5 m/s, erosion control measures will be required for assessment during the detailed design stage of the project.

Future considerations during the detailed design stage will be required for the 800mm Onramp east culvert. Drainage of the onramp may be required through collection from ditch inlets to meet MTO HDDS Criteria (i.e., minimum culvert crossing size of 800mm).

Proposed Hydrologic Analysis

The hydrologic analysis of the Study Area was completed using Visual OTTHYMO 5.0 (VO5) modelling software. The uncontrolled proposed conditions flow rates at each outfall are summarized below.

Table 15: Proposed Outfall Flows – Uncontrolled

Outfall (OF#)	Design Storm [m ³ /s]					
	2 year	5 year	10 year	25 year	50 year	100 year
OF1	0.011	0.015	0.017	0.020	0.022	0.024
OF2	0.028	0.037	0.043	0.050	0.055	0.061

Outfall flows summarized below includes the quantity measures described above and its post to predevelopment flow rate reductions.

Table 16: Proposed Outfall Flows – Controlled

Outfall (OF#)	Design Storm [m ³ /s]					
	2 year	5 year	10 year	25 year	50 year	100 year
OF1	-	-	-	-	-	-
OF2	0.010	0.016	0.021	0.027	0.031	0.035

The outfall flow comparison table summarized in the table below demonstrates the change at each outfall between existing and proposed conditions for the 100-year design storm.

Table 17: Flow Comparison Summary

Outfall (OF#)	Design Storm [m ³ /s]			
	Existing 100 year	Proposed 100 year Uncontrolled	Proposed 100 year with LID	Proposed 100 year with LID Existing
OF1	0.015	0.024	-	-
OF2	0.036	0.061	0.035	-0.026

The 100-year storm (as well as all storm events, 2 through to 100-year) demonstrates the post development flows will be at or less than existing flow rates.

Criteria Summary

Storm Sewers

- **Minor System:** The storm sewer along the Highway 404 Ramp Extension has been designed to convey the 5-year storm event. The ultimate discharge point of OF2 is Woodbine Pond, conveyed through the minor system of Markland Street, Russell Dawson Road and Princess Diana Drive.
- **Major System:** The proposed roadway profile and on-ramp allows for suitable drainage of the 100-year major storm to the Major Mackenzie Drive Culvert in the event of occurrence. Flow depths have not been completed at this stage of the project and it is recommended that the MNRF flood hazard guidelines be incorporated in the assessment during the detailed design stages of the project.

Water Quality

- The City has provided confirmation that the downstream Woodbine Pond can accommodate half of the additional drainage area from OF2.
- Infiltration Trenches and OGS Units are recommended as part of a treatment train approach to meet water quality objectives for OF2.
- For OF1 and OF3, a proposed 1m wide flat bottom ditch provides inherent water quality benefits and conveys flows downstream of the 3000 * 2400mm box culvert underneath extension road, and the proposed 800mm culvert along the Highway 404 E-N Ramp. Further water quality benefits are available through the use of vegetated embankments along the ditch, and riprap downstream of OF1.

Water Quantity

- Infiltration Trenches have been sized to meet the storage volume required to control post-development peak flows to pre-development levels for all storms up to and including the 100-year storm
 - During detailed design, review the applicability of implementing a variety of quantity control practices (i.e super pipes) to address the additional drainage outside of the Woodbine Pond capacity.
- Water quantity control measures are not required for OF1 and OF3.
 - Due to the small drainage contributing drainage area from OF1, there is a negligible increase in flows to the outfall.
 - OF3 has no increase to the existing contributing drainage area outletting to the Major Mackenzie Drive Culvert, the proposed design has no significant increase on the flows, and the discharge is expected to continue as under existing conditions.

4.2.4 Transportation and Traffic

As indicated above, an updated Transportation Study has been undertaken to review current existing traffic conditions and reassessed the need for the Highway 404 northbound off-ramp road extension from Major Mackenzie Drive to Markland Street and reviewed the validity of the approved design and its ability to meet future travel demands.

This report investigates the future (2051 horizon year) traffic pattern changes and the resulting traffic operations in the project Study Area based on future traffic growth. The Synchro traffic model used a flow rate of 2,000 vehicles per hour per lane, consistent with the York Region Mobility Plan Guidelines for Development Applications.

For the preferred design concept, three (3) scenarios for forecasted traffic volumes were modelled using Synchro analysis: the without off-ramp extension (i.e., do-nothing) scenario, the three-lane off-ramp extension scenario and a four-lane off-ramp extension scenario. Results of the analysis are summarized below.

Scenario 1: Without Off-Ramp Extension ("Do Nothing")

In this scenario, future conditions traffic operations analysis for signalized intersections indicate that all signalized intersections in the Study Area except Nichols Boulevard and Major Mackenzie Drive will experience capacity constraints.

The traffic operations analysis for the unsignalized intersection at Markland Street and Russell Dawson Road indicate that during the weekday AM peak hour, the eastbound through and southbound left turn movements are forecast to experience significant congestion. In the PM peak hour, the westbound through movement is forecast to be over capacity.

Scenario 2: Highway 404 Northbound Off-Ramp Extension (Three-Lane Cross Section)

In this scenario, some of the signalized intersections anticipate congested operations except for the Nichols Boulevard/Plaza and Major Mackenzie Drive, and Carpool Lot/Highway 404 Southbound Ramp and Major Mackenzie Drive intersections.

At Markland Street and Russell Dawson Road unsignalized intersection, the southbound left lane is forecast to approach capacity in the AM peak period. There are no movements of concern in the PM peak hour for this intersection.

Scenario 3: Highway 404 Northbound Off-Ramp Extension (Four-Lane Cross Section)

In this scenario, some of the signalized intersections anticipate congested operations except for the Nichols Boulevard/Plaza and Major Mackenzie Drive, and Carpool Lot/Highway 404 Southbound Ramp and Major Mackenzie Drive intersections.

The specific movements at the Markland Street and Major Mackenzie Drive intersection that are forecast to experience capacity constraints are similar to those in Scenario 2.

The specific movements at the Woodbine Avenue and Major Mackenzie Drive and at the Markland Street and Major Mackenzie Drive intersections that are forecast to experience capacity constraints are similar to those outlined in Scenario 1.

There are no movements of concern in the AM or PM peak hour for the unsignalized intersection of Markland Street and Russell Dawson Road.

2051 Pedestrian Mode Performance

Based on the York Region TMP and City of Markham Active TMP, the following pedestrian network improvements were assumed for the 2051 pedestrian future conditions:

- A minimum 2.4 metre pedestrian clearway with a minimum 4.5 metre buffer along the expanded section of Major Mackenzie Drive from Leslie Street to Woodbine Avenue.

It is also expected that pedestrian treatments will be implemented at Markland Street and Russell Dawson Road. A map of the existing and planned pedestrian facilities in 2051 are presented in **Figure 31**. The improvement in pedestrian facilities along Major Mackenzie Drive will provide improved LOS compared to existing conditions.



Figure 31: 2051 Pedestrian Network Map

2051 Bicycle Mode Performance

The 2051 Regional Road Cycling Network in the York Region Transportation Master Plan indicates that there will be cycling facilities along Major Mackenzie Drive through the Study Area to be determined in consultation with the Pedestrian and Cycling Planning and Design Guidelines.

The following cycling network improvements were assumed for the 2051 bicycle future conditions:

- A 1.5 metre separated cycling track along the expanded section of Major Mackenzie Drive from Leslie Street to Woodbine Avenue including associated intersection cycling treatments.

The anticipated 2051 bicycle mode performance is expected to improve compared to existing conditions. The addition of a cycle track along Major Mackenzie Drive will provide a higher level of service along the corridor and significantly improve bicycle connectivity.

Sensitivity Analysis

A two-lane off-ramp extension was tested through a sensitivity analysis to explore whether a reduced cross-section could still support future traffic needs. The analysis showed that while certain movements at the intersection of the off-ramp and Major Mackenzie Drive would experience increased delays and queuing compared to the three-lane option, overall operations remained within acceptable limits for most movements. At the Markland Street intersection, performance remained largely the same under the two-lane and three-lane scenarios, with only the eastbound through movement in the PM peak showing capacity concerns.

Summary of Traffic Analysis

An overview of the traffic operations at signalized intersections is presented below:

- Operations at the Highway 404 southbound ramp and Major Mackenzie Drive intersection are currently acceptable and operating below capacity under existing 2024 Conditions.
- At the Highway 404 northbound ramp and Major Mackenzie Drive intersection, some congestion is forecasted in all three 2051 scenarios. The three-lane and four-lane ramp extension lane configurations exhibit capacity constraints due to limitations with the added southbound-right turn lane. Due to the capacity restraints in the 3-lane configuration for the southbound right, congestion is higher compared to the 4-lane configuration.
- At the Markland Street and Major Mackenzie Drive intersection, existing operations note capacity constraints, with congestion worsening under the 2051 "Do-Nothing" scenario. The two off-ramp extension scenarios serve to favorably maintain existing operational level of service at this intersection in the 2051 horizon year despite forecasted traffic growth in the area.
- At the Woodbine Avenue and Major Mackenzie Drive intersection, peak hour operations are currently congested with constraints worsening in all three 2051 horizon year scenarios.

At the Markland Street and Russell Dawson Road unsignalized intersection, current operations are constrained in the weekday AM peak hour, with capacity constraints forecasted in the AM and PM peak hours in the future "Do-Nothing" scenario. The extension would provide relief in congestion at this intersection for both peak periods.

Safety Assessment

Potential enhancements to existing non-automobile road user operations from a behaviour and safety improvement perspective are considered to improve safety and comfort for all users. Therefore, the recommended off-ramp extension configuration shall consider:

Potential road user behaviour/safety improvements to pre-existing road conditions.

- In the 2051 horizon year, with background development activity planned for the west side of Markland Street, it is expected that crossing facilities will be warranted along Markland Street. Future improvements should consider painted crosswalks on the west, north, and east legs.
- Per Ontario Traffic Manual (OTM) Book 18 guidelines, assuming the 50 km/hr posted speed limit is maintained, a minimum buffer of 0.3 metres and a minimum cycle track width of 1.5 metres is desired.

Future Lane Configuration

Based on the operations performance of the off-ramp scenarios 2 and 3 presented above, a two-lane cross section is preferable for the following reasons:

- Shorter pedestrian crossing distance across the ramp extension intersection at Markland Street leads to a safer intersection for all road users;
- Narrower road cross section provides inherent traffic calming properties; and,
- Oversupplying lanes and road capacity tends to incentivize increased traffic volumes.

Potential traffic operation improvements (e.g. traffic pattern alterations via turning restrictions) and method of traffic control (e.g. all-way stop, traffic signal).

- The estimated future 2051 total AM and PM peak hour volumes for the intersection of Highway 404 Off-Ramp and Markland Street were used to complete an all-way stop control warrant and traffic signal warrant. An all-way stop control warrant analysis was conducted following the guidelines outlined in MTO's Ontario Traffic Manual Book 5: Regulatory Signs. All-way stop control conditions were met for the PM peak period, but not for AM peak period.
- Based on the calculation, an all-way stop is not warranted; furthermore, a traffic signal is not warranted at the intersection of Highway 404 Off-Ramp and Markland Street.
- However, the inclusion of a traffic signal in the design aims to enhance safety for cyclists and pedestrians, ensuring that all road users can navigate the intersection safely and efficiently. This proactive measure underscores the commitment to creating a transportation network that prioritizes the safety and accessibility of all users.

Recommendations

The following requirements were established for the off-ramp extension detail design considerations to ensure the design adheres to local and regional standards, providing a safe and efficient roadway:

- Each lane shall be designed to be 3.5 metres wide, as specified by the City of Markham's Standard Cross Section Drawing MR 8 major collector road, with the curb width set at 0.25 metres.
- The total pole area space combines the curb width (0.25 metres) and the pole setback space (0.5 metres), totaling 0.75 metres.

- A separated cycling facility shall be provided in alignment with OTM Book 18's recommendation of a 1.8-metre width and a suggested minimum width of 1.5 metres, with a 0.6-metre tactile strip between the sidewalk and the separated cycling facility to ensure safety and accessibility. A 1.8-metre sidewalk is recommended to meet the minimum sidewalk width specified for a collector road by York Region.
- With development activity planned for the west side of Markland Street, additional pedestrian crossing facilities should be installed at the existing intersections north and south of the proposed off-ramp extension intersection location.
- Given this spacing distance between adjacent intersections, the proposed off-ramp extension intersection should also have pedestrian crosswalks integrated into the design.
- Per Ontario Traffic Manual (OTM) Book 18 guidelines, assuming the 50 km/hr posted speed limit is maintained throughout the Markland Street Study Area, a minimum buffer of 0.3 metres and a minimum cycle lane width of 1.5 metres is desired.
- Based on the 2009 alternative and current-day general best practices to increase multi-modal connectivity, especially near residential and commercial areas, a speed limit of 50 km/hr should be considered instead of the 80 km/hr cited in previous studies to provide a more uniform expected operating speed as drivers travel through the surrounding urban areas.

5.0 SUMMARY OF ENVIRONMENTAL EFFECTS AND PROPOSED MITIGATION MEASURES

The following section describes changes to potential environmental impacts in the Study Area that have occurred since 2009.

5.1 Land Use & Socio-Economic

The road extension is currently located in the City of Markham in an area designated as Business Park Employment, Service Employment, and Commercial and is also within the Cathedral District Special Policy Area. Cathedral District is intended to be a mix of retail, commercial, industrial, recreational, cultural and residential uses that are supported by an efficient transportation system and can be easily accessed from Highway 404.

Since the road extension has been designed with safety, accessibility, and convenience in mind to create an integrated road network, activities associated with operations of the road are compatible with existing and planned land uses. The road extension is also in keeping with the policies of the York Region Official Plan by providing access to essential services, jobs, housing, transportation, and public facilities within the City of Markham.

The Provincial Policy Statement encourages a multimodal transportation system and improved connectivity within and among transportation systems, including connections cross jurisdictional boundaries (Policy 3.2.3). The road extension would not only alleviate congestion in the area but also provide a more efficient transportation system that connects vehicles exiting from Highway 404 to amenities within the City of Markham more seamlessly, ultimately reducing trip times.

It is recognized that land use over time changes as communities evolve; however, all land use is regulated through the Municipal Official Plans. The operation of the road extension assessed as part of this Addendum is not anticipated to restrict future development of surrounding land uses.

As indicated in the 2009 ESR, the proposed road extension would provide access to the Cathedral Community directly from Highway 404 by connecting to Markland Street and providing an opportunity for access to the future developments. The City supports future access to the adjacent properties along the proposed Highway 404 exit ramp extension, the details of future access will be finalized during the Site Plan approval process and is subject to MTO approval.

Although there are active recreational amenities and sensitive facilities within 1km of the road extension, there are no anticipated impacts. The road extension will provide a more integrated active transportation network, as sidewalks and bike lane(s) are recommended. Cycling and pedestrian infrastructure will be implemented to align with the recommended transportation network per the York Region TMP and City of Markham Active TMP.

In terms of impact to properties back in 2009, Sites B and C (see **Figure 7**) would have been severed as a result of the proposed road extension. Today, no permanent property acquisition is anticipated as nearby developments are currently protecting for the proposed ramp extension.

Potential socio-economic effects associated with construction are anticipated and relate largely to noise/vibration, air quality, temporary traffic effects and visual disturbances associated with construction activities/areas. These effects are anticipated to cease once construction has finished.

5.2 Natural Environment

5.2.1 Wetlands

The City of Markham has acknowledged that removal of a portion of the wetland feature will be required to accommodate the proposed alignment and will therefore require compensation as a form of mitigation. As compensation details are to be determined at the detailed design stage, specifics are unable to be discussed within this report; the Guideline for Determining Ecosystem Compensation (2018) should be consulted to determine the total amount of compensation required to replace the wetland loss. The Guidelines for Determining Ecosystem Compensation (TRCA, 2018) will assist in understanding how compensation can be effectively implemented through a standard and consistent approach.

Additionally, collaboration with TRCA will be necessary to confirm details of the compensation to be provided and how it will be implemented. Confirmation regarding whether the compensation will be provided through cash-in-lieu or the undertaking of a wetland compensation project will be required. If a wetland compensation project is to be implemented, a permit from the TRCA will be required and details pertaining to the timing, design, and location of the compensation will be necessary.

5.2.2 Wildlife

As mentioned in Section 3.3.2, the Goldenrod Forb Meadow has been assumed SWH in the form of Special Concern & Rare Species for Monarch, American Bumble Bee and Yellowbanded Bumble Bee. Based on the proposed alignment of the road extension, removal of a portion of the Goldenrod Forb Meadow will be required. As such, provided the mitigation measures detailed in **Section 5.9.2** and in **Appendix C** are implemented, and vegetation removal is completed outside of the active season (late May to mid-August).

To offset the proposed removal of SWH for pollinator species, it is recommended that the ephemeral drainage ditches alongside Highway 404 be planted with herbaceous and woody native, pollutant tolerant, pollinator species suitable to the soil and moisture conditions. The incorporation of a suitable seed mix is also recommended.

5.2.3 Vegetation

The proposed alignment for the ramp extension bisects the Graminoid Mineral Meadow Marsh and Goldenrod Forb Meadow communities and will require removal of existing vegetation, approximately 0.34 ha and 0.43 ha, respectively, to accommodate the roadway. The proposed development will not result in negative impacts to the vegetation communities provided the mitigation measures detailed in **Section 5.9.2** and in **Appendix C** are implemented.

5.2.4 Designated Areas

As there are no provincially designated natural features,

The OP Section 8.6.1.2 states that transportation is a permitted use within the Greenway System, so long as environmental approval is received. As this Addendum is being prepared, it fulfills the requirements under the *Environmental Assessment Act*. Based on this understanding, the ramp extension is not expected to conflict with the current land uses.

As there are no provincially designated natural features, no mitigation measures are required.

5.2.5 Tree Inventory

Per the Tree Inventory, a total of 15 trees are recommended for removal due to the proposed ramp extension. A Tree Inventory and Preservation Plan will need to be completed during detailed design by an ISA Certified Arborist.

5.2.6 Species at Risk

One Species at Risk, Kentucky Coffeetree, listed as Threatened under the ESA was identified within the Study Area. As the tree identified was not naturally occurring, they are not subject to the ESA, and therefore, no mitigation measures are required.

5.3 Cultural Heritage Landscapes and Built Heritage Resources

Based on the original 2009 ESR, no built heritage resources (BHRs) or cultural heritage landscapes (CHLs) have been identified in the Addendum Study Area. As part of this Addendum, no further assessments were deemed required, and no mitigation measures are proposed.

5.4 Archaeological Resources

Based on a review of the Stage 1 and 2 Archaeological Assessment completed in 2009, the area north of Major Mackenzie Drive and east of Highway 404 had been intensively disturbed during the construction of the Highway 404 and Major Mackenzie Drive interchange and does not retain archaeological potential. As part of this Addendum, no further assessments were deemed required as the proposed road extension is not expected to have a significant archaeological impact. No mitigation measures are proposed.

5.5 Noise

A noise analysis was not carried out as part of the 2009 ESR, as there were no existing residential developments in the proximity of the proposed road extension (i.e. no noise sensitive areas).

As part of the Noise Impact Assessment completed to support this Addendum, traffic data in the form of Average Annual Daily Traffic (AADT) for the horizon year 2051 was calculated for the roadways.

Sound levels at the receptor's Outdoor Living Area (OLAs) were calculated without the project and with the project. Sound levels were calculated using the MECP's STAMSON v 5.04 computer program implementation of the ORNAMENT prediction model. The sound levels are calculated in the OLAs, 3m from the façade of the building and 1.5m above the ground on the basis of a 16-hour daytime (07:00–23:00) equivalent sound level (Leq).

Changes in sound levels with the project do not exceed 5 dB at all the receptors. While not required for municipal roadway projects, the absolute sound levels are also below 65 dBA (Leq,16hr). The predicted sound levels are summarized in **Table 18** below.

Table 18: Predicted Sound Levels

Receptor	Daytime Sound Level (dBA, 16 hr. Leq)		Change in Sound Levels	≥ 5 dB Impact
	Without Project (2051)	With Project (2051)		
1	59	59	0	No
2	58	59	1	No
3	57	58	1	No
4	56	57	1	No
5	56	57	1	No

The results of the noise assessment show that the change in future sound levels with the project is at most 1 dB. Noise mitigation is not required for the nearby sensitive receptors given that potential noise impacts are considered insignificant. As the project is unlikely to generate enough traffic to cause a noticeable noise increase, no mitigation measures are proposed.

Construction is inherently a noisier than usual activities. As MECP does not enforce construction noise and vibration limits, construction-related items are typically addressed through the local by-laws. Efforts will be made to follow the by-law requirements and minimize inconvenience to the public. Measures to mitigate construction related impacts are included in **Section 5.9.5** below.

5.6 Air Quality

An air quality analysis was not carried out as part of the original 2009 ESR. As part of the Air Quality Impact Assessment completed to support this Addendum, the modelling considered vehicle emissions from Highway 404, Major Mackenzie Drive, and Markland Street. The following scenarios were considered during the assessment:

- 2024 Existing No Build (NB) – Assess the existing air quality conditions at representative receptors. Predicted contaminant concentrations from the existing traffic levels were combined with hourly measured ambient concentrations to determine combined impacts.
- 2051 Future No Build (NB) – Assess the future air quality conditions without the proposed project. Predicted concentrations associated with increased traffic levels due to City growth was combined with hourly measured ambient concentrations to determine combined impacts.
- 2051 Future Build (FB) – Assess the future air quality conditions with the proposed project in place. Predicted contaminant concentrations associated with increased traffic levels for the preferred alternative was combined with hourly measured ambient concentrations to determine combined impacts.

The maximum combined concentrations for the Future Build emissions scenario were below their respective MECP guidelines or Canadian Ambient Air Quality Standards (CAAQS), with the exception of the annual CAAQS-Nitrogen dioxide (NO₂), annual Particulate Matter (PM)_{2.5}, 24-

hour PM₁₀, 24-hour TSP, 24-hour and annual benzene, and 24-hour and annual Benzo[a]pyrene. Since the overall contribution from the roadway emissions was less than 15% of total concentration, and only a few days are expected to exceed the guideline, no mitigation measures are proposed.

During construction of the roadway, dust is the primary contaminant of concern, while contaminants such as Nitrogen oxides (NO_x) and Volatile Organic Compounds (VOCs) may be emitted from equipment used during construction. Measures to mitigate construction related impacts are included in **Section 5.9.6** below.

5.7 Utilities

A Subsurface Utility Engineering (SUE) Quality Level C Investigation was completed in accordance with CI/ASCE Standard 38-02: Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data. Enbridge Gas, Rogers and Alectra Hydro utilities may be in conflict with the proposed ramp extension. Conflicts can be mitigated by the removal, reconfiguration, relocation, lowering and/or casing extension of utilities. Mitigation strategies will be further explored during detail design in consultation with the effected utility company.

5.8 Contamination

An Environmental Site Assessment (ESA) was not carried out as part of the original 2009 ESR. A Phase One ESA and Phase Two ESA has since been conducted for environmental due diligence purposes and to support the management of excess soils for the Highway 404 northbound off-ramp extension at Major Mackenzie Drive.

A Phase One ESA was conducted in April 2024 which identified two (2) areas of potential environmental concerns (APECs) as a result of potentially contaminating activities on-site or from neighbouring properties within 250 m. A Phase Two ESA and Sampling and Analysis plan (SAP) was recommended to investigate the soil in the APECs identified.

A Phase Two ESA was conducted in general accordance with Ontario Regulation 153/04. The objective of the Phase Two ESA was to investigate the soil conditions at the APECs identified in the Phase One ESA and to collect baseline soil data. The Phase Two ESA included the advancement of five (5) boreholes to assess soil quality. Field investigations were completed between May 16, 2024 and May 28, 2024. Soil samples were collected for the laboratory analysis of one (1) or more of the following parameters:

- Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX);
- Petroleum Hydrocarbon Fractions 1 to 4 (PHC F1 to F4);
- Volatile Organic Compounds (VOCs);
- Polycyclic Aromatic Hydrocarbons (PAHs);
- Metal and Inorganics; and,
- Organochlorine Pesticides (OCs).

The measured concentrations of BTEX, PHC F1 to F4, VOCs, PAHs, metals and inorganics, and OCs were found to exceed the MECP Table 1 Site Condition Standard (SCS) in the following soil samples submitted for laboratory analysis:

- Sodium Adsorption Ratio (SAR) in soil samples BH1-SA1 (3.7) exceeded the MECP Table 1 SCS (2.4).
- The remaining soil samples met the MECP Table 1 SCS for the parameters analyzed.

Acceptance of soil that meets MECP Table 1 SCS, with the exception of salt-related parameters (i.e., SAR) is at the discretion of the receiving site. This soil can generally be accepted provided that the soil is placed below 1.5 m of the surface at receiving sites.

A Soil and Excavated Materials Management Plan shall be developed for the handling, management and disposal of all excavated material (i.e., soil, rock and waste) that is generated or encountered during the work.

5.9 Summary of Mitigation & Monitoring Measures

5.9.1 Land Use & Socio-Economic

To address nuisance effects, the following mitigation measures and protocols will be implemented as appropriate during construction activities:

- Proper fencing should be erected around all work areas prior to commencement of any earth moving, clearing or construction activities in order to prevent encroachment on adjacent properties. Fencing should remain for the duration of the work and be periodically inspected to ensure it is in good repair.
- An Erosion and Sediment Control Plan will be developed in accordance with the Ministry of the Environment, Conservation and Parks (MECP) Stormwater Management Planning and Design Manual (2003), and the guidelines of the TRCA. Erosion and sediment control monitoring to be conducted.
- Develop and implement a Communications Protocol, which will indicate how and when surrounding property owners and residents will be informed of anticipated upcoming construction works, including work at night, if any. Respond to issues that develop during construction.
- There is also potential for temporary construction phase impacts on land uses in the vicinity of construction sites and temporary access disruption. Therefore, the following mitigation measures will be adhered to:
 - Provide well connected, clearly delineated, and appropriately signed walkways and cycling route options, with clearly marked detours where required.
 - Provide temporary lighting and wayfinding signs and cues for navigation around the construction site.
 - Develop and implement a plan to reduce the effects of light pollution.
 - Access to businesses during working hours will be maintained, where feasible. Where regular access cannot be maintained, alternative access and signage will be provided.
- The following monitoring activities will also be undertaken during the construction phase:
 - Temporary access paths and fencing will be monitored.
 - Document and report to the City of Markham on the number of complaints and compliments received and resolution of complaints and compliments received.

5.9.2 Natural Environment

In addition to the mitigation measures outlined in Section 6.3.2 of the 2009 ESR, the following recommendations are provided to ensure the protection of natural heritage features and function adjacent to the road extension:

- Implement Erosion and Sediment Control Plan (ESC) following guidelines provided in TRCA's Erosion and Sediment Control Guide for Urban Construction (2019) and the City of

Markham ESC Standards, as part of detailed design, for protection of the surrounding natural features, and exclusion of wildlife from the area of works.

- The area of construction disturbance shall be kept to a minimum. Equipment is to be limited to the construction allowance area.
- Control access and movement of equipment and people through implementation of staging and storage areas.
 - Implement appropriate protocols outlined in the Clean Equipment Protocol for Industry (Halloran et al., 2013).
- All disturbed areas will be re-vegetated or restored with site appropriate native species, per the compensation details agreed upon by the City of Markham and TRCA during the detailed design stage.
- Install native, pollutant tolerant and pollinator friendly herbaceous and woody species suitable to the soil and moisture conditions throughout the ephemeral drainage ditches alongside Highway 404. Seeding through an appropriate native seed mix is also recommended.
- Time activities to avoid wildlife disturbance during critical life stages:
 - Avoid removal of trees and vegetation during the generalized breeding bird nesting period from April 1 to August 31. If vegetation removal is necessary during this period, a skilled biologist/ecologist is to conduct a nest search. Any active nests found are to be monitored weekly until they become inactive.
 - No clearing of trees on site is to occur during the bat maternity window (April 1- September 30) in compliance with provincial direction.
- Implement low impact development measures as detailed in the Drainage and Stormwater Management Report.
- Limit any cleaning solutions or paint used on the proposed roadway and take appropriate precautions to avoid products entering the adjacent natural features.
- Wetland compensation details are to be determined at the detailed design stage in consultation with TRCA.
- A Tree Inventory and Preservation Plan will need to be completed during detailed design by an ISA Certified Arborist.

5.9.3 Cultural Heritage Landscapes and Built Heritage Resources

As no BHRs or CHLs were identified, no mitigation or monitoring measures are required.

5.9.4 Archaeological Resources

As the Study Area has been intensively disturbed during the construction of the Highway 404 and Major Mackenzie Drive interchange, it does not retain archaeological potential. No mitigation or monitoring measures are required, however, in the event that previously undocumented archaeological resources are found, the following shall apply:

- All work shall be performed in accordance with Applicable Law, including but not limited to the *Ontario Heritage Act*, the Ministry of Citizenship and Multiculturalism (MCM), formerly the Ministry of Heritage, Sport, Tourism and Culture Industries (MHSTCI) Standards and Guidelines for Consultant Archaeologists (2011), and the MCM document, *Engaging Aboriginal Communities in Archaeology: A Draft Bulletin for Consultant Archaeologists in Ontario* (2011).

- Should previously undocumented archaeological resources be discovered, they may be a new archaeological site and therefore subject to Section 48 (1) of the *Ontario Heritage Act*. The proponent or person discovering the archaeological resources must cease alteration of the site immediately and engage a licensed consultant archaeologist to carry out archaeological fieldwork, in compliance with Section 48 (1) of the *Ontario Heritage Act*.
- If any suspected human remains are found, the Ministry of Transportation (MTO) Project Manager/Environmental Planner should be contacted. MTO will approve a licensed archaeologist to confirm the finds as human remains.
- *The Funeral, Burial and Cremation Services Act, 2002, S.O. 2002, c.33* requires that any person discovering human remains must cease all activities immediately and notify the police or coroner. If the coroner does not suspect foul play in the disposition of the remains, in accordance with Ontario Regulation 30/11 the coroner shall notify the Registrar, Ontario Ministry of Public and Business Service Delivery (MPBSD), which administers provisions of that Act related to burial sites.
- If police/coroner determine that the finds are archaeological, then the licensed archaeologist. In situations where human remains are associated with archaeological resources, the MCM should also be notified (at archaeology@ontario.ca) to ensure that the archaeological site is not subject to unlicensed alterations which would be a contravention of the *Ontario Heritage Act*. Any site personnel responsible for carrying out or overseeing land-disturbing activities will be informed of their responsibilities in the event that an archaeological resource is encountered. Should the proposed work extend beyond the assessed Study Area or should changes to the project design or temporary workspace requirements result in the inclusion of previously un-surveyed lands, these lands should be subject to further archaeological assessment conducted by a professionally licensed archaeologist prior to any disturbance or construction activities.

5.9.5 Noise

As the project is unlikely to generate enough traffic to cause a noticeable noise increase, no mitigation or monitoring measures are proposed.

Construction noise is temporary and will cease once the project is completed. As it is transient and not permanent, the associated effects of construction noise will be short term in nature. It is recommended the City of Markham Noise By-law and provincial guidelines as found in NPC-115 and NPC-118 be adhered to by the contractor during construction of the project.

A Construction Noise and Vibration Management Plan will also be developed once construction methods, staging areas, and equipment are determined. This plan will recommend mitigation measures and approaches to managing construction-related noise and vibration impacts, including best practices, monitoring requirements, and communication protocols to minimize disruptions to nearby receptors.

5.9.6 Air Quality

Since the overall contribution from the roadway emissions was less than 15% of total concentration, and only a few days are expected to exceed the guideline, no mitigation measures are proposed.

During construction of the roadway, dust is the primary contaminant of concern, while contaminants such as Nitrogen oxides (NO_x) and Volatile Organic Compounds (VOCs) may be emitted from equipment used during construction. Mitigation measures include material

wetting or use of non-chloride dust suppressants to reduce dust, use of wind barriers, and limiting exposed areas which may be a source of dust and equipment washing. Planting vegetation (for example coniferous species and shrubs) should be considered to minimize particulate impacts at nearby sensitive receptors. It is recommended that these best management practices be followed during construction of the roadway to reduce any air quality impacts that may occur.

5.9.7 Utilities

During the detailed design phase, the exact locations and depths of utilities will be determined and the staging and relocations approach will be established in discussion with the affected utility company. The following additional work will be undertaken as appropriate:

- Continue to meet with the utility companies to determine risks, timing and appropriate mitigation strategy to address potential conflicts;
- Confirm utility relocations/protection required based on detailed design and undertake negotiations with relevant utility companies, as required;
- Utilities affected by construction may be temporarily relocated;
- Develop and implement a mitigation plan during construction; and,
- Monitor construction activities to ensure that works schedule is being coordinated.

5.9.8 Contamination

A Soil and Excavated Materials Management Plan shall be developed for the handling, management and disposal of all excavated material (i.e., soil, rock and waste) that is generated or encountered during the work. The plan will be overseen by a Qualified Person pursuant to Ontario Regulation 153/04 under the *Environmental Protection Act* (QP) and will comply with Ontario Regulation 406/19 (On-Site and Excess Soil Management – enacted into law on July 1, 2020), the Ministry of the Environment, Conservation and Parks (MECP), formerly the Ministry of the Environment and Climate Change (MOECC)'s Management of Excess Soils: A Guide for Best Management Practices (April 2019, as amended) and all Applicable Law. The plan will describe how to address the management of the excavated materials, imported materials, and contaminated materials, including handling, transportation, testing, documentation and reuse and disposal of excavated materials generated as part of the works and in accordance with applicable regulatory requirements.

Prior to construction, the Project should adhere to the Excess Soil Reuse Planning requirements under Ontario Regulation 406/19, On-Site and Excess Soil Management. Additional chemical testing may be required based on the volume of soil to be removed during the Project.

6.0 COMMITMENTS & FUTURE WORK

This section is to be read in conjunction with **Section 5.0** of this Addendum.

To ensure that potential adverse environmental effects associated with the Project are avoided or mitigated to the extent possible, the following actions will be adhered to by the City of Markham during the subsequent phases of the project:

- Implement all mitigation & monitoring measures as documented in **Section 5.0** of this Addendum during the detailed design, construction and operational phases of the project;
- Ensure that all mitigation & monitoring measures and commitments as outlined in this Addendum are captured in the Contract Documents for implementation by the City of Markham and/or their Contractor, as appropriate; and,
- Undertake any additional environmental studies and obtain all necessary permits and approvals prior to implementation of the Project.

6.1 Detailed Design

The following shall be undertaken during the detail design phase of the project.

The recommended design for the Highway 404 Ramp Extension includes a retaining wall to accommodate the development on 770 Markland Street property. Pending further discussions and negotiations between the City of Markham and the Owner of 770 Markland Street, it is assumed that if the ramp profile and grading are revised to a 3:1 slope ratio during detail design, the change would alter the project footprint, side-slope extents, surface drainage, and potential interactions with adjacent environmental or property features. No changes to the horizontal alignment are anticipated.

Based on these assumptions, should the ramp profile and grading be revised to a 3:1 slope ratio, the applicable future commitments are contained within **Appendix J**. These commitments should be revisited as the detailed design phase kicks off and again at each milestone with the City, abutting landowners/development, and approving agencies.

6.1.1 Design Approval

Detailed design of the future road extension and the realigned Highway 404 E-N ramp will be subject to City of Markham, MTO, and York Region approval. Additionally, design will need to be coordinated with all three (3) existing and planned adjacent development properties.

6.1.2 Ministry of Transportation of Ontario (MTO) as an Asset Owner

Continuing with the discussion during the EA Addendum phase, the City shall confirm asset ownership and demarcation limits of the new extension road and new bridge over the Highway 404 on-ramp prior to the start of detailed design, as both fall within the Controlled Access Highway (CAH) limits. As the potential asset owner, MTO will be actively consulted throughout the detailed design phase of the project.

Although MTO policy may limit the potential for future driveway access along the proposed Highway 404 ramp extension, this option will continue to be assessed, provided it can be demonstrated to be technically feasible. Furthermore, it is anticipated that access will be required to support the future development of adjacent blocks, and this requirement will be addressed through ongoing planning and design processes.

MTO views the 404 E-N Ramp Exit design as a Freeway exit rather than a municipal connection, hence requiring further discussion and coordination between MTO and the City during detailed design. All pavement and bridge designs within the MTO right-of-way shall conform to MTO standards, including the following:

- Preparation of a Pavement Design Report (Detail Design) for the project and includes a geotechnical field investigation, material sampling/laboratory testing, pavement evaluation/design and input and liaison with MTO during the design and review phases of the project.
- Field and laboratory investigation must follow the Provincial Pavement Engineering Investigation Guidelines, Version 2.1 for the provision of soils boreholes, pavement cores and other subsurface investigative techniques, including material sampling and laboratory testing, as required to effectively evaluate subsurface conditions in support engineering recommendations and to provide contract document information for construction purposes.
- Design of all new pavement structures within the project area in accordance with the 1993 AASHTO Guide and AASHTO Ware Pavement ME Guide for the Design of Pavement Structures. Traffic load calculations shall be carried out as described in the Ministry of Transportation Report "Procedures For Estimating Traffic Loads For Pavement Design, November 1995". AASHTO pavement design parameters shall be selected as described in the Ministry of Transportation Materials Information Report MI-183 "Adaptation and Verification of AASHTO Pavement Design Parameters for Ontario Conditions".
- Pavement within MTO right of way must adhere to Superpave guides (MTO Superpave and SMA Guide, March 2008) and MTO surface course directive (1-Surface Course PHM-C-001 (Dec 2014) Final).

As such, it is recommended that RAQs-qualified suppliers are engaged for geotechnical investigations and geometric design. Additionally, coordination with MTO will continue regarding access restrictions, drainage, and traffic design. Moreover, it is recommended that field investigation plans be shared with MTO, prior to fieldwork, to gain early alignment and derisk rework during the detailed design.

An alternative Highway 404 E-N ramp design concept with a design speed of 70km/hr has been provided to demonstrate how impact to MTO operations can be further reduced during the detailed design. This is to be further evaluated by the detailed design project team.

6.1.3 York Region and Major Mackenzie Drive

It is worth noting that the preliminary design took into consideration of the future 6-lane Major Mackenzie Drive configuration, which is to be led by York Region. Multi-use path (MUP) will not be constructed on day one and will be phased when improvements on Major Mackenzie Drive are constructed. As such, the detailed design project team shall coordinate closely with York Region for smooth integration of both the roadway and active transportation.

The proposed Active Transportation (AT) facilities on the extension road are not intended for immediate construction. Instead, they would be phased in and built in alignment with the future widening of Major Mackenzie Drive (MMD) and the addition of cycle tracks along MMD. Since the Region has not yet conducted an Environmental Assessment (EA) for the widening of MMD to accommodate rapid transit and cycling infrastructure, this EA Addendum's preliminary

design shows the widened MMD for illustrative purposes only, without details for transit, cycle tracks, or sidewalks. Future coordination regarding the intersection and AT integration will be required through close collaboration with York Region.

6.1.4 Conservation Authorities Act

A portion of the Study Area is regulated due to the presence of a Locally Significant Wetland and its area of interference. Per the proposed alignment, removal of a portion of the wetland will be required to accommodate the roadway. Per Section 28.1 of the Act, removal may be permitted where the authority issues a permit to engage in an activity that would otherwise be prohibited.

A permit (PER-DPP-2024-00099) was issued by the TRCA on May 13, 2025, and is valid for two (2) years. This permit grants permission to undertake works within the TRCA's Regulated Area of the Rouge River Watershed, including the interference with or alteration of the wetland, to facilitate the construction of a multi-phase commercial development, including an east-west private road. The permit is subject to standard conditions, erosion and sediment control requirements, and compliance with approved site plans and an executed eco-compensation agreement.

Ongoing coordination between the City of Markham and TRCA will be required to ensure continued compliance with permit conditions.

6.1.5 Ontario Regulation 41/24

Due to the presence of the wetland feature within the Study Area and proposed partial removal to accommodate the ramp extension, the development must comply with Ontario Regulation 41/24. Per Section 5, development of a proposed roadway is not included within the listed exemptions. As such, a permit under Ontario Regulation 41/24, through TRCA, will be required to proceed with the development of the proposed roadway. Correspondence between the City of Markham and TRCA will be required.

In addition, continued discussions with TRCA will be required during detailed design to confirm the appropriate wetland compensation amount.

6.1.6 Ontario Heritage Act

Should previously undocumented archaeological resources be discovered, they may be a new archaeological site and therefore subject to Section 48 (1) of the Act. The proponent or person discovering the archaeological resources must cease alteration of the site immediately and engage a licensed consultant archaeologist to carry out archaeological fieldwork, in compliance with sec. 48 (1) of the Act.

Archaeological sites recommended for further archaeological field work or protection remain subject to Section 48(1) of the Act and may not be altered, nor may artifacts be removed from them, except by a person holding an archaeological license.

6.1.7 The Funeral, Burial and Cremation Services Act

If any person discovering or having knowledge of a burial site shall immediately notify the police or coroner. It is recommended that the Registrar of Cemeteries at the Ministry of Consumer Services is also immediately notified.

6.1.8 Utilities

Exact locations and depths of utilities are to be determined and the staging and relocations approach will be established in discussion with the affected utility company. The following additional work will be undertaken as appropriate:

- Continue to meet with the utility companies to determine risks, timing and appropriate mitigation strategy to address potential conflicts;
- Confirm utility relocations/protection required based on detailed design and undertake negotiations with relevant utility companies, as required;
- Utilities affected by construction may be temporarily relocated;
- Develop and implement a mitigation plan during construction; and,
- Monitor construction activities to ensure that works schedule is being coordinated.

6.1.9 Drainage and Stormwater Management

The following is required to be reviewed during detailed design to ensure the new road extension and the Highway 404 E-N ramp design adheres to the City of Markham, TRCA, and MTO requirements:

- **Storm Sewer - Major System:** Flow depths have not been completed at this stage of the project and it is recommended that the MNRF flood hazard guidelines be incorporated in the assessment during the detailed design stages of the project.
- **Water Quality:** Review the applicability of implementing additional water quality measures to meet City/MECP/TRCA water quality objectives.
- **Water Quantity:** The City has confirmed the downstream Woodbine Pond can accommodate half of the OF2 drainage area of the proposed road alignment. Downstream sewer capacity assessment to be completed prior to tying into the existing 600mm stub on Markland Street. Review the applicability of implementing a variety of water quantity control practices (i.e., super pipes) to address the additional drainage areas outside of the Woodbine pond capacity.
- **Storm Infrastructure:** At this stage, the proposed East On-Ramp culvert is unable to achieve clearance from the ramp pavement structure due to the limitations of the downstream ditch depth. At this preliminary stage, without detailed design of the on-ramp, future considerations will be required to ensure MTO HDDS Criteria is met (i.e., ditch inlets) to meet MTO HDDS Criteria (i.e., minimum culvert crossing size of 800mm). Ownership of stormwater assets also to be confirmed during detailed design.

Additionally, the following general commitments related to stormwater management will be fulfilled during detailed design, as appropriate:

- A detailed Stormwater Management Plan/Design will be carried out and will address quantity control, quality control, water balance, and erosion and sediment control;
- The proposed development area used in the preliminary SWM assessment were based on conceptual design; therefore, reassessment of the drainage areas and surrounding areas (contributing and outlets) will be required during detailed design;

- The contractor must identify any property that is required to address storage by retention or detention, in compliance with applicable stormwater management regulations or climate change adaptation criteria;
- The ramp will be designed such that flooding will not affect proper functioning of the roadway and will not result in adverse environmental effects;
- The flow contribution to existing ditches, culverts and storm sewers is to be reviewed during detailed design. A firm design must be presented that utilizes information from a detailed survey to determine the capacity of site runoff outfalls;
- If required, MECP, Regulatory Agencies and relevant municipalities will be contacted for their comments and approvals; and,
- A SWM Monitoring and Maintenance Plan will be prepared to confirm the performance of stormwater management measures during and following construction. This plan will outline inspection requirements, maintenance activities, and adaptive management procedures to ensure SWM features continue to function as intended.

6.1.10 Geotechnical Investigation

During the detailed design stage of the project a detailed geotechnical investigation will be required to inform and confirm the design of the structural foundations, on-ramp, and extension road. In particular, additional boreholes will be required for the pavement/foundation design of the new on-ramp and bridge following MTO Guidelines and additional boreholes are required to confirm the findings.

As part of the geotechnical investigation, additional ground water monitoring is recommended to be performed to capture seasonal groundwater fluctuations and confirm suitability of LID approach.

6.1.11 Transportation and Traffic

The following requirements were established for the off-ramp extension detailed design considerations to ensure the design adheres to local and regional standards, providing a safe and efficient roadway:

- The new road extension will have a posted speed of 40km/hr and a design speed of 40km/hr.
- Each lane shall be designed to be 3.5 metres wide, as specified by the City of Markham's Standard Cross Section Drawing MR 8 major collector road.
- Streetlighting will need to be strategically placed in the 2.2m boulevard spaces on both sides of the proposed road, finding a balance with proposed planting.
- A separated 3.0m wide multi-use path facility shall be provided on both sides of the roadway, in alignment with OTM Book 18. This facility will not be constructed immediately, it will be phased and completed in coordination with planned improvements on Major Mackenzie Drive.
- Active transportation connectivity should be reviewed at both intersections north and south of the proposed road extension.
- Re-confirm that the minimum clearance is met during detailed design.

6.2 Construction

The following shall be undertaken during the consultation phase of the project.

6.2.1 Construction Management Plans

Construction Management Plans will be developed and implemented during the detailed design phase and implemented as part of construction, taking into consideration applicable legislation, as appropriate. Construction Management Plan(s) will be made available to the City of Markham prior to implementation.

6.2.2 Construction Staging Areas

The locations of construction staging areas will be finalized during detailed design. Any potential environmental impacts associated with construction staging areas that fall outside the Project Study Area will be reviewed and assessed; mitigation measures will be identified as/if applicable. The construction staging sequence shall be developed in consultation with, and be subject to approval by, the MTO. It is also recommended that RAQs-qualified suppliers be retained to undertake the geotechnical investigations and geometric design.

The 2009 ESR identified construction staging as a key consideration, particularly the need to maintain the east-to-north (E-N) ramp to Highway 404 throughout construction. Due to the close proximity between the existing E-N ramp and the proposed realigned E-N ramp, the 2009 ESR recommended that the proposed road extension and grade separation be constructed in three stages, as summarized below and show in **Figure 32**:

Stage 1

- Construct a temporary E-N ramp detour tie-in from Major Mackenzie Drive to the existing E-N ramp.
- Close the existing E-N ramp access from Major Mackenzie Drive once the temporary E-N ramp detour is operational.

Stage 2

- Realign the E-N ramp to the new alignment.
- Construct the grade separation structure and connect it to the section of the proposed road extension between the structure and Markland Street.

Stage 3

- Remove the temporary E-N ramp detour.
- Redirect traffic to the realigned E-N ramp.
- Construct the section of the proposed road extension from Major Mackenzie Drive and connect it to the grade separation structure.
- Complete construction of the Highway 404 northbound off-ramp / Major Mackenzie Drive intersection, including associated features such as the new median island.

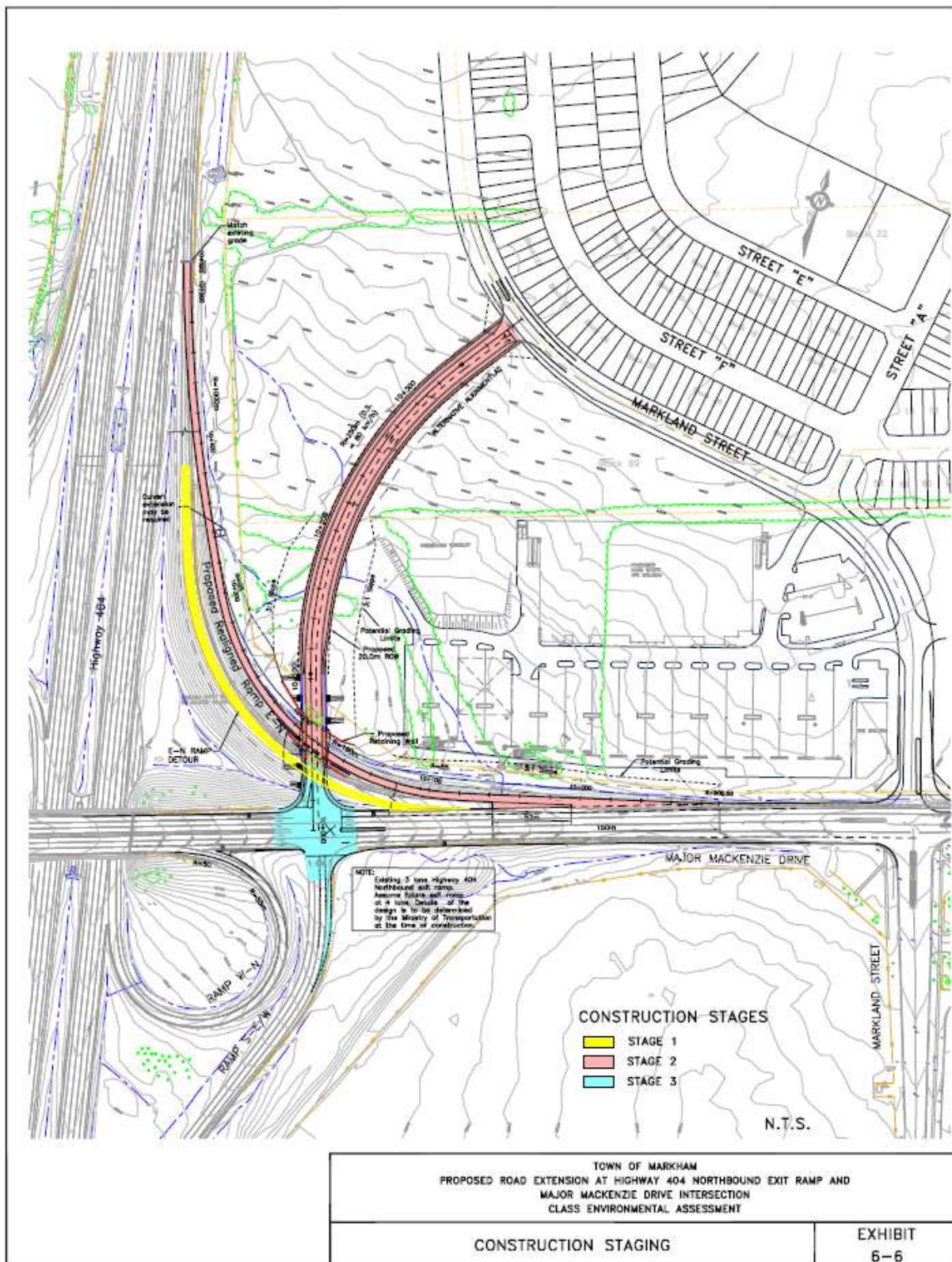


Figure 32: Construction Staging (Excerpt, MRC 2009)