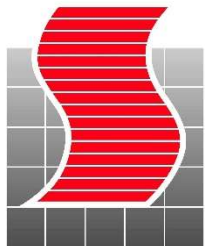


Kirby Road Extension Municipal Class Environmental Assessment

Environmental Study Report

Prepared For: Rizmi Holdings Limited and City of Vaughan



SCHAEFFERS
CONSULTING ENGINEERS

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Glossary of Terms and Acronyms

ALTERNATIVE SOLUTIONS	Means feasible alternative ways of solving an identified problem (deficiency) or addressing an opportunity, from which a preferred solution is selected." Note: alternative solutions include the "Do Nothing" alternative.
ALTERNATIVE DESIGN	Means alternative ways of designing or carrying out the preferred solution.
ARTERIAL ROADS	Means roads which move moderate to high traffic volumes over moderate distances within a municipality between principal areas of traffic generation and which gather traffic from collector roads and local roads and move it to the Provincial highway system; arterial roads are generally designed for medium speed, have capacity for 2 - 6 lanes, may be divided, with limited or controlled direct access from adjacent developments and with on-street parking discouraged.
CLASS ENVIRONMENTAL ASSESSMENT (CLASS EA)	Means a planning process, approved under the EA Act for a class or group of undertakings. Projects included in the Class EA may be implemented without further approval under the EA Act provided the approved Class EA planning process is followed.
EA ACT	Means Ontario Environmental Assessment Act (1990)
EAS	Environmental Assessment Study
ENVIRONMENT	"Environment", as defined in the EA Act, means: a) air, land or water, b) plant and animal life, including human life, c) the social, economic and cultural conditions that influence the life of humans, or a community, d) any building, structure, machine or other device or thing made by humans, e) any solid, liquid, gas, odour, heat, sound, vibration or radiation resulting directly or indirectly from human activities, or f) any part or combination of the foregoing and the interrelationships between any two or more of them, in or of Ontario.
ENVIRONMENTAL STUDY REPORT (ESR)	Means the documentation for a specific project planned in accordance with the procedures for Schedule C projects, setting out the planning and decision making process, including consultation practices, which has been followed to arrive at the preferred solution. The ESR also sets out the mitigating measures proposed to avoid or minimize environmental impacts.
ESA	Ontario Endangered Species Act



MECP	Ontario Ministry of the Environment, Conservation and Parks
MNR	Ontario Ministry of Natural Resources and Forestry
MMAH	Ontario Ministry of Municipal Affairs and Housing
MUNICIPAL RIGHT-OF-WAY (ROW)	Means a dedicated strip of land intended for the accommodation of traffic movements, utilities, drainage, and other similar public uses.
NET ENVIRONMENTAL EFFECTS	Means the impacts, both positive and negative, of an alternative, which remain after mitigation measures have been applied.
NEW ROAD	Means the construction of an improved surface for vehicular traffic on a new right-of-way where the right-of-way is entirely separate from any previous right-of-way. Also refers to construction of a road on a road allowance where no road surface previously existed.
PROJECT	Means a specific activity planned and implemented in accordance with the Class EA (may also be referred to as the undertaking). The project consists of all those activities necessary to solve a specific problem (deficiency) or address an opportunity.
PUBLIC	Means the general public, individual members of the public who may be affected by or have an interest in a project and special interest groups.
PIC	Public Information Centre
PSW	Provincially Significant Wetland
REVIEW AGENCIES	Means government agencies, ministries or public authorities or bodies whose mandates require them to have jurisdiction over matters affected or potentially affected by projects planned under this Class EA.
ROAD ALLOWANCE	Means a surveyed allowance of land for roadway purposes. A road allowance can be either "opened" with an existing road surface or "unopened" in which case no travelled surface is provided.
SAR	Species at Risk
TMP	Transportation Master Plan
TRCA	Toronto and Region Conservation Authority



Executive Summary

ES1 Background

The City of Vaughan (CoV) Transportation Master Plan (TMP) - A New Path (2012), companion to the CoV Official Plan (2010), identified projects that will improve connections to local and regional infrastructure, provide access to future developments, support transit-oriented nodes and corridors, and enhance transit ridership, cycling and walking. The TMP identified Kirby Road as a key east-west arterial corridor in the City and confirmed the need to widen Kirby Road between Keele Street and Dufferin Street from two to four lanes by 2021 and to extend Kirby Road between Dufferin Street and Bathurst Street as a four lane roadway.

The CoV determined the sequence of improvements for the Kirby Road corridor and developed an action plan to complete the Kirby Road improvements. Further to the City's staff report #44 to the Committee of the Whole, on December 15, 2015 the Council of the authorized and directed staff to formalize arrangements with Rizmi Holdings Limited (RHL), a private land developer, and permit RHL to undertake a Class Environmental Assessment Study (EA Study) for the Kirby Road Extension between Bathurst Street and Dufferin Street.

Ontario Environmental Assessment Act (1990, as amended) (further referenced as EA Act) establishes an approach for reviewing the potential environmental effects of a proposed project prior to its implementation. Municipal Class EA (MCEA) document (2000, as amended) prepared by the Municipal Engineers Association (MEA) of Ontario is one of the parent Class EA documents established under the EA Act. This Class EA is a planning and design process prepared for a class or group of municipal infrastructure undertakings, including roads, water and wastewater and transit projects. The process is approved by the Ministry of the Environment, Conservation and Parks (MECP). Provided the Class EA process was followed, a study proponent has complied with requirements of the EA Act. As stipulated in the EA Act, proponent means a person who proposes or carries out an undertaking or is the owner or person having charge, management or control of an undertaking.

This Environmental Study Report (ESR) documents the planning and design process for the Kirby Road Extension between Bathurst Street to Dufferin Street as a Schedule "C" project per the MCEA document. Schedule "C" projects, such as construction of new facilities, may have significant environmental effects on the environment and require completion of Phases 1 through 4 of the process.

This EA Study took into account findings of the CoV TMP (2012), the York Region TMP (2016) and the North Vaughan and New Communities TMP (2019) studies. Phase 1 "Problem and /or Opportunity" and Phase 2 "Alternative Solutions" of the MEA MCEA process for this project have been completed and documented through these master planning efforts. Nevertheless, Phases 1 and 2 were revisited by the Project Team. The EA Study carried out the Phase 3 "Alternative Design Concepts for Preferred Solution" and Phase 4 "Environmental Study Report" of the MEA MCEA process.

The purpose of this EA study is to determine the alignment and characteristics of a planned easterly extension of Kirby Road from Dufferin Street to Bathurst Street in the CoV; to conduct an assessment of the environmental effects associated with the project; and, to select and recommend a preliminary preferred design for the project.



The Study Area is an 800m wide corridor, spanning a distance of approximately 2000m in the east-west direction. The study corridor covers an area of approximately 170 hectares, extending approximately 400m north and south of an unopened 20m wide municipal Right of Way (RoW), and is located immediately west of the City of Richmond Hill (CoRH) municipal border. The Study Area is illustrated in **ES Figure 1**.

Existing Kirby Road terminates at T-shaped intersection with Dufferin Street in the City of Vaughan. The most eastern 200 m of the municipal road allowance provide a gravel driveway access to existing properties from the Bathurst Street and Gamble Road T-shaped intersection. The balance of the road allowance is mostly forested. The Subject Lands consist primarily of active agricultural land, open meadows, disturbed areas, former aggregate extraction lands and forest habitat. Natural areas are comprised primarily of forested uplands, with pockets of tree and shrub swamp located in the bottomlands and/or along drainage features.

A number of Provincially and Regionally designated environmentally sensitive areas are found both within and proximal to the Study Area. Key Natural Heritage features identified in the Study Area include Significant Woodlands, Habitat of Endangered, Rare and Threatened Species, Significant Wildlife Habitat, Life Science Areas of Natural and Scientific Interest (ANSI), and a Provincially Significant Wetland (PSW) with related watercourse in the central part of the Study Area.

The proposed extension will be an arterial road under the jurisdiction of the CoV. As a part of broader Kirby Road improvements, the proposed road extension will support planned population growth and the orderly distribution of traffic. The road is contemplated to play an important role and function in the overall York Region road network and as such to be eventually transferred to the Regional jurisdiction.

ES2 Problem and Opportunity Statement

Currently, Kirby Road is a discontinuous east-west arterial road with a gap between Dufferin Street and Bathurst Street. King-Vaughan Road and Major Mackenzie Drive are the only two continuous east-west arterial roads between Highway 400 and the eastern limit of Vaughan. Commuters from the City of Richmond Hill or northern Vaughan need to travel along north-south arterial roads such as Bathurst Street and Dufferin Street to access either of these roads, causing significant peak hour congestion on these north-south arterials, as well as overloading traffic on King-Vaughan Road and Major Mackenzie Drive with long distance trips. Therefore, satisfying travel demand, providing connectivity for all modes of transportation and eliminating the gap in the existing road network is critical to addressing traffic congestion in the study area.

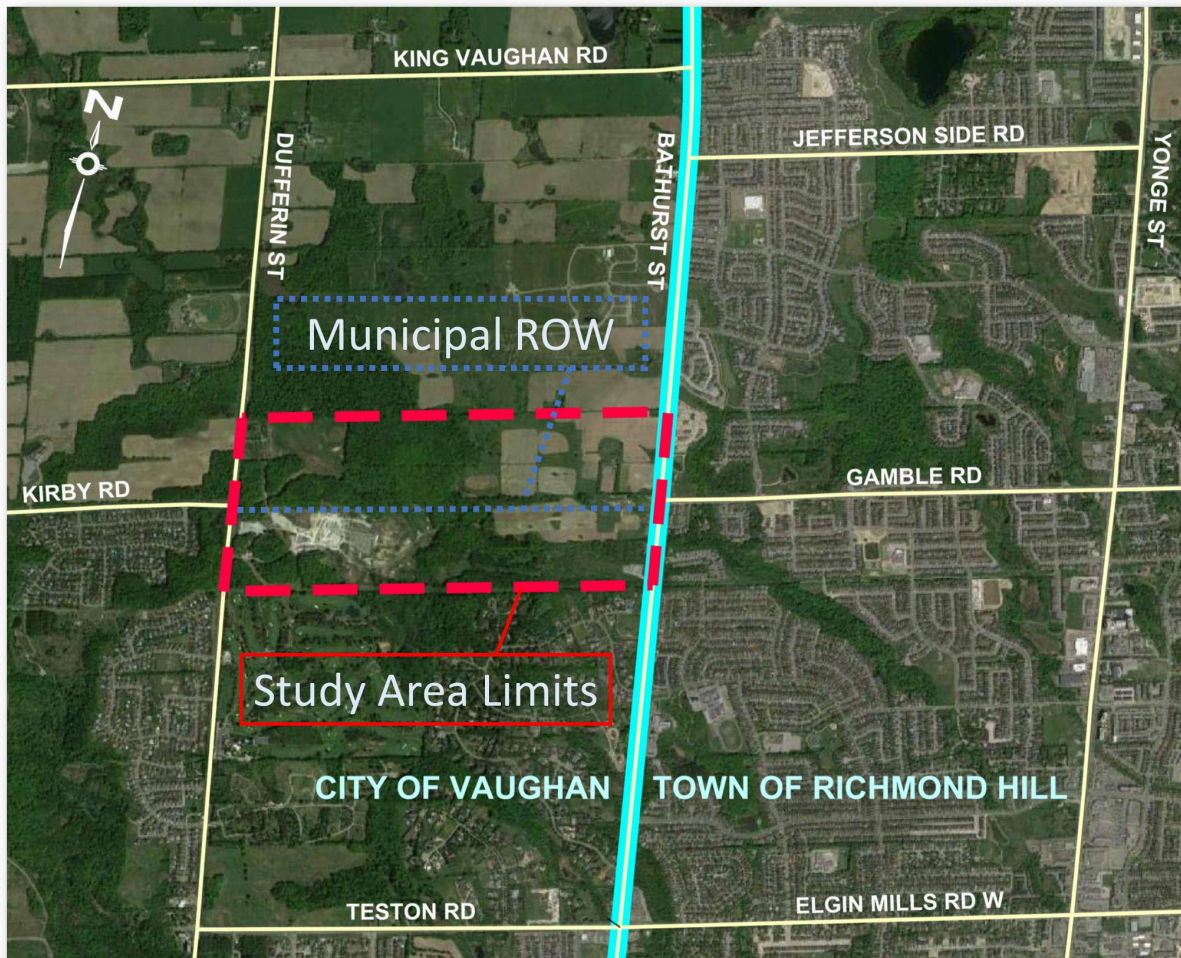
Problem solving provides an opportunity to:

- Improve road network connectivity needed to move people and goods;
- Provide for planned future growth and increased travel demand in the northeast quadrant of the City, including facilitation of future transit service;
- Ensure wise management of important environmental resources;
- Incorporate municipal services in the Kirby Road Extension as part of broader Kirby Road improvements and to align implementation of servicing infrastructure to support growth in North Vaughan and the adjacent Future Urban Area in the Study Area; and



- Accommodate facilities for bicyclists and pedestrians through this part of the City.

ES Figure 1: Study Area



ES3 Public and Stakeholders Engagement

Consultation and communication about the project is a mandatory part of the Class EA process. The principal consultation mechanisms and tools that were employed over the course of the study included:

- Notifications
- Technical Advisory Group (TAG) meetings
- Citizen Liaison Committee (CLC) meetings
- Public Information Centres (PICs)
- Technical review of Draft Environmental Study Report (ESR)
- Dedicated project email address
- Project webpage



The MEA MCEA guidelines define the minimum requirements for environmental planning, including minimum mandatory points of contact with stakeholders and the public. Actual consultation efforts considerably exceeded the minimal requirements for Schedule “C” Municipal Road project.

A Notice of Study Commencement (NOC) was advertised in two consecutive editions of the local newspapers on May 11, 2017 and May 18, 2017 respectively. In addition, the Notices along with a cover letter were sent out to stakeholders, agencies, municipal staff and Indigenous Peoples on the project contact list.

At the onset of the Study, SCE created a project webpage hosted on the company’s website. The web page included project background, brief description, timelines, updates and the project contact information.

As part of the public consultation program, a TAG was established following publication of the NOC. The TAG provided a forum for focused discussion of the project with a broadly-based group of technical project stakeholders, including representatives from the Ministry of the Environment, Conservation and Parks (MECP), Ministry of Municipal Affairs and Housing (MMAH), Toronto and Region Conservation Authority (TRCA), York Region, York Region Transit, Richmond Hill and Vaughan.

As part of the public consultation program, a CLC was established following publication of the NOC. The CLC provided a forum for focused discussion of the project with a broadly-based group of public project stakeholders, including residents at large and ratepayers associations.

A PIC #1 was held on June 29, 2017 at the Maple Downs Golf and Country Club in Vaughan. A Notice of PIC #1 was advertised in two consecutive editions of local newspapers in advance of the event. In addition, 110 Notices along with a cover letter were sent out to stakeholders, agencies, municipal staff and Indigenous Peoples on the project contact list about the PIC #1.

The main purpose of PIC #1 was to provide information about the project and EA process, present screening of the long list of alternative road alignments. A total of twelve (12) stakeholders attended the PIC #1. A project response form was handed over to the attendees to provide their input on the project and the PIC#1. No concerns about the project were raised and no completed response forms were provided to the project team during the event.

A PIC#1 update was circulated on July 14, 2017 to the project stakeholders included in the study mailing list. The update included a cover letter, a copy of selected display boards and a Response Form.

Overall PIC#1 provided the project stakeholders a good introduction to the project, overview of the planning process, preliminary details on the undertaking and completed analysis.

A site walk was held on August 29, 2017 with representatives from MECP, TRCA, MNRF, CoV, York Region and selected members of the project team. The group included 21 persons in total.

The purpose of the site walk was to focus on the Study Area and to identify specific environmental features and constraints. Key observations noted during the site walk and specific guidance from the review agencies was used to update the short-listed road alignments and develop an additional modified version (Alignment 6A) that curves farther to the south to avoid natural heritage features.



A PIC #2 was held on June 28, 2018 at the Civic Centre Resource Library in Vaughan. A Notice of PIC #2 was advertised in two consecutive editions of the local newspapers in advance of the event. In addition, 96 Notices along with a cover letter were sent out to stakeholders, agencies, municipal staff and Indigenous Peoples on the project contact list about the PIC #2.

The main purpose of PIC #2 was to provide information on the recommended preliminary preferred design concepts including road alignment and cross-section for consultation. A total of eleven (11) stakeholders attended the PIC #2. During the event questions were raised by the attendees about the evaluation of various alignments and cross-sections which were responded to the by the project team.

A PIC#2 update was circulated on July 20, 2018 to the project stakeholders included in the study mailing list. The update included a Response Form and copy of selected display boards showing the recommended road alignment and cross-section.

A Draft ESR and a Final Draft ESR was circulated to TAG members for review and feedback on December 21, 2018 and May 13, 2019 respectively. The Final Draft ESR was also circulated to CLC members. To facilitate the review, the project team held TAG #3 and CLC #3 meetings on May 2, 2019.

Following their review of the Final Draft ESR, City staff tabled a report to the Finance, Administration and Audit Committee meeting on June 5, 2019 on the outcome of the Kirby Road Extension EA. On June 12, 2019, City of Vaughan Council authorized City staff to proceed jointly with RHL as co-proponents to issue Notice of Study Completion and file the ESR for the mandatory review period in accordance with the MCEA.

A Notice of Study Completion was advertised in two consecutive editions of the local newspapers on September 19, 2019 and September 26, 2019 respectively. In addition, the Notices along with a cover letter were sent out to stakeholders, agencies, municipal staff and Indigenous Peoples on the project contact list about the ESR available for review. The ESR was filed on public domain to mark the completion of the EA study and begin the mandatory 30-day public review period.

Indigenous Peoples are an important public body for consultation on municipal projects. Initial consultation steps with Indigenous Peoples were undertaken by the SCE staff. With gradually expanding contact list, through personalized letters the Indigenous Peoples were notified about the study commencement, PIC#1 and an update to PIC #1. In preparation to PIC #2 it was decided to engage the First Nations Engineering Services Ltd. (FNESL) in the Indigenous Peoples consultation program for the EA study. Acting as an impartial facilitator, the FNESL provided a customized consultation process between the Indigenous groups and organizations, potentially affected by the proposed development, and the RHL (EA Study Proponent).

As a result of the consultation efforts described above, numerous comments from the project stakeholders were received by the project team. At the first rounds of consultation, key comments were related to the study area limits; Need and Justification for the project; addressing Phases 1 and 2 of the Class EA process; screening of alternatives and protecting the Oak Ridges Moraine features and other legislated areas. At the concluding rounds of consultation, key comments were related to the comparative evaluation of shortlisted road alignments; equal weighting of environmental factors; anticipated magnitude of the impacts on significant Natural Environment features from the Technically



Preferred Alignment 5, and conformity of Alignment 5 to the 2017 Oak Ridges Moraine Conservation Plan.

The project team ensured that all identified concerns were addressed as appropriate and responses with supplementary information were provided to the stakeholders, agencies and Indigenous communities.

ES4 Need and Justification

The need for Kirby Road improvement was assessed in both the Vaughan TMP (2012) and the York Region TMP (2016), which recommended widening to 4 lanes, completion of the “missing link” between Dufferin Street and Bathurst Street at 4 lanes and transfer to York Region as Kirby Road will have a regional function as development occurs. It was also recommended by the North Vaughan and New Communities Transportation Master Plan (NVNCTMP) (2019) that the road should be transferred to Regional jurisdiction, requiring a ROW of 36 m to function as a 4-lane arterial road in the future.

In February 2018 the Ministry of Transportation announced that Ontario will not be proceeding with a proposed highway in the GTA West Corridor. The transportation analysis by Poulos & Chung Ltd. confirmed that by 2031 without the GTA West freeway the projected segment of Kirby Road will still require two (2) traffic lanes in each direction of travel to serve the anticipated vehicle demand. In November 2018, in their release of "A Plan for the People, Ontario Economic Outlook and Fiscal Review, 2018 Background Papers", the Province announced their intention to resume the EA for the GTA West Highway Corridor, which was suspended in 2015.

The “Transportation, Traffic and Active Transportation Need and Justification Assessment” report (2018, Poulos & Chung Ltd.) included in **Appendix C2** to the ESR summarizes the detailed analysis that was undertaken. The information contained in this report was used by the Project Team to:

- Verify the need to construct new roadway for Kirby Road Extension;
- Determine detailed engineering criteria and design basis for the road;
- Complete the screening and evaluation of alternative design concepts (road alignments and cross-sections);
- Select recommended Alternative Design Concept for the Kirby Road Extension.

ES5 Alternative Solutions

As appropriate to satisfy Phase 2 of the Municipal Class EA process, an assessment was undertaken to evaluate the Alternative Solutions to the Undertaking. Notwithstanding the significant amount of analysis completed by York Region and the CoV, the project team revisited the technical analysis. The assessment extracted relevant analysis completed by the authorities and included updated existing roadway and intersection traffic flow information. A range of Alternative Solutions were assessed to determine the Preferred Solution for the Kirby Road Extension. The following alternatives were evaluated:

- Do Nothing
- Use / Widen Parallel East – West Roads
- Provide Active Transportation Facilities including Travel Demand Management



- Construct New Roadway Extension

Construction of a new roadway extension with elements of active transportation was confirmed as the Preferred Alternative Solution, as it best provides the required operating capacity, supports future growth and land uses, improves east-west connectivity, supports the orderly distribution of traffic in the local area, and allows for a future easterly extension of Kirby Road in agreement with local and regional plans.

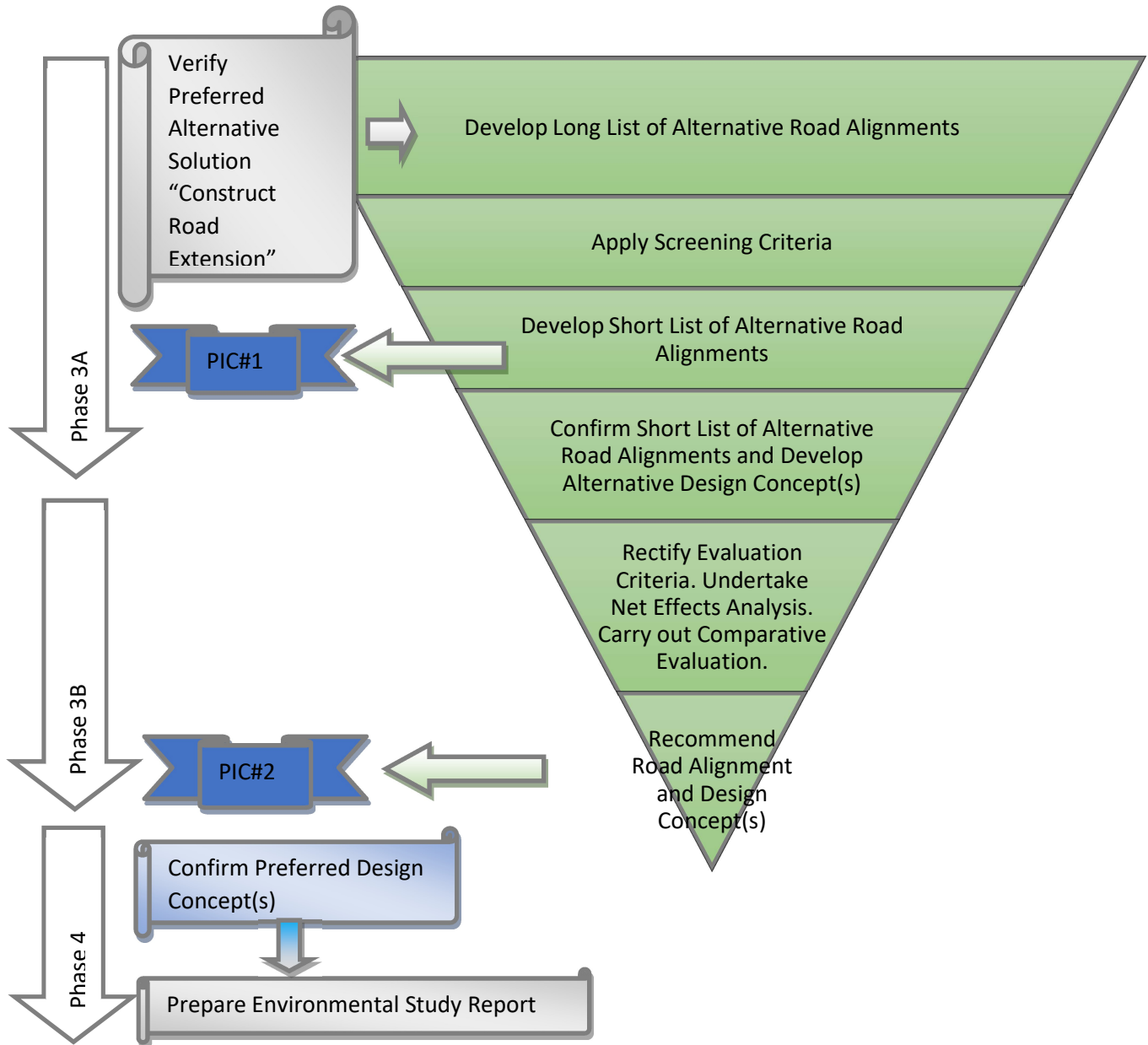
The localized Study Area assessment and updated traffic analysis undertaken by the project team corroborated the need and justification for extending Kirby Road between Dufferin Street and Bathurst Street as a 36 m wide arterial road as part of the Preferred Solution.

ES6 Alternative Design Concepts

Alternative methods of implementing the Preferred Alternative Solution were examined to satisfy Phase 3 of the Municipal Class EA process. The methodology used for selection of a Recommended Design Concept(s) included two consecutive steps: initial screening and detailed evaluation of potential road alignments. Phase 3 of the MCEA planning and design process was divided into two parts: Phase 3A – Screening and Phase 3B – Evaluation to provide broader consultation opportunities. **ES Figure 2** below illustrates how the methodology aligns with the Kirby Road Class EA decision making process and corresponds with the undertaken consultation steps.



ES Figure 2: Methodology for Selection of Alternative Design Concept(s)



The screening analysis assessed a full range of alternative design concepts against the project's rationale and need, narrowed down potential design concepts to a manageable number of options and ensured that only viable design concepts have been carried forward for detailed evaluation.

The initial screening of Alternative Road Alignments involved generation of a Long List of Alternative Road Alignments, developing and applying screening criteria, determining and confirming short-listed road alignment options.



The consequent step was a detailed evaluation. Purpose of the detailed evaluation was to identify all potential environmental effects of the short-listed Alternative Road Alignments, develop mitigation measures, confirm net effects on the environment and identify Recommended Design Concept(s).

The detailed evaluation of Alternative Design Concepts involved the following key activities: developing of Alternative Design Concepts for horizontal road alignment and road cross-section, rectifying evaluation criteria and indicators (measures) presented to the project stakeholders at PIC#1, undertaking net effects analysis and carrying out comparative evaluation.

Since ultimate jurisdiction for the Kirby Road extension has not yet been confirmed, it is necessary to consider engineering design criteria and design guidelines from both the City of Vaughan and Regional Municipality of York. Transportation Association of Canada Design Guidelines were also contemplated along with examination of existing conditions west of Dufferin Street. The design parameters from each governing agency were compared and proposed standard was established.

According to the MEA MCEA document, a reasonable range of functionally different alternatives should be considered for the “alternative methods” of implementing the preferred solution. Significant impacts to Natural, Social and Technical environments should be avoided where possible. Where the key features cannot be avoided, then effects should be minimized where possible, and every effort made to mitigate adverse impacts.

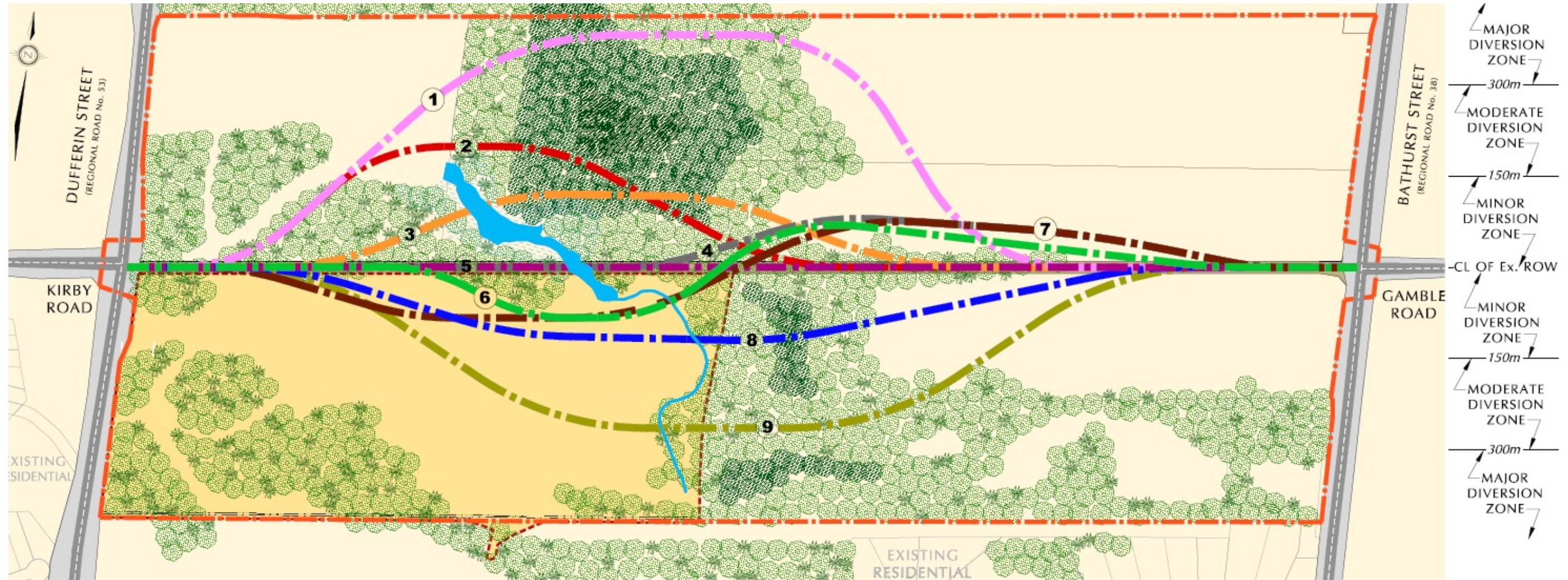
Phase 3A – Identification and Screening of Long List of Alternative Road Alignments

The purpose of screening was to ensure that only viable Alternative Road Alignments were carried forward for selection of recommended options. According to the MEA MCEA document, a reasonable range of alternatives should be considered. Significant impacts to Natural, Social and Technical (Built) environments should be avoided where possible. Where the key features cannot be avoided, then effects should be minimized where possible, and every effort made to mitigate adverse impacts.

The feasibility of the alternative designs depends, in part, on the nature and location of the transportation system, the nature and location of the problem being addressed, the comparative cost of the alternative designs, and on the municipality’s capacity to finance the extension of services.

Taking into consideration sensitivities and constraints identified by the project team within the Study Area, a Long List of Alternative Road Alignments for the Kirby Road Extension was developed for screening. The list included nine Alternative Road Alignments as presented on **ES Figure 3** below.

ES Figure 3: Long List of Alternative Road Alignments



LEGEND FOR ALIGNMENTS

- ① MAJOR NORTHERLY DIVERSION TO AVOID WETLAND AND DENSE FOREST
- ② MODERATE NORTHERLY DIVERSION TO AVOID WETLAND AND GROUNDWATER DISCHARGE AREA
- ③ MINOR NORTHERLY DIVERSION WITH WETLAND CROSSING TO AVOID DENSE FOREST
- ④ MINOR NORTHERLY DIVERSION WITH WETLAND CROSSING TO MINIMIZE IMPACTS TO FOREST
- ⑤ DIRECT EXTENSION WITH WETLAND CROSSING
- ⑥ SOUTH TO NORTH MINOR JOG DIVERSION TO AVOID WETLAND AND MINIMIZE IMPACTS TO FOREST
- ⑦ SOUTH TO NORTH MINOR JOG DIVERSION TO AVOID WETLAND AND MINIMIZE IMPACTS TO FOREST
- ⑧ MINOR SOUTHERLY DIVERSION TO AVOID WETLAND
- ⑨ MODERATE SOUTHERLY DIVERSION TO AVOID WETLAND AND MINIMIZE IMPACTS TO DENSE FOREST

GENERAL LEGEND

- DENOTES KIRBY ROAD EXTENSION STUDY AREA
- DENOTES FUTURE URBAN AREA BOUNDARY
- 🌳 DENOTES FOREST AREA (LIGHT TO MODERATE)
- 🌳 DENOTES FOREST AREA (MODERATE TO DENSE)
- 🌳 DENOTES FOREST AREA (DENSE TO VERY DENSE)
- ▭ DENOTES EXISTING RIGHT OF WAY WITH EXISTING ROAD
- ▭ DENOTES EXISTING ROAD ALLOWANCE WITH NO ROAD
- ▭ DENOTES FUTURE URBAN AREA
- ▭ DENOTES EXISTING WETLAND
- ▭ DENOTES EXISTING GROUNDWATER DISCHARGE AREA
- DENOTES EAST PATTERSON CREEK

NOTE: WETLAND LIMITS AND CREEK ALIGNMENT NEED TO BE CONFIRMED WITH MNRF



Notably, according to the MCEA guidelines, during Phase 3 of the process the Project Team is required to evaluate and not to also screen Alternative Design Concepts. However, the Project Team applied due diligence and screened the Long List of Alternative Road Alignments before carrying out a detailed evaluation. The two step approach allowed for a focused review of the short-listed options.

Phase 3B – Evaluation of Road Alignments and Cross-sections

Initial Screening of the Long List of Alternative Road Alignments resulted in sequential narrowing down to three road alignments, namely # 4, 5 and 6 out of nine initial options. On August 29, 2017, a site walk was held with representatives from MECP, TRCA, MNRF, City of Vaughan, York Region and selected members of the project team. The purpose of the site walk was to identify specific environmental features and constraints that would inform the decision making. It was recommended to bring into consideration an additional road alignment.

Consequently, the collected data was used to develop a modified version of Alignment 6 (referenced as Alignment 6A) and to update the short-listed road alignments. The additional alignment curves farther to the south compared to Alignment 6 to avoid and minimize potential impacts to the natural heritage features in the western part of the Study Area. The figure below illustrates the updated short-list of Alternative Road Alignments.

ES Figure 4: Shortlisted Road Alignments



Whereas the initial nine (9) alignment alternatives were screened using as the basis 36 m RoW for the roadway, the four (4) short-listed alignment alternatives were developed further to define their footprint based on their respective earthworks requirements. A full Ecological Land Classification (ELC) assessment was applied to units directly affected by the alignment alternatives.

Identification of Alternative Road Cross-Section Options



It was determined through a traffic analysis conducted by Poulos & Chung Ltd. that at minimum a four-lane cross section is required for the Kirby Road Extension. Building on this recommendation, five road cross-section options (read Alternative Design Concepts) were developed as described below.

Option 1 offers a 4 lane cross-section, including auxiliary lanes where required, MUP provided on both sides of the road. The design features a 14.5m paved surface for vehicular movement and 10.75m wide boulevards, fitting all the elements within a 36m RoW.

Option 2 offers a 4 lane cross-section, including auxiliary lanes where required and dedicated bike lanes and sidewalks provided on both sides of the road. The design features a 17.5m paved surface for vehicular movement and 9.25m wide boulevards, fitting all the elements within a 36m RoW.

Option 3 offers a 5 lane cross-section with continuous shared left turn lane, including right turn lanes where required and either a sidewalk or an MUP provided on one side of the road. The design features a 19.5m paved surface for vehicular movement and 8.25m wide boulevards, fitting all the elements within a 36m RoW.

Option 4 offers a 5 lane cross-section with continuous shared left turn lane, including right turn lanes where required and dedicated bike lanes and sidewalks provided on both sides of the road. The design features a 22.5m paved surface for vehicular movement and 6.75m wide boulevards, fitting all the elements within a 36m RoW.

Option 5 offers a 4 lane cross-section with green refuge strip, including auxiliary lanes where required, dedicated bike lanes provided on both sides of the road and either a sidewalk or an MUP provided on one side of the road. The design features a 17.5m paved surface for vehicular movement, a 9m center strip and 9.25m wide boulevards, fitting all the elements within a 45m RoW.

Detailed Evaluation

Purpose of the detailed evaluation was to identify all potential environmental effects of the short-listed Alternative Road Alignments, including the Alternative Design Concepts for road cross-section, develop mitigation measures, confirm net effects on the environment and identify Recommended Design Concepts. By means of the comparative evaluation, advantages and disadvantages of the design alternatives have been considered against the ability of the options to fulfill the project specific evaluation criteria, culminating with selection of a Recommended Design Concept(s).

The proposed Evaluation Criteria have been established with consideration given to the types of environment recommended by the MEA MCEA guidelines specific to municipal road projects (Part B, Section B.3.1 Description of the Environment). It was concluded that the environment associated with the Study Area would be best described through the four environmental factors: Transportation, Natural Environment, Social Environment and Economic Environment. The criteria were grouped under different aspects identified for each of the environmental factors

A summary table including the draft Evaluation Criteria was presented to the public for review and comment at PIC #1 held on June 29, 2017. Additional revisions were applied by the project team for a greater clarity.



The proposed Indicators to evaluation criteria have been established based on professional expertise of the team. The indicators provide a basis for comparison between the alternatives, i.e. they should be used to judge on degree of meeting the respective criterion.

One of the key principles of successful environmental planning requires systematic evaluation of alternatives in terms of their advantages and disadvantages helping to determine their net environmental effects. The evaluation of the Alternative Road Alignments and Road Cross-sections was documented through series of tables.

The principal advantages and disadvantages for each short-listed road alignment are summarized in **ES Table 1** below.

ES Table 1: Principal Advantages and Disadvantages for Short-Listed Road Alignments

#	Principal Advantages	Principal Disadvantages
4	<ul style="list-style-type: none"> • Less complex design and construction • Small earthwork quantity and grading footprint • Avoids hedgerow and cultural farmscape of interest • Minimal impact on future development 	<ul style="list-style-type: none"> • Significant impact to PSW riparian area due to 50m crossing structure • Significant impact to and direct removal of woodlands which provide Significant Wildlife Habitat Moderate impact to habitat for Species at Risk • Significant impact on agricultural lands • Moderate private land acquisition requirements
5	<ul style="list-style-type: none"> • Least complex design and construction • Smallest earthwork quantity and grading footprint • Least impact on agricultural lands • Minimal private land acquisition requirements • Minimal impact on future development 	<ul style="list-style-type: none"> • Significant impact to PSW riparian area due to 50m crossing structure • Significant impact to and direct removal of woodlands which provide Significant Wildlife Habitat Significant impact to habitat for Species at Risk • Highest potential for archaeological findings • Edge impacts to cultural farmscape of interest
6	<ul style="list-style-type: none"> • Minimal impact to woodlands which provide Significant Wildlife Habitat • Minimal impact to East Patterson Creek • Avoids hedgerow and cultural farmscape of interest 	<ul style="list-style-type: none"> • Moderate impact to PSW and riparian area • Moderate impact to habitat for Species at Risk • Complex design and construction • Large earthwork quantity and grading footprint. • Significant impact on agricultural lands. • Challenge for traffic safety due to high number of curves and transition segments between curves, increased possibility for black ice conditions. • Significant impact on future development proposals • High private land acquisition requirements



#	Principal Advantages	Principal Disadvantages
6A	<ul style="list-style-type: none"> Minimal impact to PSW and riparian area Minimal impact to woodlands which provide Significant Wildlife Habitat Minimal impact to East Patterson Creek Avoids hedgerow and cultural farmscape of interest Lowest potential for archaeological findings 	<ul style="list-style-type: none"> Most complex design and construction Largest earthwork quantity and grading footprint. Challenge for traffic safety due to highest number of curves and transition segments between curves, increased possibility for black ice conditions Significant impact on agricultural lands. Very significant impact on future development proposals Highest private land acquisition requirements

Each Alternative Design Concept was ranked based on the identified advantages and disadvantages on a Factor-by-Factor (Transportation, Natural, Social and Economic Environments) basis.

The established Factor specific rankings range from “no net effect” (most preferred) to “very significant net effect” (least preferred). The rankings of design concept were visually illustrated through the use of the following symbols and corresponding scores:

ES Table 2: Symbols and Scores

Ranking Symbol	Ranking Description	Ranking Score
	No Effect	5
	Minimal Effect	4
	Moderate Effect	3
	Significant Effect	2
	Very Significant Effect	1

To ensure that visual presentation is accurate, the design alternatives were scored by assigning a highest score of 5 points to the alternative that would create no impacts, and indexing the remaining alternatives against the recommended alternative for each Factor (minimum score is 1 point).

As there is a different number of criteria under each environmental Factor, the Factor specific scores have been averaged up to two decimal points to arrive at a normalized score for each Factor. To signify equal importance of all the Factors to the environment, no numerical weighting was applied to the scores.



An overall ranking for each alternative was established based on combining the Factor specific rankings. Lastly, a Recommended Design Concept was identified based on the combined consideration of the overall scores. The Alternative Design(s) with the lowest overall impact, i.e. highest overall score was identified as the Recommended Design Concept(s).

The results of comparative evaluation of short-listed Road Alignments across all four environmental factors are summarized in **ES Table 3** below.

ES Table 3: Summary of Comparative Evaluation for Short-Listed Road Alignments

Evaluation Criteria		Alternative Road Alignments			
		Alignment 4	Alignment 5	Alignment 6	Alignment 6A
Transportation Ranking	Symbol				
	Average Score	4.17	4.50	3.50	3.67
Natural Environment Ranking	Symbol				
	Average Score	3.22	3.11	3.67	3.89
Social Environment Ranking	Symbol				
	Average Score	3.25	3.38	3.13	3.00
Economic Environment Ranking	Symbol				
	Average Score	3.67	4.00	3.00	2.67
TOTAL SCORE (Sum of Factors)		14.31	14.99	13.29	13.22
RECOMMENDED?		Recommended	Highly Recommended	Least Recommended	Not Recommended

The Project Team concluded that Alignment 5 represents an acceptable balance of advantages and disadvantages across the range of evaluation criteria and should be carried forward as the Highly Recommended Alternative Road Alignment.

The principal rationale for selection of Alignment 5 as the Recommended Design Concept is as follows:

- Least complex design without horizontal curvature does not require super-elevated sections
- Physically the easiest to construct
- Smallest earthwork quantity and environmental footprint
- Least impact on agricultural lands
- Minimal private land acquisition requirements
- Minimal impact on future development

The principal advantages and disadvantages for each road cross-section option are summarized in **ES Table 4** below.



ES Table 4: Principal Advantages and Disadvantages for Short-Listed Road Cross-Sections

#	Principal Advantages	Principal Disadvantages
1	<ul style="list-style-type: none"> Provides the highest level of service for bicyclists. Offers the greatest design flexibility in placement of utilities, street furniture and tree planting. Entails the least structural requirements, the least infrastructure for storm water management and the least width of pavement area. Exhibits the least potential runoff and erosion impacts to wetland and vegetation. Offers the lowest capital, operation and maintenance costs. 	<ul style="list-style-type: none"> Lacks dedicated bike lane continuity from Gamble Road.
2	<ul style="list-style-type: none"> Offers dedicated bike lane continuity from Gamble Road. Entails less structural requirements, less infrastructure for storm water management and less pavement area than Options 3 and 4. Offers the second lowest capital, operation and maintenance costs. 	<ul style="list-style-type: none"> Provides on road bike lane with a reduced level of service.
3	<ul style="list-style-type: none"> Provides the highest level of service for bicyclists. Entails a moderate pavement area with slightly more storm water management infrastructure. Exhibits a slight increase of potential runoff and erosion impacts compared to Options 1 and 2. 	<ul style="list-style-type: none"> Includes a continuous center left turn lane that is unlikely to be needed due to land formation. Lacks dedicated bike lane continuity from Gamble Road.
4	<ul style="list-style-type: none"> Offers dedicated bike lane continuity from Gamble Road. 	<ul style="list-style-type: none"> Provides on road bike lane with a reduced level of service. Includes a continuous center left turn lane that is unlikely to be needed due to land formation. Exhibits the widest pavement area and increase of potential runoff and erosion impacts compared to Options 1, 2 and 3.
5	<ul style="list-style-type: none"> Exceeds the requirements of the York and Vaughan TMPs. Allows for “green” design. 	<ul style="list-style-type: none"> Entails the most complex non-standard design and structural requirements. Exhibits the highest capital, operation and maintenance costs. Exhibits the greatest potential for loss of edge/riparian habitat.



#	Principal Advantages	Principal Disadvantages
		<ul style="list-style-type: none"> Exhibits a significant impact on existing agricultural and residentially approved lands.

The approach for scoring and ranking used for Alternative Road Alignments was also used for Alternative Road Cross-sections. The results of comparative evaluation of Alternative Road Cross-sections (Options 1 to 5) across all four environmental factors are summarized in **ES Table 5** below.

ES Table 5: Summary of Comparative Evaluation for Short-Listed Cross-sections

Evaluation Criteria		Alternative Road Cross-sections				
		Option 1	Option 2	Option 3	Option 4	Option 5
Transportation Ranking	Symbol					
	Average Score	5.00	4.00	3.67	2.83	2.33
Natural Environment Ranking	Symbol					
	Average Score	5.00	4.56	3.78	3.33	2.56
Social Environment Ranking	Symbol					
	Average Score	4.25	4.25	4.25	4.25	2.00
Economic Environment Ranking	Symbol					
	Average Score	3.67	3.67	3.00	2.33	1.00
TOTAL SCORE (Sum of Factors)		17.92	16.47	14.69	12.75	7.89
RECOMMENDATION		Highly Recommended	Recommended	Less Recommended	Least Recommended	Not Recommended

The Project Team concluded that Option 1 represents an acceptable balance of advantages and disadvantages across the range of evaluation criteria and should be carried forward as the Highly Recommended Alternative Road Cross-section.

The principal rationale for selection of Option 1 as the Recommended Design Concept is that this option exhibits an efficient cross-section that improves connectivity, meets all forecast modal demands, provides a maximum level of service to each mode of transportation, and entails the least design and construction complexity.

ES7 Preferred Alternative Design Concepts

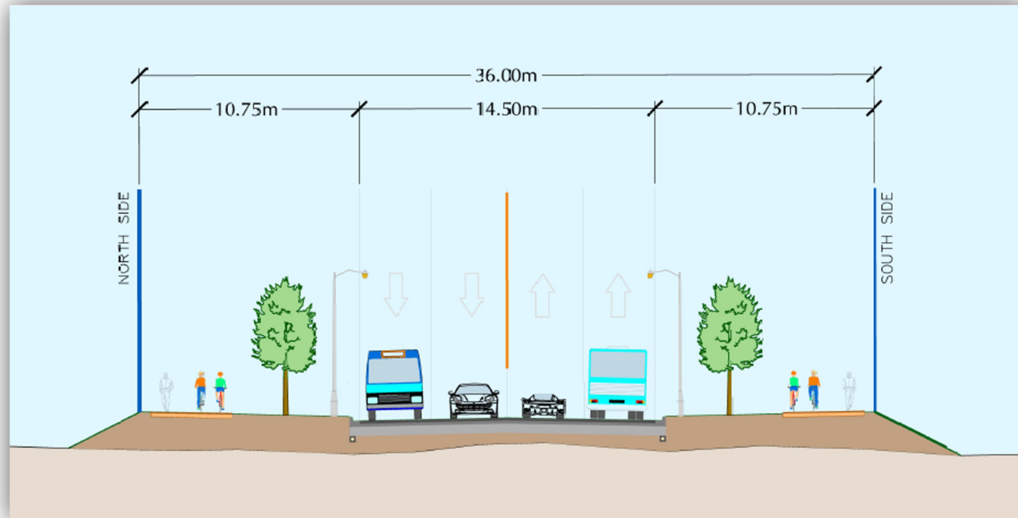
According to the MEA MCEA guidelines, once all environmental impacts have been identified, mitigating measures to minimize impact on the environment have been determined, and further input from interested parties have been gained, the recommended design can be confirmed as preferred.

Following PIC #2, minor comments received with regard to selection of the Recommended Road Cross-section were addressed through individual responses to the project stakeholders. Option 1 as presented at PIC #2 did not accurately reflect the intention of the project team to define the highest level of



service for bicyclists. The graphics was further updated to indicate that the identified RoW is sufficient to maintain accessibility for both pedestrians and bicyclists. Figure below shows the Preferred Road Cross-section (Option 1).

ES Figure 5: Preferred Road Cross-section



The key concerns identified with regard to selection of the Recommended Horizontal Road Alignment included conformity to the 2017 ORMCP policies, the equal weighting of environmental factors, the variety of servicing alternatives considered and how the requirements of the 2007 Endangered Species Act (ESA) will be satisfied for preferred Alignment 5. In an effort to resolve the specific concerns, the project team held individual meetings with the TRCA (November 16, 2018) and MNRF (December 13, 2018).

Eventually, the recommended road cross-section Option 1 and horizontal Alignment 5 have been confirmed as the technically preferred design concepts. The project team prepared a Draft ESR and on December 21, 2018 circulated the document to the members of TAG (MECP, MNRF, MMAH, TRCA, York Region, CoRH and CoV) for technical review.

Following a six weeks review period, all the agencies provided their comments on the Draft ESR with exception for MMAH. The comments suggested various degree revisions to the report. The key recurring concern was regarding the magnitude of effects on Natural Environment exhibited by Alignment 5. In part, the comment letter dated February 1, 2019 from TRCA indicated that their staff would pursue adjustments to the preferred alignment with the CoV, study proponent and involved agencies.

On February 27, 2019 the project team met with the MECP and CoV staff to discuss MECP comments provided on Draft ESR. It was noted during the meeting that refinements to the technically preferred road alignment could reduce adverse effects on Natural Environment and offer greater conformity with applicable ORM policies.

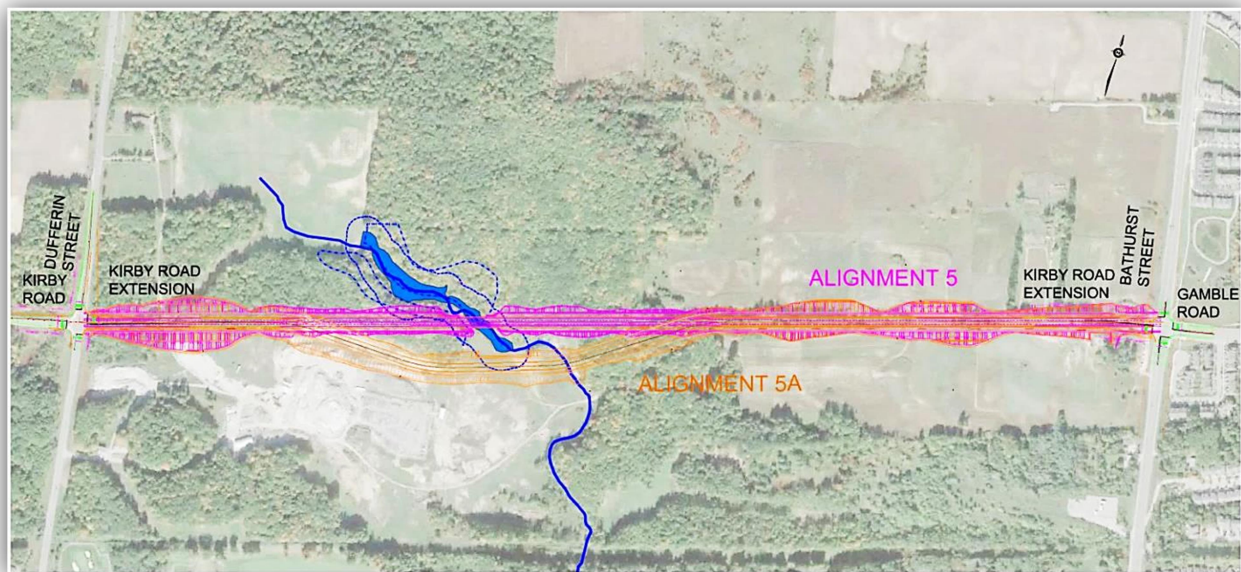


In response to the comments received from review agencies on the Draft ESR, the project team has committed to revisit Alignment 5. To capitalize on the evaluation effort and analysis already done, refinements to the Technically Preferred Alignment 5 were developed with the following objectives in mind:

- Avoid crossing of PSW
- Avoid crossing of interior forest within 100m from the woodland edge
- Cross Natural Core Area of the ORMCP at a narrowest possible point
- Maximize the use of existing RoW
- Minimize encroachment into private properties and property acquisition requirements
- Adhere to the engineering design criteria and match closely with the geometric design elements used to develop the shot-listed road alignments

In consideration of the above objectives, the middle segment of Alignment 5 was modified. The Refined Preferred Alignment ultimately recommended by the EA Study is further referenced as 5A. **ES Figure 6** shows the Technically Preferred Alignment 5, as selected by the Project Team and the Refined Preferred Alignment 5A, i.e. Alignment 5 amended in consultation with the review agencies addressing the need to reduce adverse effects on Natural Environment and to offer greater conformity with the applicable ORM policies.

ES Figure 6: Technically Preferred Alignment 5 and Refined Preferred Alignment 5A



As illustrated above, the Refined Preferred Alignment 5A gradually bends to the south starting at approximately 360 meters east of Dufferin Street to follow the existing forest edge for about 360 meters; then it gradually bends to the east to continue in parallel to Alignment 5 for about 170 meters straight segment while crossing the creek at approximately right angle; then Alignment 5A gradually bends to the north to follow the existing forest edge for about 360 meters and lastly it gradually bends to the east to follow Alignment 5 from approximately 820 meters east of Bathurst Street. As a result of



the refinements, the total length of the road of approximately 2020m for Alignment 5 increased to approximately 2070m for Alignment 5A.

ES8 Preliminary Cost Estimates

The preferred road alignment extends beyond the limits of existing municipal unopened road allowance and includes lands designated for future residential development subject to February 2015 Minister of Municipal Affairs and Housing Zoning Order. Based on the current local market conditions and using a median value for residential rates for the majority of blocks in the City, which are assumed to be fully serviced with servicing available at the lot frontage with low density residential development in accordance with planning and zoning policies fully in, the estimated property acquisition would cost approximately \$16.6 Million.

Taking as a basis the capital cost breakdown provided for the shortlisted road alignments, a more detailed preliminary cost estimate for the Refined Preferred Alignment (5A) has been prepared. The preliminary cost estimate for the Preliminary Preferred Design including capital and property is in the order of \$43.2 million. In consideration of options proposed for the stormwater treatment train, preliminary cost estimates for Option 1 Bioswale and Option 2 Tree Pits were prepared and sensitivity analysis undertaken. The difference between the two total capital costs is about 1%, i.e. it lies within estimate tolerance.

In addition to the preliminary capital cost estimates, a preliminary life cycle Removal and Replacement cost estimate and a preliminary life cycle Operation and Maintenance cost estimate have been prepared for each of the capital cost estimate options. The annual cost requirements for Option 1 are estimated at approximately \$770K per year and for Option 2 at \$757K per year. The preliminary cost analysis indicates that the road project with Option 1 (Bioswale) is nominally more expensive than the one with Option 2 (Tree Pits). The difference of approximately \$20K per year appears within estimate tolerance.

The preliminary cost estimates are subject to update, revision and refinement through detailed design and engineering and future processes for acquiring and securing property. At detailed design stage the final cost estimate may vary according to market conditions and with respect to specific servicing, grading, piping depth, additional investigations findings, utility relocation requirements and streetscaping opportunities.

ES9 Environmental Effects, Mitigation Measures and Key Commitments

The Refined Preferred Road Alignment has been developed to the preliminary (30%) level of design. Preliminary Design drawings are presented in **Appendix D** of this ESR.

Potential exists for indirect impacts on the one unit of the King-Vaughan Provincially Significant Wetland Complex that is present within the north central area of the Subject Lands. The following measures will be implemented in consultation with review agencies to mitigate impacts to the wetland:

- Use of retaining wall and increased grade slope through sensitive features to reduce total footprint in these areas;
- Use of appropriate erosion and sedimentation measures;
- Wildlife passage structure(s) to maintain connectivity, where appropriate;



- Feature-based water balance of the PSW to inform design and mitigation options.

A total of 64 ha of significant woodlands are present within the Subject Lands. Significant woodlands will be directly impacted by vegetation removal during the construction process. Longer-term indirect effects on residual significant woodlands within the Subject Lands may occur due to the creation of new woodland edges following vegetation removal (e.g., sunscald, windthrow, increased light penetration) and potential slope stability issues. Applying the methodology outlined in the TRCA Guideline for Determining Ecosystem Compensation (2018) the estimated removal of 3.2 ha of significant woodland requires an area of woodland restoration in the amount of 20.2ha. As per the Guideline, TRCA and the Municipality can track the land area removed from the natural system from all infrastructure projects and work together to explore avenues to off-set these losses through options such as municipal land acquisition and ecological restoration programs or other means.

Significant wildlife habitat and Habitat for three Threatened or Endangered Species, including Butternut, Eastern Small-footed Myotis and Little Brown Myotis are anticipated to be impacted mostly due to habitat removal. Mitigation in the form of habitat re-creation should be explored. ESA requirements associated with removal of habitat for endangered bat species on the Subject Lands will be discussed directly with MECP. It is anticipated that a permit under Section 17(2) (c) of the ESA may be required. Additional studies have been identified for two species: American Ginseng and Eastern Whip-poor-will based on consultation with MRNF on October 13, 2017.

No direct effects to the tributary to East Patterson Creek are anticipated. Potential indirect effects could occur from the proposed road construction. Preparation and implementation of an Erosion and Sediment Control Plan; adherence to and effectiveness of spill prevention and response measures is recommended throughout the construction period. Provided water balance is maintained to this drainage feature, negative impacts are not anticipated to occur as a result in alterations in surface water runoff and infiltration associated with the proposed road.

Key future commitments resulting from this EA Study include but not limited to the following:

- Confirm the need for permits with regulatory agencies and approval authorities and obtain, as needed, during detailed design and engineering.
- Further investigate stormwater management design options for water balance, quantity and quality control in accordance with City, Region standards and all approval and regulatory authorities.
- Further investigate the impacts to the infrastructure required to convey surface runoff from external Catchment 301E including Option 1 (Intake/by-pass storm sewer) and Option 2 (Cross culvert).
- Further investigate lowering the road and storm sewer for the right of way runoff to reduce fill volume.
- Further investigate the road profile design (i.e. vertical alignment) from Dufferin Street to the watercourse crossing, including any associated modifications to grading, stormwater infrastructure, etc., during detailed design.
- Develop erosion prevention and sediment control (ESC) measures that shall be implemented to mitigate erosion and sediment processes during construction. The ESC plans should be



consistent with the TRCA's Erosion and Sediment Control Guideline for Urban Construction (2006).

- Confirm the Significant Woodlands limits through field staking (if needed) and submit to the City and TRCA during detailed design. For significant woodland impacts provide an ecosystem compensation plan and associated costs for the preferred alignment in accordance with the TRCA's Guideline for Determining Ecosystem Compensation (2018).
- Develop restoration plans, including edge management plan and other tools to mitigate identified impacts on the Natural Environment during detailed design.
- Confirm PSW limits including a 30 m vegetation protection zone through field staking and submit the results to the MNRF during detailed design. This information will be used to support the design of the road and associated infrastructure.
- Consult with MECP regarding Species at Risk impacts and permitting requirements, prior to construction.
- Complete an updated Headwater Drainage Feature Assessment as per TRCA's Evaluation, Classification and Management of Headwater Drainage Features Guidelines (2014) during detailed design.
- Conduct additional environmental studies needed to determine Significant Wildlife habitat for two species: American Ginseng and Eastern Whip-poor-will during detail design. The environmental reports will be provided to the City and TRCA for review and approval.
- Coordinate with and obtain approval from the MOECP regarding Climate Change compliance prior to construction.
- Consider separation of pedestrian and cycling facilities proposed along the road and appropriate cycling connections at the Bathurst Street and Kirby Road intersection.
- Consider increasing clear height and width relative to length, within the culvert trail underpasses subject to on-site constraints, at detailed design.
- Provide trail ramp connections from Kirby Road Extension ATF down to the proposed trail system and tunnel connections at both north and south sides of the road.
- Complete a Stage 2 Archaeological Assessment in accordance with the requirements of the Ontario Heritage Act; if recommended through the Stage 2, a Stage 3 Archaeological Assessment will be prepared.
- Notify the potentially affected Indigenous Peoples of any archaeological findings and engage these communities as needed.
- Complete a resource-specific Cultural Heritage Impact Assessment for the residence at 11490 Bathurst Street, and attain heritage permit if needed.
- Conduct an earthwork analysis to optimize the proposed preliminary vertical road alignment in consideration of the grading for the Future Urban Area.
- Identify and implement source water protection mitigation measures (i.e., salt management, temporary storage of fuels) as per the CTC Source Protection Plan regulated by the Clean Water Act, prior to construction.
- Undertake additional work through detailed design and engineering to confirm various technical components of the design, including the roadway geometry and profile, illumination, culvert crossings, wildlife crossings, utilities, construction staging, and property requirements.
- Further assess wildlife passages at detailed design and engineering.



- Develop Soil Management actions. Since the removal or movement of soils are required, undertake further assessment and testing, where and as applicable, to determine contaminant levels from previous land uses or dumping at detailed design and engineering.
- Carry out consultation and further coordination with key technical agencies, Indigenous Communities and stakeholders through detailed design pertaining to watercourse crossing(s) and fish habitat.
- Confirm the need to obtain PTTW. A PTTW may be required as some of the roadwork may intersect some shallow and coarse-grained fill soils that might require dewatering. Potential for construction dewatering is more likely to be required where deep excavations occur that intersect the shallow water table.

Modifications to the design and implementation of the Kirby Road Extension proposed in this ESR may occur due to unforeseen circumstances and result in the project being inconsistent or non-compliant with commitments made in the ESR. Significant modifications to the project proposals or changes in the environmental setting that occur after the filing of the ESR will require preparation of an addendum to the ESR. When an ESR Addendum is issued, only the project elements included in the Addendum (i.e. the proposed changes) will be open for review.