APPENDIX C3

Socio-Economic Impact

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APPENDIX C3.1

Socio-Economic Impact Assessment Report

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KIRBY ROAD EXTENSION
CLASS C ENVIRONMENTAL ASSESSMENT

Socio-Economic Impact Assessment

April 2018

Revised May 2019

LUCAS & ASSOCIATES
Consultants in Planning and Land Development
24 Debra Crescent
Barrie, Ontario
L4N 3T1
(705) 727-8335

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1.0 INTRODUCTION

Lucas and Associates (LAA) is part of the team assembled by Schaeffers Consulting Engineers to undertake an Environmental Assessment for the extension of Kirby Road in the City of Vaughan. This analysis of the potential socio-economic impacts provides a community perspective to the Assessment and supports the prevention of negative social impacts and enhancement of positive ones. The community/socio-economic inventory component of the SEIA includes an overview of baseline conditions and a community profile.

1.1 Study Area

The study area includes a ± 2.0 km stretch of the Kirby Road unopened road allowance in the City of Vaughan between Dufferin Street and Bathurst Street. The study area includes all properties and land uses within ±400m of the centre line of Kirby Road unopened road allowance as shown in Figure 1: Map of Study Area.

Figure 1: Map of Study Area

1.2 Report Outline

This report identifies the approach to predicting potential social effects and impacts (Section 2.0). It establishes baseline conditions and provides a detailed snapshot of the community's social context through the development of a community profile and inventory (Section 3.0). Section 4 examines the relevant provincial, regional and local planning policies that apply to the Study Area. Section 5 examines the options for the extension of Kirby Road and provides an analysis of the potential social effects and impacts with the purpose of providing recommendations for the creation of a shortlist of optional alignments.

1.3 Methodology

LAA initiated the SEIA by undertaking site visits in May 2017 to obtain both quantitative and qualitative social use information about economic conditions and site characteristic data for the study area. This data was used to develop a socio-economic profile of the study area existing conditions which formed the basis for all evaluations and analyses. LAA also completed a comprehensive review of relevant provincial, regional and municipal planning legislation to obtain a better understanding of the policy context surrounding the Kirby Road Extension. Maps and aerial photographs were reviewed along with property ownership data for all lands within the study area.

1.4 Points of Clarification

There are several points of clarification regarding the general approach to this SEIA.

1. Evaluation methods, socio-economic factors and criteria were selected and employed on the basis of professional experience.

2. Google Earth mapping was used as an observation tool where field observations were difficult due to vegetation, fencing, private property etc.

3. It is assumed the project will respect the local noise by-law. Schedule '10. Construction' of the Corporation of the City of Vaughan's Noise By-law 96-2006 indicates that within the Study Area, construction equipment can be operated between 7.00 AM and 5.00 PM Monday through Saturday, with no activity permitted on Sunday.

2.0 APPROACH TO SOCIO-ECONOMIC IMPACT ASSESSMENT

Socio-Economic Impact Assessments (SEIAs) are intended to improve our understanding of the social effects and consequences of implementing proposed policies, programs and projects. In Ontario, the definition of 'environment' under the Environmental Assessment Act includes social, economic and cultural conditions that influence the life of humans or a community. As such, SEIAs support the protection, conservation and wise management of the environment.

SEIAs are undertaken early in the planning process to better enable project managers to anticipate possible impacts before significant resources are invested into proposed initiatives. While time and cost-savings are important, the primary objective of SEIAs is to protect and enhance quality of life by ensuring potential social impacts are lessened and responsible decisions are made. Often, SEIAs also have the added benefit of improving community and stakeholder relationships and smoothing the approval process for future initiatives.

2.1 Decision Benchmarks

In order to accurately assess the extent of social impacts, it is important to set out a series of benchmarks, that help to quantify and evaluate effects. Table 1 below, summarizes what was used to identify social impacts associated with the road improvements and associated construction activities.

Table 1: Decision Benchmarks to Determine Significance of Impacts

Effect	Considerations	Decision Benchmark
Noise	Ambient Noise in Urban Standard Residential Area: 55 (decibel) dB Ambient Noise Level in Busy Urban Areas: 65-75 dB Construction Noise Level (100-200m): 80dB Every rise in 10 dB above ambient noise levels within 200 m has moderate impact	All residences and businesses within 100 m of noise source have potential for significant noise effects
Vibration	• All residences/businesses within 200 m of construction may have vibration impacts • Soil and vegetation cover reduce vibration impacts significantly	All residences within 100 m of vibration source have potential for significant vibration effects
Dust	• All residences within 200 m of construction have potential for impacts • All residences within 100 m of construction have potential for significant impacts • Significant dust impingement levels are typically 2.5 to 10 microns	All residences within 200 m of dust source have potential significant dust effects
Visual Impacts	• All residences within 100 m: higher impacts • Residences within 300-500 m: lower impacts • Residences over 500: negligible impacts	All residences within 100 m have potential for significant visual effects
Traffic Effects	• Traffic Effects occur when the circulation of vehicular traffic is compromised • Lane closures have a significant effect for commuters and local residents	Significance of traffic effects will depend on the extent of road closure and the timing
Property Values and Economic Impacts	• There will be property acquisition regardless of the final road alignment. Land acquisition costs can vary and be significant depending on the final alignment • The potential for a decline in property values is possible depending on the final road alignment	Do the costs vary significantly based on the cost to acquire lands and the impact on property values
Impacts on Existing and Future Land Uses	• The potential for impacts on existing and future land uses is possible depending on the road alignment	Significance will depend on the extent to which existing and future land uses are disturbed by the alignment
Impacts on Existing Features	• The potential for impacts on existing natural features is possible depending on the final road alignment • Provincial, regional and local planning policies provide direction with respect to the protection of key natural heritage features and measures to mitigate potential impacts	To what extent does the extension of Kirby Road comply with existing planning policies

2.2 Criteria for Evaluation of Effects

In order to better assess the potential extent of these effects, it is important to evaluate them using several criteria. These criteria help us to more succinctly quantify and qualify the nature and extent of each effect. Some of the criteria that we have used for this study include:

- Frequency and Duration: Is effect constant? Is it short term or long term?
- Location and Magnitude: What is the scale of effect? How far or strong will it be felt?
- Timing: Is effect time-sensitive? Are some times for effect better or worse?
- Irreversibility: Is the effect temporary or permanent?
- Scope and Nature: Can effects be mitigated?
- Level of Public Concern: What concerns have been raised? Is there significant opposition?
- Risk: Is there possibility for exposure to contaminants or pollution? Potential for accidents/safety concerns?
- Mitigation: How does this balance the impacts created?
- Overall: What is the net effect of each impact in the area? What is the net effect of all the impacts?

3.0 COMMUNITY PROFILE AND INVENTORY

3.1 Surrounding Land Use

The Study Area is in an area of transition between urban and semi-urban uses and rural uses (Figure 2: Surrounding Land Use).

Figure 2: Surrounding Land Use

Lands located immediately south of the Study Area include a golf course and an estate residential community. Lands to the immediate north are undeveloped or used for agricultural purposes. Lands to the west include urban residential uses south of Kirby Road and agricultural lands and forested lands to the north. Lands to the east of the Study Area are located within the Town of Richmond Hill and have been developed for residential purposes.

3.2 Study Area Description

The study area includes all properties and land uses within ±400 m of the centre line of the Kirby Road unopened road allowance The Study Area has an area of approximately 166 hectares comprised of 10 parcels of land and the unopened road allowance between Lots 30 and 31, Concession 2 (Figure 3: Study Area Land Use). All the land parcels are privately owned, except for the unopened road allowance which is owned by the Corporation of the City of Vaughan. A detailed summary of the Study Area land parcels is attached as Appendix A.

Table 2 summarizes the composition and current land use of the parcels.

Table 2: Study Area Composition

Parcel No.	Address	Area (m2)	Existing Land Use
1	11641 Dufferin Street	203,612	Residential, Agricultural, Vacant
2	(Not Assigned)	359,922	Agricultural, Utility, Vacant
3	(Not Assigned)	240,126	Agricultural, Vacant
4	11490 Bathurst Street	212,980	Residential, Agricultural, Vacant
5	11400 Bathurst Street	173,391	Vacant
6	11333 Dufferin Street	399,274	Concrete Recycling, Vacant, TransCanada Pipeline, (Future Residential)
7	11654 Bathurst Street	1,404	Residential
8	11426 Bathurst Street	2,994	Residential, Vacant
9	11414 Bathurst Street	3,049	Residential, Vacant
10	(Not Assigned)	24,575	Utility, Vacant
Unopened Road Allowance	N/A	40,004	Vacant, Residential Driveway

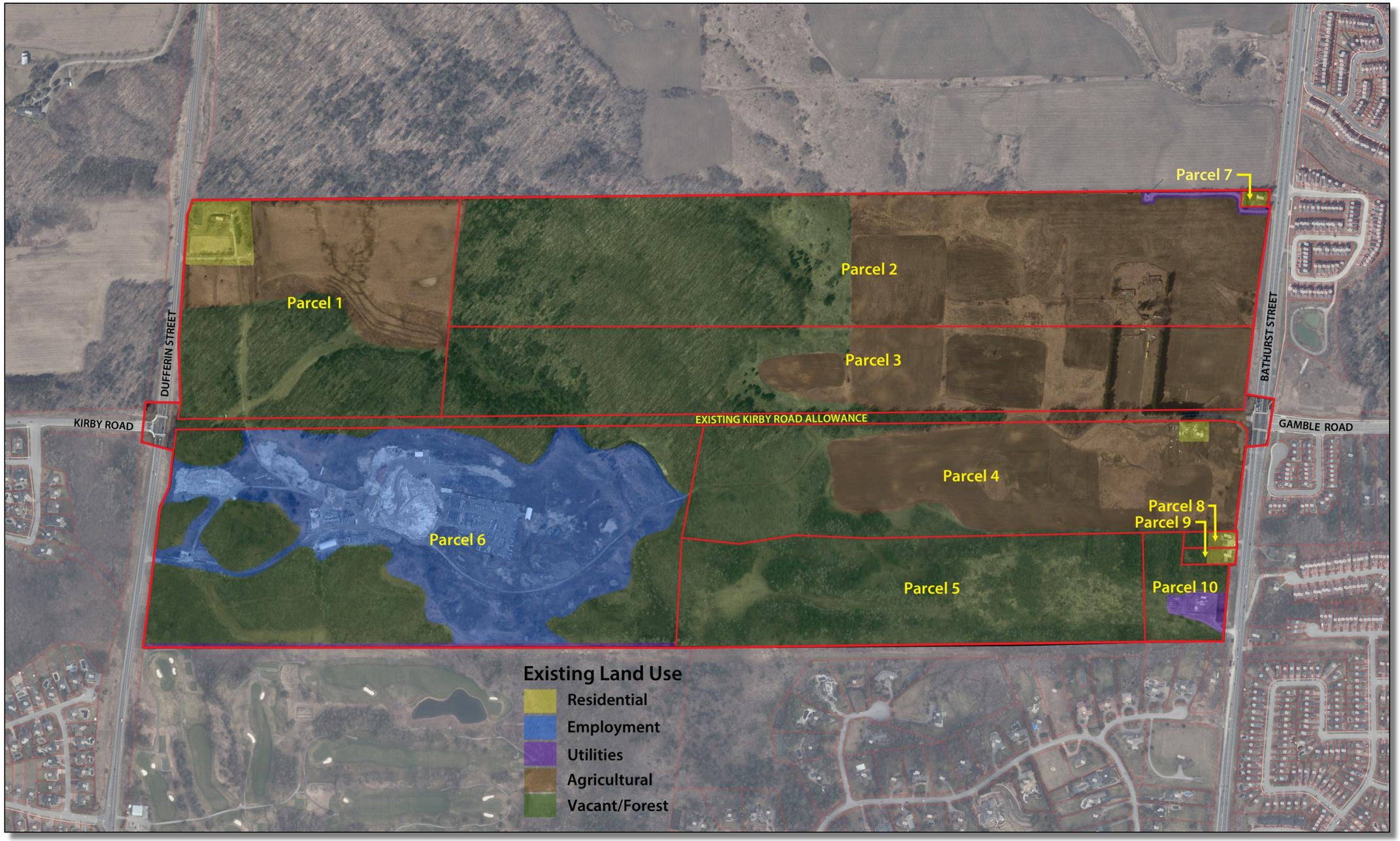


Figure 3 - Study Area Land Use

3.3 Employment Uses

The Study Area has one employment use located in Parcel 6. Parcel 6 is a former aggregate extraction site, and while aggregate extraction no longer occurs on the lands, the parcel is being used for concrete recycling.

Parcel 6 has been approved for residential development subject to the submission of a plan of subdivision application and zoning by-law amendment application. The future development of Parcel 6 is discussed in more detail in Section 4 of this report.

Photo 1: Concrete Recycling at 11333 Dufferin Street

Photo 2 - Photo Looking East from the Centre of 11333 Dufferin Street

3.4 Residential Uses

There are five existing rural residential uses located within the Study Area; one on Dufferin Street and four on Bathurst Street. Three of the five residences are located on the relatively small Parcels 7, 8 & 9 and two on the larger Parcels 1 & 4.

Photo 3: Residence at 11641 Dufferin Street

Photo 4: Residence at 11654 Bathurst Street

Photo 5: Residence at 11426 Bathurst Street

Photo 6: Residence at 11414 Bathurst Street

3.5 Agricultural Uses

Approximately 29.37 ha of land within the Study Area is in agricultural use, or approximately 18% of the Study Area located in the eastern portion of the Study Area. A summary of the area by land parcel is summarized in Table 3.

Photo 7: Agricultural Use Adjacent to Bathurst Street

Figure 4 – Lands in Agricultural Production

The agricultural uses are limited to the growing of cash crops. During the summer of 2018, the agricultural lands were used to grow soybeans crops. There are no agricultural homes, barns, or livestock operations within the Study Area.

Table 3: Lands in Agricultural Production

Parcel	Lands in Agricultural Production
2	11.88 ha
3	9.53 ha
4	7.96 ha
Total	23.37 ha

3.6 Utility Uses

There are three utility uses in the Study Area. The first is a Bell Mobility tower located in the northeast corner of the Parcel 2. The second utility use is a natural gas gate station operated by Enbridge Gas Distribution and gas metre station operated by TransCanada located adjacent to Bathurst Street in the southeast corner of the Study Area.

Photo 8: Enbridge Gate Station TransCanada Metre Station adjacent to Bathurst Street

The third utility use is a gas pipeline that runs in an east west direction adjacent to the south limits of the Study Area. This pipeline, owned by TransCanada, forms part of the Canadian Mainline that carries natural gas from Alberta and Saskatchewan to Ontario and beyond.

3.7 Unopened Kirby Road Allowance

The unopened Kirby Road allowance is approximately 20 m wide and 2000 m long and runs in an east-west direction between Dufferin Street and Bathurst Street. The most eastern 200 m of the unopened road allowance provides a gravel driveway access to Parcels 3 and 4. The balance of the road allowance is vacant and mostly forested.

Photo 9: Kirby Road Allowance West of Bathurst Street

3.8 Vacant and Forested Lands

The balance of the lands in the Study Area are vacant or forested. This includes a relatively large forested area that generally bisects the Study Area in north south direction in the centre of the Study Area. This forested block, which also contains a Provincially Significant Wetland, forms part of the McGill Area ESA (Environmentally Significant Area) and the Regionally Significant Oak Ridges Moraine Maple Spur ANSI (Areas of Natural and Scientific Interest). The Study Area also contains several fragmented forest blocks. A more detailed analysis of the environmental features is contained in the Natural Heritage Existing Conditions Report prepared by Savanta.

4.0 REVIEW OF RELEVANT PLANNING POLICY

This section provides an overview of the relevant provincial, regional and local planning policies affecting the Study Area. This review is intended to provide context and to complement Section 3 Community Profile and Inventory. A detailed summary of the various land use designations that apply to the Study Area land parcels is attached as Appendix A.

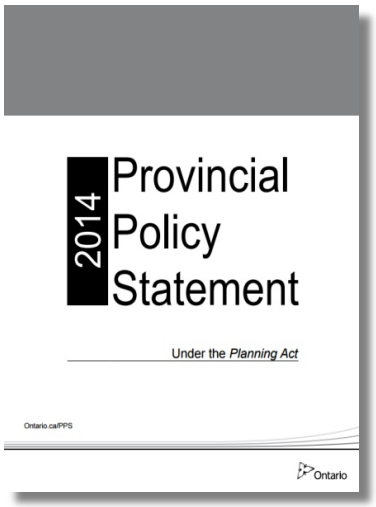
4.1 Provincial Planning Policy

The Province of Ontario's land use planning policies are outlined in several documents including the Provincial Policy Statement, and for specific geographic areas, in provincial plans such as the Growth Plan for Greater Golden Horseshoe and the Oak Ridges Moraine Conservation Plan, both of which affect the Study Area. It should be noted that Provincial plans are to be read in conjunction with Provincial Policy Statement and take precedence over policies in this Provincial Policy Statement to the extent of any conflict, except where legislation establishing provincial plans provides otherwise.

4.1.1 Provincial Policy Statement (PPS)

The PPS provides province-wide policy direction on matters of provincial interest related to land use planning and development to promote strong communities, a strong economy, and a clean and healthy environment. The PPS includes policies on key issues that affect our communities, such as:

- the efficient use and management of land and infrastructure
- protection of the environment and resources
- ensuring appropriate opportunities for employment and residential development, including decisions on other planning matters.



With respect to Transportation, Subsection 1.6.7 of the PPS states the following:

1.6.7.1 Transportation systems should be provided which are safe, energy efficient, facilitate the movement of people and goods, and are appropriate to address projected needs.

1.6.7.2 Efficient use shall be made of existing and planned infrastructure, including through the use of transportation demand management strategies, where feasible.

With respect to Natural Heritage, Subsection 2.1 of the PPS states the following:

2.1.4 Development and site alteration shall not be permitted in:

a. significant wetlands in Ecoregions 5E, 6E and 7E[1]; and
b. significant coastal wetlands.

2.1.5 Development and site alteration shall not be permitted in:

a. significant wetlands in the Canadian Shield north of Ecoregions 5E, 6E and 7E[1];
b. significant woodlands in Ecoregions 6E and 7E (excluding islands in Lake Huron and the St. Marys River);
c. significant valleylands in Ecoregions 6E and 7E (excluding islands in Lake Huron and the St. Marys River);
d. significant wildlife habitat;
e. significant areas of natural and scientific interest; and
f. coastal wetlands in Ecoregions 5E, 6E and 7E that are not subject to policy 2.1.4(b)

unless it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions.

2.1.6 Development and site alteration shall not be permitted in fish habitat except in accordance with provincial and federal requirements.

2.1.7 Development and site alteration shall not be permitted in habitat of endangered species and threatened species, except in accordance with provincial and federal requirements.

2.1.8 Development and site alteration shall not be permitted on adjacent lands to the natural heritage features and areas identified in policies 2.1.4, 2.1.5, and 2.1.6 unless the ecological function of the adjacent lands has been evaluated and it has been demonstrated that there will be no negative impacts on the natural features or on their ecological functions.

It should be noted that the PPS defines "development" to exclude activities that create or maintain infrastructure authorized under an environmental assessment process. In addition, the PPS defines significant areas of natural and scientific interest (ANSI) as areas identified as provincially significant by the Ontario Ministry of Natural Resources and not regionally significant ANSIs such as those found within the Study Area.

4.1.2 Growth Plan for the Greater Golden Horseshoe

The Growth Plan for the Greater Golden Horseshoe was prepared under the Places to Grow Act, 2005. The Plan, which was amended in 2017, provides a framework for implementing the Province's vision of building stronger, prosperous communities by better managing growth.

The purpose of the Plan is to mitigate urban sprawl through policies that direct growth to built-up areas, promote transit-supportive densities and a healthy mix of residential and employment land uses, and preserves employment uses for future economic opportunities.

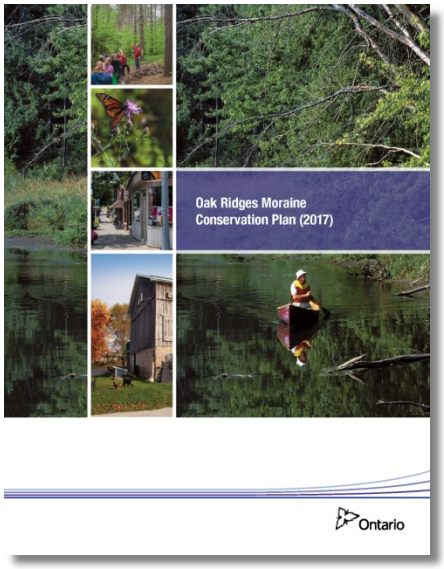
Guiding principles include building compact, vibrant and complete communities, optimizing the use of existing and new infrastructure to support growth in a compact efficient form, and reducing dependence on the automobile through development of mixed-use, transit supportive, pedestrian-friendly urban environments. In addition, cities and towns are encouraged to develop as "complete communities" with a diverse mix of land uses, a range and mix of employment and housing types, high quality public open space and easy access to local stores and services.

Subsection 3.2.2 states the following regarding transportation:

> The *transportation system* within the *GGH* will be planned and managed to:
>
> a. *provide connectivity among transportation modes for moving people and for moving goods;*
> b. *offer a balance of transportation choices that reduces reliance upon the automobile and promotes transit and active transportation;*
> c. *be sustainable and reduce greenhouse gas emissions, by encouraging the most financially and environmentally appropriate mode for trip-making and supporting the use of zero and low-low emission vehicles;*
> d. *offer multi-modal access to jobs, housing, schools, cultural and recreational opportunities, and goods and services;*
> e. *offer multinodal access to jobs, housing, schools, cultural, and recreational opportunities, and goods and services;*
> f. *provide for the safety of system users.*

4.1.3 Oak Ridge Moraine Conservation Plan (ORMCP)

The Oak Ridges Moraine Conservation Plan is an ecologically based plan established by the Ontario government in 2002 and amended in 2017 to provide land use and resource management direction for the 190,00 hectares of land and water within the Moraine.



The purpose of the Oak Ridges Moraine Conservation Plan is to provide land use and resource management planning direction to provincial ministers, ministries, and agencies, municipalities, municipal planning authorities, landowners and other stakeholders on how to protect the Moraine's ecological and hydrogeological features and functions.

The Plan divides the Moraine into four land use designations: Natural Core Areas, Natural Linkage Areas, Countryside Areas, and Settlement Areas. In general terms, the disturbed area within Parcel 6 is designated Countryside, the most eastern portion of the Study Area is designated Natural Linkage Areas and the balance of the Study Area is designated Natural Core Areas.

Policy 41(2) of the ORMCP states the following with respect to infrastructure in a Natural Linkage Area:

> *An application for the development of infrastructure in or on land in a Natural Linkage Area shall not be approved unless,*

(a) the need for the project has been demonstrated and there is no reasonable alternative; and

(b) the applicant demonstrates that the following requirements will be satisfied, to the extent that is possible while also meeting all applicable safety standards:

1. *The area of construction disturbance will be kept to a minimum.*
2. *Right of way widths will be kept to the minimum that is consistent with*
   i. *meeting other objectives such as stormwater management and erosion and sediment control, and*
   ii. *locating as much infrastructure uses within a single corridor as possible.*
3. *The project will allow for wildlife movement.*
4. *Lighting will be focused downwards and away from Natural Core Areas.*
5. *The planning, design and construction practices adopted will keep any adverse effects on the ecological integrity of the Plan Area to a minimum.*

Policy 41(3) states the following with respect to infrastructure in a Natural Core Area:

An application for the development of infrastructure in or on land in a Natural Core Area shall not be approved unless the applicant demonstrates that,

(a) the requirements of subsection (2) have been met;

(b) the project does not include and will not in the future require a highway interchange or a transit or railway station in a Natural Core Area; and

(c) the project is located as close to the edge of the Natural Core Area as possible.

Policy 41(4) states:

Except as permitted in subsection (5), with respect to land in a key natural heritage feature or a key hydrologic feature, the development of new and the upgrading or extension of existing infrastructure, including the opening of a road within an unopened road allowance, is prohibited.

Policy 41(5) states the following:

Infrastructure may be permitted to cross a key natural heritage feature or a key hydrologic feature if the applicant demonstrates that,

(a) the need for the project has been demonstrated and there is no reasonable alternative;

(b) the planning, design and construction practices adopted will keep any adverse effects on the ecological integrity of the Plan Area to a minimum;

(c) the design practices adopted will maintain, and where possible improve or restore, key ecological and recreational linkages, including the trail system referred to in section 39;

(d) the landscape design will be adapted to the circumstances of the site and use native plant species as much as possible, especially along rights of way; and

(e) the long-term landscape management approaches adopted will maintain, and where possible improve or restore, the health, diversity, size and connectivity of the key natural heritage feature or key hydrologic feature.

The Study Area is in either a Category 1 or Category 2 Landform Conservation Area. Policy 30 of the ORMCP sets out the requirements for development or site alteration with respect to land in a landform conservation area. However, the ORMCP defines "development" to exclude activities that create or maintain infrastructure authorized under an environmental assessment process.

4.2 Regional Planning Policy

The Study Area is in the Region of York and is subject to York Planning Policies.

4.2.1 Region of York Official Plan (YROP 2010)

The *York Region Official Plan 2010 (YROP 2010)* describes how York Region plans to accommodate future growth and development while meeting the needs of existing residents and businesses in the Region. It sets out directions and policies that guide economic, environmental and community planning decisions.

Apart from Parcel 6, the Region of York Official Plan designations that apply to the Study Area lands conform and reflect the designations of the ORMCP designations. Parcel 6 is subject to an Order issued in February 2015 by the Minister of Municipal Affairs and Housing that modifies the Official Plan to permit the development of urban uses. Details of the Minister's order are discussed in Subsection 4.4 of this Report.

The YROP 2010 identifies that lands within the Study Area are Woodlands, form part of an ESA and ASNSI, that contain a Provincially Significant Wetland. In addition, the entire Study Area is located within a Primary Mineral Aggregate Resource Area, a Significant Groundwater Recharge Area, Highly Vulnerable Aquifers, and in either a Category 1 or Category 2 Landform Conservation Area. Except for disturbed area in Parcel 6, the entire Study Area is located within York's Regional Greenland System. A detailed summary of the various land use designations that apply to the Study Area land parcels is attached as Appendix A.

4.2.2 Region of York Transportation Master Plan (TMP)

The Region of York Transportation Master Plan was adopted in December of 2016 and establishes the vision for transportation services, assesses existing transportation system performance, forecasts future travel demand and defines actions and policies to address road, transit and active transportation needs in York Region to 2041.

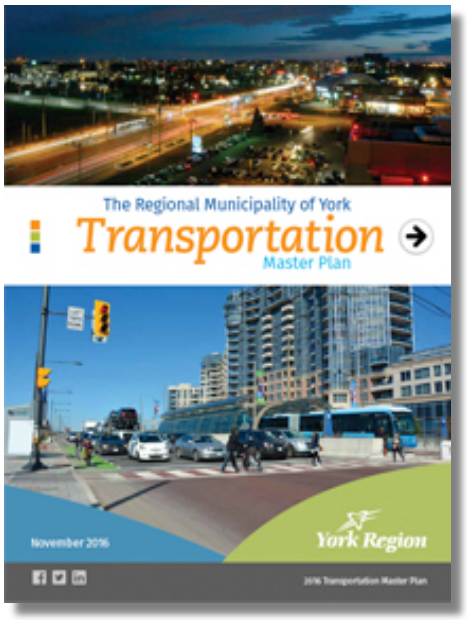
Traffic congestion continues to be identified as the top issue facing York Region residents according to an annual survey conducted by an independent third-party organization. Furthermore, in that same survey, residents identified traffic as the greatest threat to quality of life in York Region, followed closely by the high rate of development taking place.

The TMP identifies that travel demand is increasing more rapidly than infrastructure is constructed and that the Region is falling behind the pace of growth. In the Introduction to the TMP, the report states the following:

> *The future success of York Region as the number one destination within the GTHA for people to live, work and play is dependent on the Region's ability to build an interconnected system for mobility. This TMP update sets out the infrastructure and policy updates to enable the Region to build and maintain such a system. this includes additional transit infrastructure, roads infrastructure and a system of sidewalks and trials to further enable active transportation.*

Section 5 of the Report describes in detail the objective to develop a road network fit for the future. Under Subsection 5.3.2 Finer Grid Network Strategy, the Report states the following:

> ***Missing links**. The Regional road network is set on a grid with several missing links, leading to circuitous routing by users and contributing to more congestion. This TMP strives to fix the gaps and complete the grid network by planning for construction of the following Regional road connections:*
>
> - *Kirby Road (Dufferin Street to Bathurst Street)*
> - *Langstaff Road (Jane Street to Keele Street)*
> - *Teston Road (west of Dufferin Street)*
> - *15th Sideroad (east and west of Jane Street)*



The Report also states:

***Road Assumptions**. As York Region grows, there is an ongoing need to regularly review the function of the road network. In some instances, roads currently under the jurisdiction of local municipalities will need to take on a more Regional role while other roads operated by the Region may better serve local needs.*

The Regional Road Assumption Policy sets out the criteria for road jurisdiction transfers. Two key principles on which the policy is based on are:

1. *Regional roads serve more than a vehicular traffic capacity function; they are diverse and support other functions including walking, cycling, transit and movement of goods*
2. *Transparency and accountability to all stakeholders; consideration should be given to local conditions as well as financial and operational factors in addition to road network factors.*

Key criteria for a road to be considered for a jurisdiction transfer are as follows.

- *Supporting the Region's longer-term plans (TMP, York Region Official Plan and Vision 2051)*
- *Arterial road with cross boundary/inter-regional/inter-municipal function*
- *Logical connection in the Regional road network where a gap exists*
- *Key link to Provincial highway system*
- *Existing or planned rapid transit route or connection to major transit hub*

The policy also considers the condition of the existing corridor, environmental criteria and financial and operating criteria.

Based on the road network assessment carried out as part of this TMP, as well as a review of the above policy, the following road corridors are candidates to be added to the Regional road network:

- *15th Sideroad from Weston Road to Keele Street*
- *King Vaughan Road from Pine Valley Drive to Yonge Street, including re-alignment at Jefferson Sideroad*
- *Kirby Road from Highway 27 to Bathurst Street*
- *Elgin Mills Road from Woodbine Avenue to Highway 48*
- *Pine Valley Drive from Teston Road to King-Vaughan Road*
- *Yonge Street from Major Mackenzie Drive to Elgin Mills Road*
- *Yonge Street from Industrial Parkway South to Orchard Heights Boulevard*
- *19th Avenue between Leslie Street and the future Donald Cousens Parkway extension*
- *Highway 50/Caledon Line between Kirby Road and 17th Sideroad*

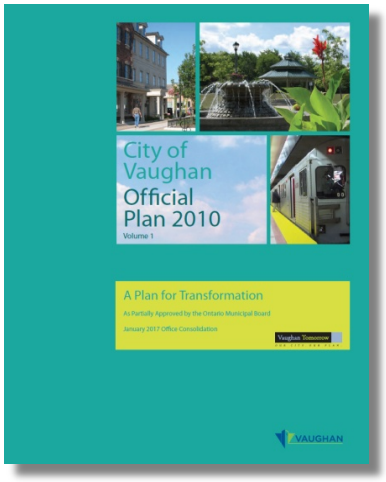
The TMP also discusses a "New Stations Analysis" being undertaken by Metrolinx which identifies a potential new Go Station where the Barrie GO rail corridor crosses Kirby Road approximately 2.5 km west of the Study Area.

4.3 Local Planning Policy

The Study Area is in the City of Vaughan and is subject to Vaughan Planning Policies.

4.3.1 City of Vaughan Official Plan 2010 (VOP2010)

The City of Vaughan Official Plan 2010 was adopted by Vaughan Council in 2010. The Plan addresses all elements of effective, sustainable and successful city-building, while managing projected growth to 2031.



The City of Vaughan Official Plan designations that apply to the Study Area lands also conform to and reflect the designations of the ORMCP designations, and the Minister's Order that applies to Parcel 6. Details of the Minister's order are discussed in Subsection 4.4 of this Report.

The VOP 2010 identifies that lands within the Study Area form part of an ESA and ASNSI, and that the entire Study Area is located within a Secondary Sand and Gravel Resource area, located in either High and Low Vulnerability Aquifer area, and in either a Category 1 or Category 2 Landform Conservation area. A detailed summary of the various land use designations that apply to the Study Area land parcels is attached as Appendix A.

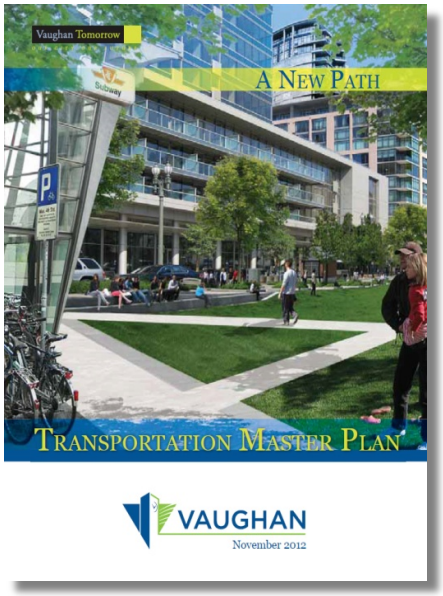
Schedule 9 Future Transportation Network identifies the Kirby Road extension between Dufferin Street and Bathurst Street as a proposed 36m Minor Arterial Road. Under Subsection 3.4.10 Transportation, Infrastructure and Utilities in the Oak Ridge Moraine, policies regarding the extension of existing transportation including the opening of a road within an unopened road allowance such as Kirby Road reflect the policies found in the Oak Ridges Moraine Conservation Plan.

Under Subsection 4.2 The Transportation network, the Plan states in Subsection 4.2.1.6 that it is a policy of Council:

> *To implement the various improvements to the street network identified on Schedule 9 in coordination with the York Region, appropriate agencies, utility providers and adjacent municipalities and secure land for such purposes through the development approvals process, improvements include widening as per the right-of ways identified on Schedule 9; completion of incomplete grid connections such as Langstaff Road over the rail corridor, Kirby Road and Teston Road; jog eliminations at intersections; new and improved interchanges with 400-series highways; mid-block crossings of 400-series highways; and, grade separated rail and highway crossings.*

4.3.2 City of Vaughan Master Transportation Plan 2012 (TMP)

The City of Vaughan Master Transportation Plan was approved in 2012 and serves as the City's transportation "blueprint" and will assist with addressing growth in a sustainable manner through to 2031.



The road network serving Vaughan is comprised of 400-series highways, arterial, collector and local roadways. Kirby Road serves as one of Vaughan's east-west arterials, while Dufferin Street and Bathurst Street serve as north-south arterials. Subsection 2.3.1 identifies the discontinuity of Kirby Road between Dufferin Street and Bathurst Street as one of several discontinuities that impact the efficiency of travel in Vaughan. As a result, there are few continuous arterials that cross from one end of Vaughan to the other in an east-west direction.

Subsection 6.4 Strategic Road Improvements identifies the Kirby Road extension as an important Plan Element in order to improve network connectivity, to provide east-west vehicular access and provide safer walking and cycling opportunities. The Action Plan outlined in Exhibit 7-5 identifies that the initiation of

the class EA, funding, and construction of the extension to occur during the period between 2016 and 2021.

4.3.3 City of Vaughan Zoning By-law

The City of Vaughan Zoning By-law 1-88 regulates land us in the City and consolidates the amendments enacted by Council. By-law 1-88 zones the majority of the Study Area ORM Oak Ridges Moraine and OS5 Open Space 5. Parcel 6 is subject Minister's Order that zones the Parcel Future Urban Zone. Details of the Minister's order are discussed in Subsection 4.4 of this Report.

4.4 Minister's Order

In February 2015, the Minister of Municipal Affairs and Housing issued an order made under Section 18(1) of the *Oak Ridges Moraine Conservation Act, 2001*. Under Section 18(1), if a matter relating to land to which the Oak Ridges Conservation Plan applies was appealed to the Ontario Municipal Board, the Minister may by order amend the relevant official plan or zoning by-law with respect to the matter. The Order applies to Parcel 6 and amends the Region of York Official Plan, the City of Vaughan Official Plan and the City of Vaughan Zoning By-law 1-88.

The Minister's Order amends specific sections in the Region of York Official Plan to indicate that the lands identified as Parcel 6 in this report are intended to be developed for urban uses and that the lands shall only be developed on the basis of full municipal services, an approved and registered draft plan of subdivision and implementing zoning by-law.

The Order amends the City of Vaughan Official Plan by designating the lands "Low Density Residential" and "Valley and Stream Corridor". In addition, the Official Plan is amended to indicate that the lands shall only be developed based on full municipal services, an approved and registered draft plan of subdivision and implementing zoning by-law. Uses permitted are limited to detached houses, semi-detached houses, school, parks and open space, private home daycare, home occupations, and local convenience centres. The maximum average density permitted is limited to 18.0 units per residential hectare. The amendment also includes implementation measures.

Lastly, the Order amends Zoning By-law 1-88 by rezoning the lands Future Urban Area Zone. This site-specific zone is intended to recognize the intent of the Official Plan policies for the lands to develop for urban purposes. A further zoning amendment is required to provide the appropriate zone categories and standards that will permit the development of the lands.

Figure 5: Parcel 6 City of Vaughan Official Plan Designations

5.0 POTENTIAL ROAD ALIGNMENT IMPACTS AND ANALYSIS

5.1 Proposed Alignments

A total of 9 potential alignments were initially identified to extend Kirby Road between Dufferin Street and Bathurst Street. The options included major, moderate and minor diversions from the existing Kirby road allowance.

The existing Kirby road allowance represents the most direct and shortest connection between Dufferin Street and Bathurst Street. All the options align with the existing Dufferin Street and Kirby Road intersection and the existing Bathurst Street and Gamble Road intersection.

The list of potential alignments increased to 11 following an agency site meeting in August of 2017, when Alignment 6a was added. Alignment 6a is the same as Alignment 6 except that it dips sooner and further south into the residentially designated lands in Parcel 6.

A brief summary of the 10 optional alignments is provided in Table 3.

Table 4: Kirby Road Extension Alignment Options

Alignment Option	Description
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
6a	Same as 6 but jogs to the south sooner and further into residentially designated lands
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 forests

5.2 Potential Impacts of Noise, Dust and Vibrations

The potential impact of noise, dust and vibrations during and after construction of the Kirby Road extension is expected to be minimal for 4 of the 5 existing residential uses located within the study area. These 4 residences are in excess of 200 metres from any of the 10 potential alignments and the intersections of the Kirby Road extension with Dufferin and Bathurst Streets (Figure 7). It should also be noted that all four of these existing homes are located either on Dufferin Street or Bathurst Street and are presently subject to impacts generated from these existing arterial roadways.

The extension of Kirby Road is expected to impact the 5th existing residence located immediately south of the existing Kirby road allowance, west of Bathurst Street. However, the level of impact does not vary amongst the 10 optional alignments as all the alignments converge just west of the existing residence and share a common alignment in the vicinity of this existing residence and east towards Bathurst Street.

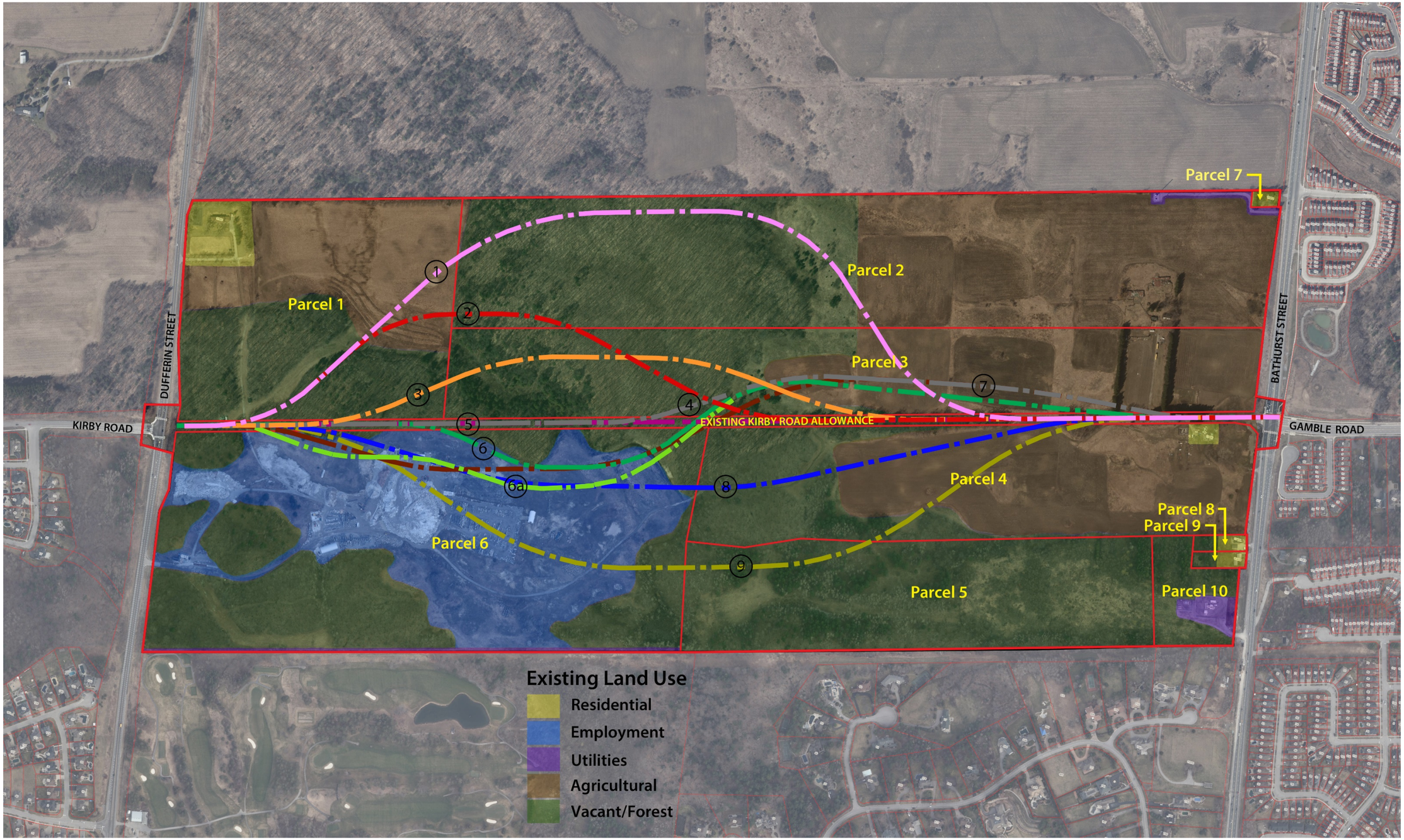


Figure 6: Kirby Road Extension Alignment Options

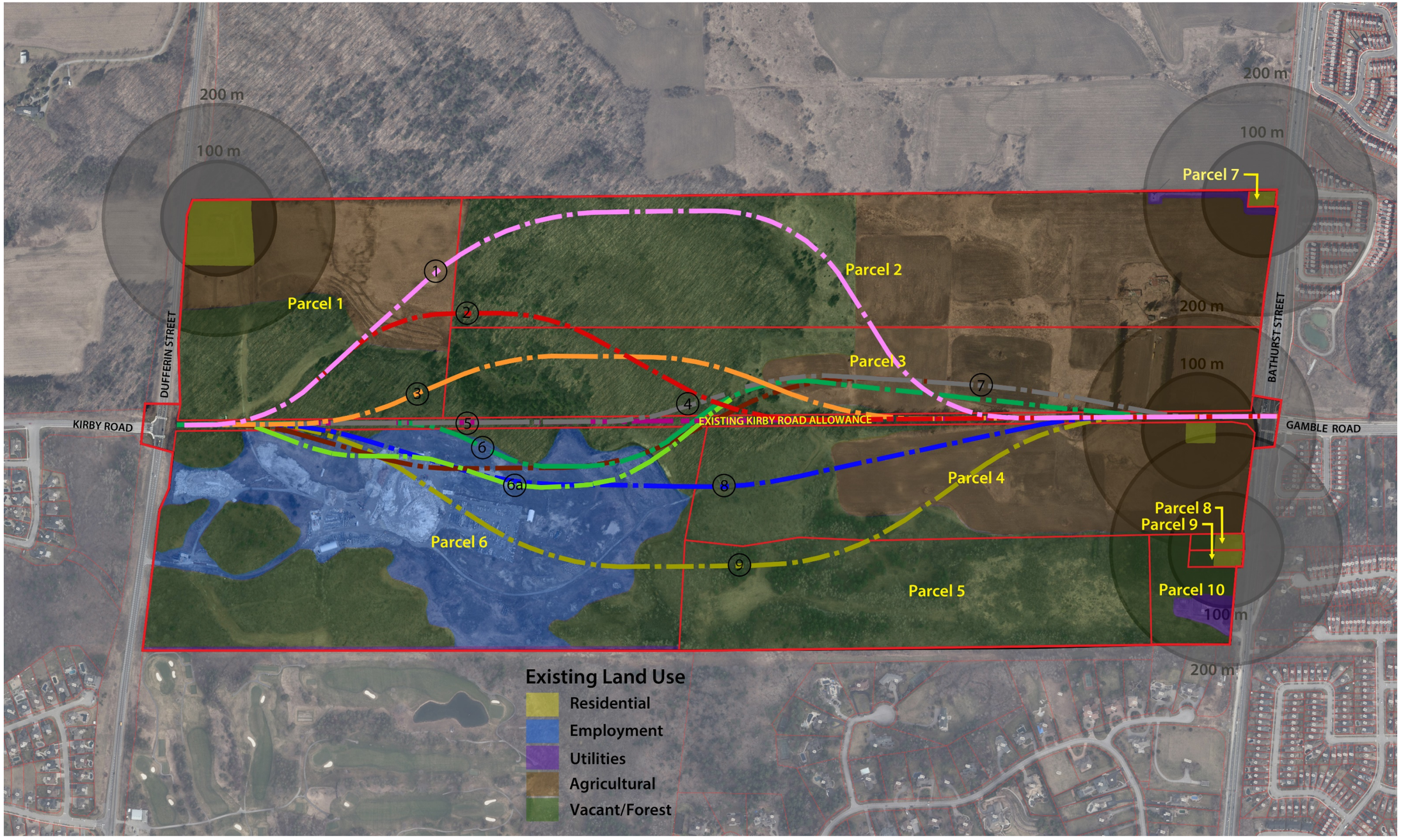


Figure 7: Potential Impacts of Noise, Dust and Vibrations

5.3 Potential Visual Impacts

The potential visual impacts of the alignments on the existing residences is also expected to be minimal for 4 of the 5 existing residences. To the extent that these existing residences are impacted, those impacts already exist at the intersections at Dufferin and Bathurst Streets. Likewise, there will be a visual impact on the fifth residence, but the impact is the same for all potential alignments.

5.4 Traffic Effects

The potential traffic effects are expected to be minimal on 4 of the 5 residences. As noted, these residences are located on either Dufferin or Bathurst Street, which are both relatively busy arterial roads in York's Regional Road network. The extension of Kirby Road, regardless of the final alignment, is not expected to result in greater impacts within the study area.

5.5 Potential Impacts on Existing and Proposed Land Uses

There are three existing land uses and one future land use that requires consideration. The three existing lands uses are the employment use (concrete recycling) located on Parcel 6, agricultural uses on Parcels 1, 2, 3 and 4, and vacant/natural heritage lands on the balance of the lands. A detailed analysis of the potential land use impacts is summarized in a table attached as Appendix B.

A review of the table reveals the following:

1. The alignments with the greatest impact on the existing employment use are Alignments 6, 6a, 7, 8, and 9. Alignment 6 has the least impact of the six and Alignment 9 has the greatest, which generally passes through the centre of the operation.
2. All the alignments have some impact on the existing agricultural uses. Alignment 5 (existing Kirby road allowance) has the least impacts followed by Alignment 3 and Alignment 2. Alignments 4, 6 and 7 have the greatest impact on agricultural uses, not only in terms of the length of road passing through the agricultural uses, but also through the creation of remnant parcels that will be relatively small, isolated and difficult to access after Kirby Road has been extended.
3. All the alignments must pass through the forested/natural heritage lands located within the Study Area. The potential impact depends on a several factors including the length of roadway passing through the natural heritage features, grading impacts, and the quality or significance of the features, including a Provincially Significant Wetland. A detailed discussion of the potential impacts on the natural heritage features is examined in the Natural Heritage Existing Conditions Report prepared by Savanta.

4. The alignment of the Kirby Road extension has the potential of significantly impacting the proposed residential development on Parcel 6 and 6a. Alignments 1, 2 and 3 make a future access from Kirby Road to the residential community very difficult requiring an access road that

will pass through the natural heritage area. Alignments 5a, 6, 6a, 7, 8 and 9 have direct impacts, and will result in the creation of remnant parcels that will be isolated from the remainder of the residential community and difficult to develop efficiently. Alignment 9 will split the community into two parts, which is undesirable and should be avoided, if possible.

5.6 Property Values and Economic Impacts

For the purposes of establishing the economic impacts associated with acquisition costs, it been assumed that existing land values generally fall in two categories: natural heritage and agricultural lands, and the future residential lands (Parcel 6). Based on a preliminary analysis of land values in the area, the difference between the two categories is significant. A 73-hectare parcel of land located in the northwest corner of the Kirby Road and Dufferin Street intersection (11724 Dufferin Street) sold in 2017 for approximately $124,000 per hectare. This parcel includes both natural heritage lands and agricultural lands and is similar in composition to lands located within the study area apart from the lands designated for residential development.

Alignment 5, which follows the existing Kirby road allowance represents the least expensive option from a land acquisition perspective. The existing 20 wide road allowance is owned by the City of Vaughan and the only lands that need to be acquired are for the 8.0 m widenings located north and south of the existing right of way and lands required for grading purposes. Alignments with the most significant impact from land acquisition cost perspective are Alignments 6, 6a, 7, 8 and 9, which all pass through Parcel 6.

5.7 Compatibility with Provincial, Regional and Local Land Use Policies

As outlined in Section 4, the Study Area is subject to land use policies from all three levels of government. At the provincial level, the policies of the Oak Ridge Moraine Conservation Plan (ORMCP) have the greatest influence in determining the preferred alignment of the Kirby Road extension. These provincial policies are also mirrored and implemented through the Region of York and the City of Vaughan Official Plans. The Minister's Order approving residential development on Parcel 6 also requires consideration when assessing the potential alignment options. A summary of the designations and policies that affect the Subject Area is attached as Appendix 2.

The ORMCP designates the Subject Area Natural Core Areas, Natural Linkage Areas and Countryside. A crossing through lands designated Natural Core Area and Natural Linkage Area is unavoidable, regardless of the alignment.

The ORMCP permits infrastructure in a Natural Linkage Area provided that :

(a) the need for the project has been demonstrated and there is no reasonable alternative; and

(b) the applicant demonstrates that the following requirements will be satisfied, to the extent that is possible while also meeting all applicable safety standards:

1. The area of construction disturbance will be kept to a minimum.
2. Right of way widths will be kept to the minimum that is consistent with
    i. meeting other objectives such as stormwater management and erosion and sediment control, and
    ii. locating as much infrastructure uses within a single corridor as possible.
3. The project will allow for wildlife movement.
4. Lighting will be focused downwards and away from Natural Core Areas.
5. The planning, design and construction practices adopted will keep any adverse effects on the ecological integrity of the Plan Area to a minimum.

Infrastructure in a Natural Core Area is also permitted provided:

(a) the requirements of infrastructure in Natural Linkage areas have been met,
(b) the project does not include and will not in the future require a highway interchange or a transit or railway station in a Natural Core Area; and
(c) the project is located as close to the edge of the Natural Core Area as possible.

Many of the requirements for infrastructure in the Natural Core and Natural Linkage Areas will be addressed through detailed design. For the purposes of this report, the primary criteria for establishing a short list of alignment options based on compatibility with land use policies is minimizing the potential impact on the key natural features and locating the extension as close to the edge of the Natural Core Area as possible.

It should be noted that the limits of the Natural Core Areas designation do not necessarily correspond to the limits of the key natural heritage features. For example, most of the lands that are presently in agricultural use are designated Natural Core Areas. For the proposes of creating a shortlist of options based on land use policy compatibility, the current land use has also been considered in determining which of the proposed alignments best meet these criteria.

5.8 Impact on Agricultural Uses

All the lands in agricultural production are in the eastern half of the Study Area. According to OMAFRA the Ontario Ministry of Agriculture and Food (OMAFRA) only lands in the northeast portion of the Study Area are classified as Prime Agricultural lands. Except for Alignments of 2,3 and 5, which is the existing Kirby Road allowance in the western portion of the Study Area, all the alignments will pass through land presently under agricultural production, resulting in the fragmentation of exi5ting agricultural fields and the creation of unusable remnant parcels. Alignments using the existing road allowance represent the least impact, where the impact is limited to 8 m wide road widenings on either side of the existing road allowance and lands required for grading.

6.0 SHORLISTING AND THE DETERMINATION OF THE PREFERRED OPTION

A total of 10 potential alignments were identified to extend Kirby Road between Dufferin Street and Bathurst Street. The options include major, moderate and minor diversions from the existing Kirby road allowance, which represents the most direct and shortest connection between Dufferin Street and Bathurst Street.

Alignments 1, 2 and 3 have significant impacts on Natural Core Area features and are not located close to the edge of the Natural Core Areas. Alignments 8 and 9 will also have significant impact the Natural Core Area features. Alignments 4, 5, 6, 6a and 7 have the potential of limiting the impact by crossing the Natural Core area features where it is the narrowest and close to the edge of the Natural Core Area where possible.

The potential visual impacts, and potential impact of noise, dust, vibrations and traffic of the 10 alignments on the existing residences located in the Study Area are expected to be minimal for 4 of the 5 residences. These 4 residences are located on either Dufferin Street or Bathurst Street and are far enough removed not to be impacted by the extension of Kirby Road. The extension of Kirby Road is expected to impact the 5th existing residence located immediately south of the existing Kirby road allowance, west of Bathurst Street; however, the level of impact does not vary amongst the 9 optional alignments.

The potential impacts on existing and proposed land uses and on property values do vary amongst the 10 alignments. Alignments 1, 2 and 3 will prohibit direct access to the proposed residential development on Parcel 6 without a connecting road that will pass through and impact key natural heritage features. Alignments through the existing employment use and future residential use could have significant impacts resulting in a disruption of the employment use in the short term and negatively impact the future residential use by dividing the community and/or creating remnant blocks of land that are either inefficient to develop or are undevelopable.

The cost to acquire lands for the extension of Kirby road could be significant, particularly if the alignment passes through lands that are approved for residential development. While the cost alone should not be used to necessarily exclude an alignment that passes through Parcel 6, measures to limit the amount of land required should be considered.

The compatibility with existing provincial, regional and local planning policies need to be considered. A significant portion of the Study Area has been identified as containing key natural heritage features, including a Provincially Significant Wetland, and is designated Natural Core Area and or Natural Linkage Area in the ORMCP. Policies of the ORMCP require that where infrastructure is considered necessary, and there are no reasonable alternatives, construction of the infrastructure must occur in a manner that minimizes the potential impacts and is located along the edge of Natural Core Areas, where possible.

Lastly, alignments 2, 3 and 5, which us the existing road allowance in the vicinity of the agricultural lands will have the least impact on those lands. An 8-metre-wide road widening on either side will be required,

however, the location will not result in the fragmenting the existing fields and the creation of unusable remnant parcels.

In consideration of all the criteria considered in this report, it was recommended that the 10 proposed alignments be shortlisted to Alignments 4, 5, 6 and 6a (Figure 7).

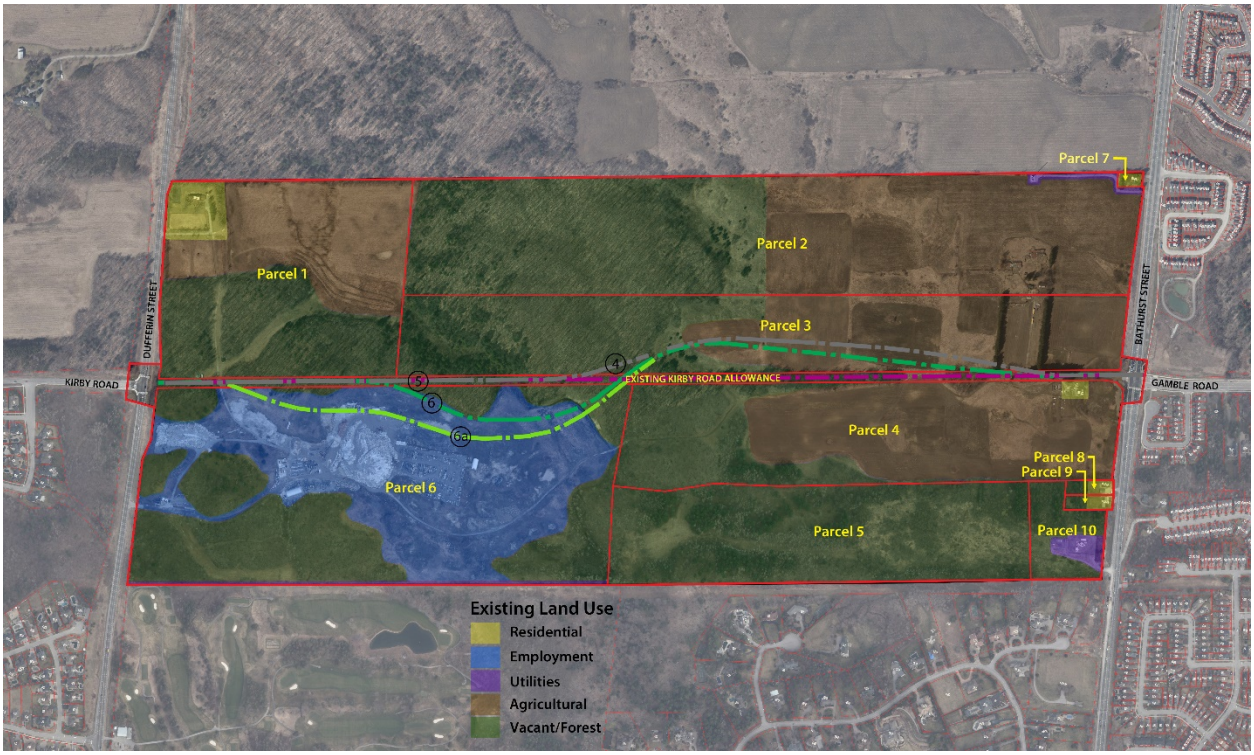


Figure 8: Recommended Shortlisted Alignments

Alignment 5 follows the existing Kirby road allowance owned by the City of Vaughan but will require a crossing of the Provincially Significant Wetland. Option 4 follows the existing road allowance in the western portion of the Study Area, and will also require a crossing of the wetland, but deviates north slightly to limit impacts on the existing forest and hedgerow. Alignment 6 and 6a will have the least impact on natural core features by deviating south to avoid the wetland followed by a deviation north to limit impacts on the existing forest and hedgerow. Alignment 6 and 6a will impact the future residential development of Parcel 6.

The four short-listed alignments went through a detailed comparative evaluation analysis. This analysis examined the options from a natural environment perspective, social environment perspective, transportation environment perspective and economic environment perspective. Following the analysis, Alignment 5 was chosen as the preferred option.

Following completion of the draft Environmental Study Report (ESR), members of the Technical Review Committee (TAG) were circulated for comment. One of the primary comments received from the TAG was

with respect to conformity with the ORMCP. More specifically, the TAG was concerned that the ORMCP contains a policy stating that infrastructure may be permitted to cross a key natural heritage feature or key hydrolic feature only if certain key requirements are satisfied, including that the planning, design and construction practices adopted will keep any adverse effects on the ecological integrity of the Plan Area to a minimum. Although Alignment 5 scored highest overall and recommended as the preferred alignment, it did not score highest with respect to effects on the natural environment.

7.0 ALIGNMENT 5A

In order to minimize any adverse effects on the ecological integrity of the Plan Area, a slightly revised Alignment 5 (Alignment 5a) was proposed that shifts the Kirby Road extension to the south to avoid two key natural heritage features in the central portion of the Study Area. Alignment 5a is very similar to Alignment 6 except that Alignment 5a utilizes all the existing Kirby Road allowance in the eastern half of the Study Area.

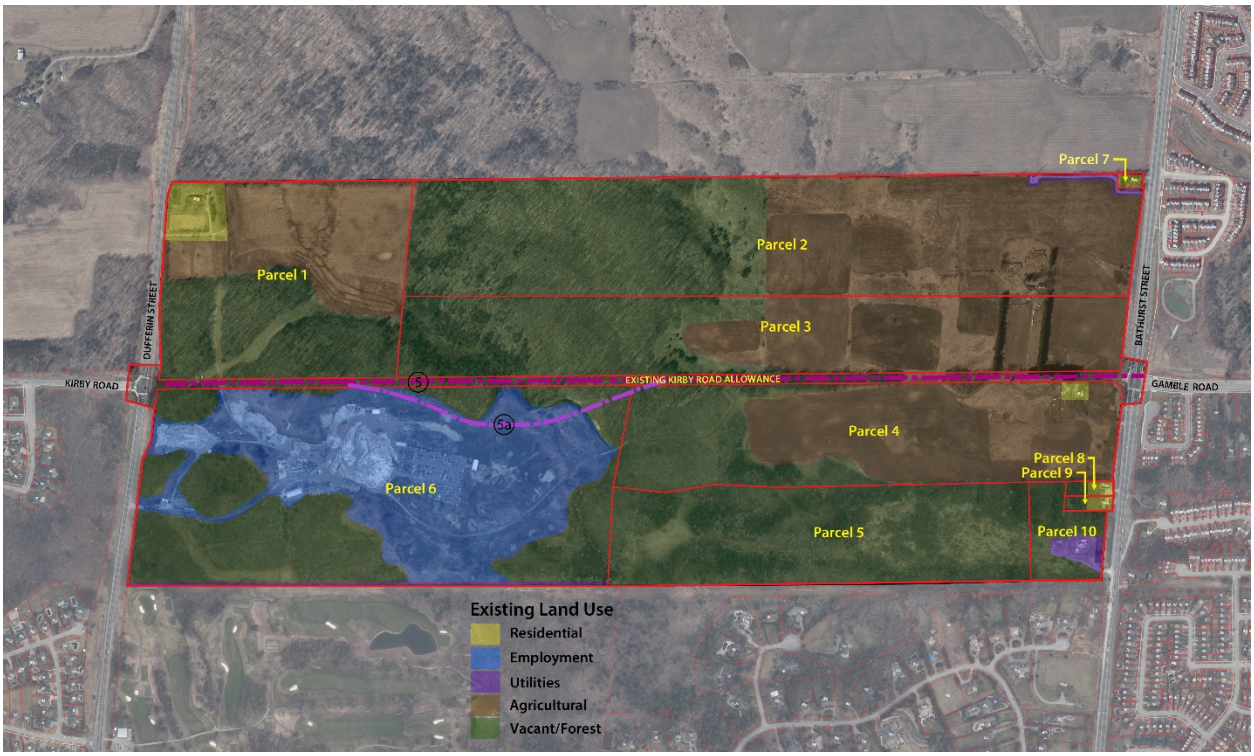


Figure 8: Alignment 5 and 5a

Alignment 5 proposed to span a Provincially Significant Wetland (PSW) with a bridge and impact a 200-metre buffer around an existing interior forest area. Shifting the alignment south would eliminate the need for the bridge and would maintain the existing 200 m buffer. A detailed analysis of how Alignment 5a conforms to the ORMCP is provided in an Addendum to the ORMCP Conformity Technical Paper, dated May 2019.

From a socio-economic perspective, the impact of Alignment 5a vs Alignment 5, increases only with respect to the impact on Parcel 6 and the need to acquire more expensive additional lands designated for residential development. It should be noted that a portion of the additional costs will be offset by the capital costs saved by not building a bridge to span the PSW and the life cycle costs of the bridge over time.

8.0 CONCLUSIONS

The need for the Kirby Road extension has been demonstrated through both the Region of York and City of Vaughan Transportation Master Plans and no reasonable alternatives have been identified. In addition, the EA team has verified the need through the Needs and Justification Transportation Study prepared by Poulos and Chung, which concluded that Kirby Road should be extended between Dufferin Street and Bathurst Street by year 2021.

A total of 10 potential alignments plus Alignment 5a have been identified to extend Kirby Road between Dufferin Street and Bathurst Street. The options include major, moderate and minor diversions from the existing Kirby road allowance, which represents the most direct and shortest connection between Dufferin Street and Bathurst Street.

Alignments 1, 2 and 3 have significant impacts on Natural Core Area features and are not located close to the edge of the Natural Core Areas. Alignments 8 and 9 will also have significant impact the Natural Core Area features. Alignments 4, 5a, 6, 6a and 7 have the potential of limiting the impact by crossing the Natural Core area features where it is the narrowest and close to the edge of the Natural Core Area where possible.

The potential visual impacts, and potential impact of noise, dust, vibrations and traffic of the alignments on the existing residences located in the Study Area are expected to be minimal for 4 of the 5 residences. These 4 residences are located on either Dufferin Street or Bathurst Street and are far enough removed not to be impacted by the extension of Kirby Road. The extension of Kirby Road is expected to impact the 5th existing residence located immediately south of the existing Kirby road allowance, west of Bathurst Street; however, the level of impact does not vary amongst the 9 optional alignments.

The potential impacts on existing and proposed land uses and on property values do vary amongst the alignments. Alignments 1, 2 and 3 will prohibit direct access to the proposed residential development on Parcel 6 without a connecting road that will pass through and impact key natural heritage features. Alignments through the centre of existing employment use and future residential use could have significant impacts resulting in a disruption of the employment use in the short term and negatively impact the future residential use by dividing the community and/or creating remnant blocks of land that are either inefficient to develop or are undevelopable.

The cost to acquire lands for the extension of Kirby road could be significant, particularly if the alignment passes close to the centre of the lands approved for residential development. While the cost alone should

not be used to necessarily exclude an alignment that passes through Parcel 6, measures to limit the amount of land required should be considered.

Lastly, the compatibility with existing provincial, regional and local planning policies need to be considered. A significant portion of the Study Area has been identified as containing key natural heritage features, including a Provincially Significant Wetland, and is designated Natural Core Area and or Natural Linkage Area in the ORMCP. Policies of the ORMCP require that where infrastructure is considered necessary, and there are no reasonable alternatives, construction of the infrastructure must occur in a manner that minimizes the potential impacts and is located along the edge of Natural Core Areas, where possible.

On this basis, and in consideration of the other criteria considered in this report, Alignment 5a of considered appropriate from a socio-economic perspective.

Respectfully submitted,
Lucas and Associates

Per: Glenn Lucas B.E.S.

Appendix 'A'
Study Area Land Description Details

KIRBY ROAD CLASS C ENVIRONMENTAL ASSESSMENT - Study Area Lands Description											
Parcel Number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Existing Kirby Road Allowance**
Property Description	Part Lot 31, Con 2	Part Lot 31, Con 2	Part S Half Lot 30, Con 2	Part NE 1/4 Lot 30, Con 2	Part Lot 30, Con 2	Part Lot 30, Con 2	Part Lot 31, Con 2	Part S1/2 Lot 30, Con2	Part S1/2 Lot 30, Con2	Part Lot 30, Con 2	Road Allowance Between Lots 30 & 31, Con 2
PIN	033420275	0332420396	033420397	33420315	033420413	033420266	033420277	033420269	033420270	033420418	033420286
Municipal Address	11641 Dufferin Street	(Not Assigned)	(Not Assigned)	11490 Bathurst Street	11400 Bathurst Street	11333 Dufferin Street	11654 Bathurst Street	11426 Bathurst Street	11414 Bathurst Street	(Not Assigned)	N/A
Area (m2)	203,612	359,922	240,126	212,980	173,391	399,274	1,404	2,994	3,049	24,575	40,004
Ownership	Private	Private	Private	Private	Private	Private	Private	Private	Private	Private	Corporation of the City of Vaughan
Current Land Use	Residential, Agricultural, Vacant	Agricultural, Utility, Vacant	Agricultural, Vacant	Residential, Agricultural, Vacant	Vacant	Concrete Recycling, Vacant	Residential	Residential, Vacant	Residential, Vacant	Utility, Vacant	Vacant, Residential Driveway
Oak Ridges Moraine Conservation Plan	Natural Core Area	Natural Core Area, Natural Linkage Area	Natural Core Area, Natural Linkage Area	Natural Core Area, Natural Linkage Area	Natural Core Area, Natural Linkage Area	Countryside, Natural Core Area	Natural Linkage Area	Natural Linkage Area	Natural Linkage Area	Natural Linkage Area	Natural Core Area, Natural Linkage Area
Region of York Official Plan Designations	Natural Core Area Designation	Natural Core Area Designation, Natural Linkage Area Designation	Natural Core Area Designation, Natural Linkage Area Designation	Natural Core Area Designation, Natural Linkage Area Designation	Natural Core Area Designation, Natural Linkage Area Designation	Subject to a Minister's Order that permits the development of urban uses.	Natural Linkage Designation Area	Natural Linkage Designation Area	Natural Linkage Designation Area	Natural Linkage Designation Area	Natural Core Area Designation, Natural Linkage Area Designation
	Regional Greenland Systems	Regional Greenland Systems	Regional Greenland Systems	Regional Greenland Systems	Regional Greenland Systems		Regional Greenland Systems	Regional Greenland Systems	Regional Greenland Systems	Regional Greenland Systems	Regional Greenland Systems
	ESA, Earth Science ANSI, Life Science ANSI	ESA, Earth Science ANSI, Life Science ANSI	ESA, Earth Science ANSI, Life Science ANSI	ESA, Earth Science ANSI, Life Science ANSI	ESA, Earth Science ANSI, Life Science ANSI		N/A	N/A	N/A	N/A	ESA, Earth Science ANSI, Life Science ANSI
	Provincially Significant Wetlands	Provincially Significant Wetlands	Provincially Significant Wetlands	N/A	N/A		N/A	N/A	N/A	N/A	Provincially Significant Wetlands
	Woodlands	Woodlands	Woodlands	Woodlands	Woodlands			Woodlands	Woodlands		Woodlands
	Area of Low Aquifer Vulnerability	Area of High Aquifer Vulnerabilty, Area of Low Aquifer Vulnerability	Area of High Aquifer Vulnerabilty, Area of Low Aquifer Vulnerability	Area of High Aquifer Vulnerabilty, Area of Low Aquifer Vulnerability	Area of High Aquifer Vulnerabilty, Area of Low Aquifer Vulnerability		Area of Low Aquifer Vulnerability	Area of High Aquifer Vulnerability	Area of High Aquifer Vulnerabilty, Area of Low Aquifer Vulnerability	Area of Low Aquifer Vulnerability	Area of High Aquifer Vulnerabilty, Area of Low Aquifer Vulnerability
	Rural Area	Rural Area	Rural Area	Rural Area	Rural Area		Rural Area	Rural Area	Rural Area	Rural Area	Rural Area
	Primary Mineral Aggregate Resource Area	Primary Mineral Aggregate Resource Area	Primary Mineral Aggregate Resource Area	Primary Mineral Aggregate Resource Area	Primary Mineral Aggregate Resource Area		Primary Mineral Aggregate Resource Area	Primary Mineral Aggregate Resource Area	Primary Mineral Aggregate Resource Area	Primary Mineral Aggregate Resource Area	Primary Mineral Aggregate Resource Area
	Significant Groundwater Recharge Area	Significant Groundwater Recharge Area	Significant Groundwater Recharge Area	Significant Groundwater Recharge Area	Significant Groundwater Recharge Area		Significant Groundwater Recharge Area	Significant Groundwater Recharge Area	Significant Groundwater Recharge Area	Significant Groundwater Recharge Area	Significant Groundwater Recharge Area
	Highly Vulnerable Aquifers	Highly Vulnerable Aquifers	Highly Vulnerable Aquifers	Highly Vulnerable Aquifers	Highly Vulnerable Aquifers		Highly Vulnerable Aquifers	Highly Vulnerable Aquifers	Highly Vulnerable Aquifers	N/A	Highly Vulnerable Aquifers
	Landform Conservation Area Category 1	Landform Conservation Area Category 1, Landform Conservation Authority Category 2	Landform Conservation Area Category 1, Landform Conservation Authority Category 2	Landform Conservation Area Category 1	Landform Conservation Area Category 1		Landform Conservation Area Category 1	Landform Conservation Area Category 1	Landform Conservation Area Category 1	Landform Conservation Area Category 1	Landform Conservation Area Category 1
City of Vaughan Official Plan Designations	Natural Areas and Countryside	Natural Areas and Countryside	Natural Areas and Countryside	Natural Areas and Countryside	Natural Areas and Countryside	Low Density Residential, Valley and Stream C orridor	Natural Areas and Countryside	Natural Areas and Countryside	Natural Areas and Countryside	Natural Areas and Countryside	Natural Areas and Countryside
	Non-Urban Area	Non-Urban Area	Non-Urban Area	Non-Urban Area	Non-Urban Area		Non-Urban Area	Non-Urban Area	Non-Urban Area	Non-Urban Area	Non-Urban Area
	Core Natural Heritage Features, Unapproved	Core Natural Heritage Features, Unapproved	Core Natural Heritage Features, Unapproved	Core Natural Heritage Features, Unapproved	Core Natural Heritage Features, Unapproved		N/A	Core Natural Heritage Features, Unapproved	Core Natural Heritage Features, Unapproved	Core Natural Heritage Features, Unapproved	Core Natural Heritage Features, Unapproved
	ESA, ANSI	ESA, ANSI	ESA, ANSI	ESA, ANSI	ESA, ANSI		N/A	N/A	N/A	N/A	ESA, ANSI
	Oak Ridges Moraine Natural Core	Oak Ridges Moraine Natural Core, Oak Ridge Moriane Natural Linkage	Oak Ridges Moraine Natural Core, Oak Ridge Moriane Natural Linkage	Oak Ridges Moraine Natural Core, Oak Ridge Moriane Natural Linkage	Oak Ridges Moraine Natural Core, Oak Ridge Moriane Natural Linkage		Oak Ridges Morain Natural Linkage	Oak Ridges Morain Natural Linkage	Oak Ridges Morain Natural Linkage	Oak Ridges Morain Natural Linkage	Oak Ridges Moraine Natural Core, Oak Ridge Moriane Natural Linkage
	Secondary Sand and Gravel Resources	Secondary Sand and Gravel Resources, Aggregare Resources Area	Secondary Sand and Gravel Resources, Aggregare Resources Area	Secondary Sand and Gravel Resources, Aggregare Resources Area	Secondary Sand and Gravel Resources, Aggregare Resources Area		Secondary Sand and Gravel Resources	Secondary Sand and Gravel Resources, Aggregare Resources Area	Secondary Sand and Gravel Resources, Aggregare Resources Area	Secondary Sand and Gravel Resources, Aggregare Resources Area	Secondary Sand and Gravel Resources, Aggregare Resources Area
	Low Vulnerability Aquifer	High Vulnerability Aquifer, Low Vulnerability Aquifer	High Vulnerability Aquifer, Low Vulnerability Aquifer	High Vulnerability Aquifer, Low Vulnerability Aquifer	High Vulnerability Aquifer, Low Vulnerability Aquifer		Low Vulnerability Aquifer	High Vulnerability Aquifer	High Vulnerability Aquifer	High Vulnerability Aquifer	High Vulnerability Aquifer, Low Vulnerability Aquifer
	Landform Conservation Category 1	Landform Conservation Area Category 1, Landform Conservation Authority Category 2	Landform Conservation Area Category 1, Landform Conservation Authority Category 2	Landform Conservation Area Category 1	Landform Conservation Area Category 1		Landform Conservation Area Category 1	Landform Conservation Area Category 1	Landform Conservation Area Category 1	Landform Conservation Area Category 1	Landform Conservation Area Category 1
	Oak Ridges Moraine Natural Core	Oak Ridges Moraine Natural Core, Oak Ridges Moraine Natural Linkage	Oak Ridges Moraine Natural Core, Oak Ridges Moraine Natural Linkage	Oak Ridges Moraine Natural Core, Oak Ridges Moraine Natural Linkage	Oak Ridges Moraine Natural Core, Oak Ridges Moraine Natural Linkage		Oak Ridges Moraine Natural Linkage	Oak Ridges Moraine Natural Linkage	Oak Ridges Moraine Natural Linkage	Oak Ridges Moraine Natural Linkage	Oak Ridges Moraine Natural Core, Oak Ridges Moraine Natural Linkage
City of Vaughan Zoning (By-law 1-88)	**ORM** Oak Ridges Moraine, **OS5** Open Space 5	**ORM** Oak Ridges Moraine, **OS5** Open Space 5	**ORM** Oak Ridges Moraine, **OS5** Open Space 5	**ORM** Oak Ridges Moraine, **OS5** Open Space 5	**ORM** Oak Ridges Moraine, **OS5** Open Space 5	Future Urban Zone	**ORM** Oak Ridges Moraine	**ORM** Oak Ridges Moraine, **OS5** Open Space 5	**ORM** Oak Ridges Moraine, **OS5** Open Space 5	**ORM** Oak Ridges Moraine, **OS5** Open Space 5	**ORM** Oak Ridges Moraine, **OS5** Open Space 5
Additional Comments						Subject to a Minister's Order Issued on February 3, 2015					

Appendix B
Existing Land Use Impacts

KIRBY ROAD CLASS C ENVIRONMENTAL ASSESSMENT - Existing Land Use Impacts											
ALIGNMENT OPTION		1	2	3	4	5	6	6a	7	8	9
Description		Major Northerly Diversion to Avoid Wetland and Dense Forest	Moderate Northerly Diversion to Avoid Wetland and Groundwater Discharge Area	Minor Northerly Diversion with Wetland Crossing and Avoid Dense Forest	Minor Northerly Diversion with Wetland Crossing to Minimize Impacts to Forest	Direct Extension with Wetland Crossing	South to North Minor Jog Diversion to Avoid Wetland and Minimize Impacts to Forest	South to North Moderate Jog Diversion to Avoid Wetland and Minimize Impacts to Forest	South to North Minor Jog Diversion to Avoid Wetland and Minimize Impacts to Forest	Minor Southerly Diversion to Avoid Wetland	Moderate Southerly Diversion to Avoid Wetland and Minimize Impacts to Dense Forest
Total Length		2,265 m	2,085 m	2,025 m	2,005 m	1,990 m	2,045 m	2,063 m	2,035 m	2,015 m	2,115 m
PARCEL	LAND USE										
PARCEL 1	Employment/Future Residential Use										
	Agricultural Use	230 m	165 m								
	Vacant Use	250 m	255 m	225 m							
	Parcel 1 Length	480 m	420 m	225 m							
PARCEL 2	Employment/Future Residential Use										
	Agricultural Use	50 m									
	Vacant Use	815 m	180 m								
	Parcel 2 Length	865 m	180 m								
PARCEL 3	Employment/Future Residential Use										
	Agricultural Use			155 m	720 m		645 m	656 m	715 m		
	Vacant Use	255 m	420 m	645 m	200 m		120 m	117 m	90 m		
	Parcel 3 Length	255 m	420 m	800 m	920 m		765 m	773 m	805 m		
Parcel 4	Employment/Future Residential Use										
	Agricultural Use									410 m	340 m
	Vacant Use									265 m	105 m
	Parcel 4 Length									675 m	445 m
PARCEL 5	Employment/Future Residential Use										
	Agricultural Use										
	Vacant Use										340 m
	Parcel 5 Length										340 m
PARCEL 6	Employment/Future Residential Use						390 m	748 m	680 m	670 m	665 m
	Agricultural Use										
	Vacant Use						90 m	97 m	110 m	40 m	85 m
	Parcel 6 Length						480 m	845 m	790 m	710 m	750 m
EXISTING KIRBY ROAD ALLOWANCE	Employment/Future Residential Use										
	Agricultural Use										
	Vacant Use	665 m	1065 m	995 m	1085 m	1990 m	800 m	445 m	440 m	630 m	580 m
	Kirby Road Allowance Length	665 m	1065 m	995 m	1085 m	1990 m	800 m	445 m	440 m	630 m	580 m
TOTALS	Employment/Future Residential Use						390 m	748 m	680 m	670 m	665 m
	Agricultural Use	280 m	165 m	155 m	720 m		645 m	656 m	715 m	410 m	340 m
	Vacant Use	1985 m	1920 m	1865 m	1285 m	1990 m	1,010	659 m	640 m	935 m	1110 m
	Total Road Length	2265 m	2085 m	2020 m	2005 m	1990 m	2045 m	2063 m	2035 m	2015 m	2115 m

APPENDIX C3.2

Oak Ridges Moraine Policy Conformity Technical Paper

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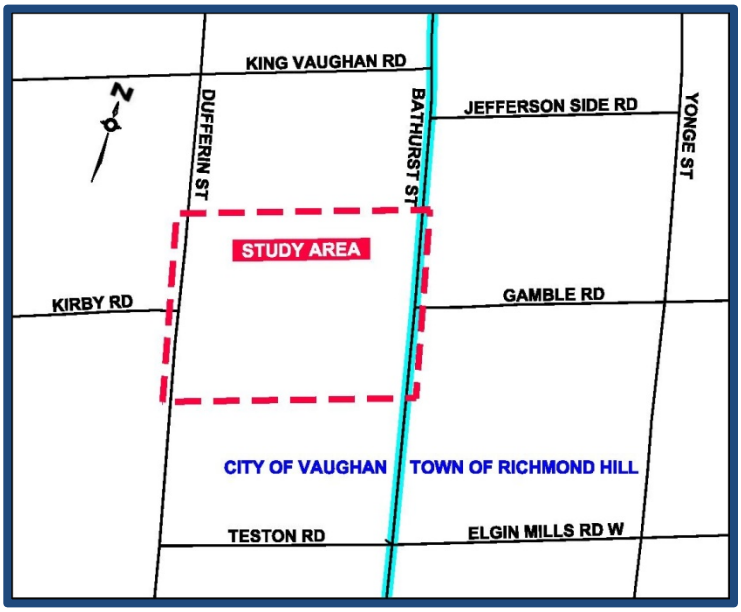
KIRBY ROAD EXTENSION
ENVIRONMENTAL ASSESSMENT STUDY

OAK RIDGES MORAINE POLICY CONFORMITY

Draft Technical Paper



September 2018

LUCAS & ASSOCIATES
Consultants in Planning and Land Development
24 Debra Crescent
Barrie, Ontario
L4N 3T1
(705) 727-8335

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for 2-sided printing purposes

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1. INTRODUCTION

This technical paper documents how the policies of the Oak Ridges Moraine Conservation Plan (ORMCP) 2017 were considered in assessment of the alignment options of the proposed extension of Kirby Road between Dufferin Street and Bathurst Street in the City of Vaughan. It also summarizes the comprehensive approach to the selection, screening and evaluation of alternative road alignments.

The proposed extension of Kirby Road is subject to a Municipal Class Schedule "C" Environmental Assessment. In Ontario, the definition of 'environment' under the Environmental Assessment Act (EAA) includes social, economic and cultural conditions that influence the life of humans or a community. The MOE Code of Practice titled Preparing, Reviewing and Using Class Environmental Assessment in Ontario (2014), under Section 3 Considerations for Good Environmental Planning, states:

> *"During the preparation of the class environmental assessment project, the proponent must consider not only the potential environmental effects on the natural environment, but also the social, economic, cultural and built environments and how they interrelate for every alternative being considered."*

The Assessment includes the preparation of a Natural Heritage Existing Conditions Report, a Socio-Economic Impact Assessment (SEIA), Transportation, Traffic and Active Transportation Needs and Justification Assessment, as well as other studies dealing with geotechnical and hydrogeologic conditions, and potential impacts on cultural and archaeological resources. Team members representing all of these technical disciplines contributed to the identification, screening and evaluation of alternatives. The environmental planning/evaluation process was led by Schaeffers Consulting Engineers (Schaeffers). Land use planning contributions (i.e., policy compliance) were led by Lucas & Associates.

Included in the SEIA is a review of relevant provincial, regional and local planning policies affecting the study area. There are two major over-arching documents that affect the study area. The study area is located within the Oak Ridges Moraine and is subject to the policies and designations of the ORMCP. Policies of both the Region of York Official Plan and the City of Vaughan Official Plan conform to and reflect the policies and designations of the ORMCP.

The ORMCP divides the Moraine into four land use designations: Natural Core Areas, Natural Linkage Areas, Countryside Areas, and Settlement Areas. In general terms, the disturbed area located in the southwest portion of the study area (Parcel 6) is designated Countryside Area, the most eastern portion of the Study Area is designated Natural Linkage Area and the balance of the Study Area is designated Natural Core Area. The Natural Core Area designation is the most restrictive and most protective of the four designations. Any potential road extension traversing the Study Area will interfere with the designated areas.

As explained in detail in the SEIA report, the EA Study Area is comprised of 10 parcels of land and an unopened road allowance (see Figure 1: Study Area Existing Land Use). Existing land uses consist of 6

residences, a concrete recycling operation, agricultural uses, utility uses, and vacant/forested lands. Parcel 6, including the concrete recycling facility and occupying significant part (approximately 25%) of the area, is located at the south-west quadrant of the Study Area. The parcel is subject to a Minister's order issued in February 2015 under Section 18(1) of the Oak Ridges Moraine Conservation Act (ORMCA), 2001. This Minister of Municipal Affairs and Housing Order amends specific sections in the Region of York Official Plan, the City of Vaughan Official Plan, and City of Vaughan Zoning By-law to permit urban uses developed on the basis of full municipal services, an approved and registered draft plan of subdivision and implementing zoning by-law.

2. REVIEW PROCESS

Nine horizontal road alignment options were identified and screened.. Identification of the nine potential alignments was undertaken to provide a range of options, including utilizing the existing unopened Kirby road allowance and alignments options located both north and south from the municipal Right of Way (RoW) (see Figure 2: ORMCP Designations – Long List).

The screening process included consideration of several background studies including a Natural Heritage Existing Conditions Report, Transportation, Traffic and Active Transportation and Justification Report, and a Socio-Economic Impact Assessment, which included an examination of provincial, regional and local planning policies. Three of the nine options (Alignments 4, 5 and 6) were short-listed following the June 2017 Public Information Center (PIC) #1 and were carried forward for further evaluation.

Generally, the six alignments that were screened out would have larger impact on the natural environment. In some cases, they passed through the widest portions of the Natural Core Area and through interior forests. In some cases, the alignments required grading well beyond the limits of the proposed 36m road allowance resulting in larger impacts on the natural environment. In addition, several of the alignments would result in increasing the length of the extension considerably, and would require significant, and less than desirable, horizontal and vertical curvatures in the road. Therefore, it was concluded that avoidance of the key environmental features had been achieved.

The first of the three initially short-listed alignments (Alignment 4) utilizes the exiting Kirby unopened road allowance in the western portion of the study area and swings slightly north in the eastern portion to avoid a hedgerow. Alignment 5 utilizes the entire length all of the existing Kirby unopened road allowance. Both alignment 4 and 5 require a bridge crossing of a PSW. Alignment 6 is the same as Alignment 4 but utilizes only a portion of the existing Kirby unopened road allowance and then swings south to avoid the PSW but does encroach into the PSW buffer.

Based on an agency site meeting in August of 2017 a fourth alignment (Alignment 6A) was added to the short-list in response to agency input with respect to avoiding existing natural features. Alignment 6A is similar to Alignment 6 but swings to the south sooner to avoid existing wooded areas within the exiting road allowance and travels further south into the Parcel 6 to avoid the PSW and the PSW buffer.

The four short-listed alignments (see Figure 3: ORMCP Designations - Updated Short List) went through a detailed comparative evaluation analysis. This analysis examined the options from a natural environment perspective, social environment perspective, transportation environment perspective and economic environment perspective.

Natural Environment Impact Analysis

The natural environment evaluation examined potential impacts on:

- wetlands,
- vegetation,
- wildlife habitat,
- surface water quantity and quality,
- aquatic habitat,
- watercourses, stormwater management, and
- recharge and discharge areas.

Based on the analysis, the team determined that:

1. Alternatives 4 and 5 will result in the most amount of impact to adjacent natural heritage features with Alternative 5 resulting in the most amount of impact.
2. Alternative 6 and 6A will result in relatively equal amounts of impact with Alternative 6 resulting in more encroachment into adjacent woodland and PSW buffer area than Alternative 6A.

Social Environment Impact Analysis

From the social environment perspective, the following criteria were considered:

- degree of compatibility with provincial, regional and municipal planning policies;
- impact on agricultural operations;
- impact on approved development proposals;
- impact on existing wells;
- noise impacts; and
- encroachment on private property and land acquisition costs.

The following summarizes the social environment analysis of the four alignment options:

1. Alignments 4 and 5 are the same except Alignment 4 avoids the hedgerow located in the existing ROW in the eastern portion of the Study Area and as a result, has a significant impact on agricultural lands.
2. Alignment 5, which uses all of the existing ROW has the least impact on existing and approved agricultural and development related land uses.
3. Alignment 5 also has the least impact on privately owned lands and requires the least amount of privately owned lands that must be acquired.
4. Alignments 6 and 6A will result in the least impact in existing environmental features and associated functions and Alignment 5 will result in the most impact to existing environmental features and functions.
5. Alignments 6 and 6A have the greatest impact on existing and approved agricultural and development related land uses.

6. Alignments 6 has a significant impact on privately owned lands requiring the acquisition of approx. 11.35 ha of land including approx. 3.21 ha of lands designated for residential development.
7. Alignment 6A has a very significant impact on privately owned lands requiring the acquisition of approx. 14.53 ha of land including approx. 6.19 ha of lands designated for residential development.
8. None of the alignments impact existing wells.
9. There are no significant differences amongst the 4 alignments with respect to noise.

Transportation Environment Impact Analysis

The transportation environment analysis considered the following:

- network connectivity and capacity
- mode of transportation
- design complexity
- construction complexity; and
- operation.

The following summarizes the transportation analysis of the four alignment options:

1. All alignments improve the overall road network operational capability.
2. Alignment 6 and 6A have varying centreline curvatures including the formation of back to back curves in order the connect to exiting Dufferin Street/Kirby Road intersection and Bathurst Street/Gamble Road intersection.
3. These curves lengthen the total travel distance, for all modes of transportation between Bathurst Street and Dufferin Street.
4. Automobiles, trucks and transit will experience increased travel times and increased operating costs and fuel consumption due to the additional travel distance.
5. Alignments 4 and 5 were found to have a minimal effect while Alignment 6A was found to have a moderate effect and Alignment 6 a significant effect.

Economic Environment Impact Analysis

The economic environment analysis considered the following:

- capital costs
- operation and maintenance costs
- property acquisition costs

The following summarizes the economic analysis of the four alignment options:

1. Although Alignments 6 and 6A had the lowest capital, the operation and maintenance costs were higher than Alignments 4 and 5.
2. The property acquisition costs were significantly higher for Alignments 6 and 6A.
3. Alignment 5 scores the highest with respect to economic ranking and Alignment 6A the lowest, primarily due to a property acquisition cost that exceeds $50 Million.

Following a full review and evaluation of all the anticipated impacts associated with the four environments, the Assessment Team scored the alignments within their respective disciplines and ranked them. Based on the cumulative score across all four environments, Alignment 5 was identified as being most recommended.

3. ORMCP INFRASTUCTURE POLICIES

The ORMCP is set out in O. Reg. 140/02 under the ORMCA, 2001.

Policy 41 of the ORMCP sets out the policies regarding the development of infrastructure, which includes "public highways", in the Oak Ridges Moraine Plan Areas.

Policy 41(1.2) states the following:

> *Municipalities shall ensure that the development of new infrastructure or the upgrading or extension of existing infrastructure is supported by the necessary studies, assessments and documentation such as Infrastructure master plans, asset management plans, land use and financial scenarios, watershed studies and subwatershed plans, environmental assessments and other relevant studies that,*
>
> *a) demonstrate that infrastructure will be financially feasible and sustainable over the long-term;*
> *b) demonstrate that an adequate water supply is available for the development, and that there is sufficient assimilative capacity to deal with the sewage from the development, without compromising the ecological integrity of the Plan area;*
> *c) address stormwater management at appropriate scales throughout the land use planning process;*
> *d) utilise appropriate low impact development techniques and green infrastructure; and,*
> *e) assess actions to reduce greenhouse gas emission and to adapt to climate change impacts.*

It should be noted that Policy 41(1.2) was not found in the original ORMCP 2002 and was added when the ORMCP was amended in 2017.

With respect to infrastructure development within the Natural Linkage and Natural Core Areas, the ORMCP Plan policies state the following:

Policy 41(2):

> *An application for the development of infrastructure in or on land in a Natural Linkage Area shall not be approved unless,*
>
> *a) the need for the project has been demonstrated and there is no reasonable alternative; and*
> *b) the applicant demonstrates that the following requirements will be satisfied, to the extent that is possible while also meeting all applicable safety standards:*

1. *The area of construction disturbance will be kept to a minimum.*
2. *Right of way widths will be kept to the minimum that is consistent with*
   i. *meeting other objectives such as stormwater management and erosion and sediment control, and*
   ii. *locating as much infrastructure uses within a single corridor as possible.*
3. *The project will allow for wildlife movement.*
4. *Lighting will be focused downwards and away from Natural Core Areas.*
5. *The planning, design and construction practices adopted will keep any adverse effects on the ecological integrity of the Plan Area to a minimum.*

Policy 41 (2.1) states:

An application for the development of infrastructure in or on land in a prime agricultural area shall not be approved unless,

a) the need for the project has been demonstrated and there is no reasonable alternative that could avoid the development occurring in the prime agricultural area; and
b) an agricultural impact assessment or equivalent analysis carried out as part of an environmental assessment, is undertaken that demonstrates that there will be no adverse impacts to the prime agricultural area or that such impacts will be minimized and mitigated to the extent possible.

Policy 41(3) states the following with respect to infrastructure in a Natural Core Area:

An application for the development of infrastructure in or on land in a Natural Core Area shall not be approved unless the applicant demonstrates that,

(a) the requirements of subsection (2) have been met;
(b) the project does not include and will not in the future require a highway interchange or a transit or railway station in a Natural Core Area; and
(c) the project is located as close to the edge of the Natural Core Area as possible.

Policy 41(4) states:

Except as permitted in subsection (5), with respect to land in a key natural heritage feature or a key hydrologic feature, the development of new and the upgrading or extension of existing infrastructure, including the opening of a road within an unopened road allowance, is prohibited.

Policy 41(5) states the following:

Infrastructure may be permitted to cross a key natural heritage feature or a key hydrologic feature if the applicant demonstrates that,

(a) the need for the project has been demonstrated and there is no reasonable alternative;

(b) the planning, design and construction practices adopted will keep any adverse effects on the ecological integrity of the Plan Area to a minimum;

(c) the design practices adopted will maintain, and where possible improve or restore, key ecological and recreational linkages, including the trail system referred to in section 39;

(d) the landscape design will be adapted to the circumstances of the site and use native plant species as much as possible, especially along rights of way; and

(e) the long-term landscape management approaches adopted will maintain, and where possible improve or restore, the health, diversity, size and connectivity of the key natural heritage feature or key hydrologic feature.

Policy 41(6) states:

Service and utility trenches for infrastructure shall be planned, designed and constructed so as to keep disruption of the natural groundwater flow to a minimum.

4. ORMCP POLICY CONFORMITY

For the purposes of this analysis the policies requirements have been summarized as follows:

1. Demonstrate the Need and there is no reasonable alternative
2. Keep Impact on the Environment to a minimum;
3. Minimize Impact on Prime Agricultural Lands; and,
4. Ensure that Infrastructure is Supported by the Necessary Studies and is Economically Feasible and Sustainable.

As a rule, development of infrastructure shall not be approved within the ORCMP protected areas. Notwithstanding the requirement, the ORCMP specifically permits infrastructure to cross/alter the protected areas, if authorized under an EA process. In other words, conformity with the ORCMP can be achieved through satisfying requirements of the EAA. Notably, the ORCMP does not provide any tools for infrastructure planning and design, including systematic evaluation of alternatives, while the municipal Class EA under the EAA does. Therefore, conformance of the proposed infrastructure with the ORMCP can be deferred to the approved EA planning and design process under the EAA.

1. Demonstration of Need and There is no Reasonable Alternative (Policy 41(2)(a), 41(5)(a))

The need for the project has been demonstrated in both the Region of York Transportation Master Plan (2016) and the City of Vaughan Master Transportation Plan (2012). The need for the project was also confirmed through a Transportation Analysis Study undertaken by Poulos and Chung Ltd. The study verified the need for Kirby Road extension, concluded that it must be completed by 2021, and that it must have two lanes in each direction.

The extension of Kirby Road connects Kirby Road west of Dufferin Street to Gamble Road east of Bathurst Street. The section represents one of several "missing links" in the Regional road network. In the case of the Kirby Road, this missing link requires that traffic moving east and west through this area of the Region use Dufferin Street and Bathurst Street to bypass the missing section resulting in more congestion and increased travel time.

There is no reasonable alternative to the proposed Kirby Road extension. A new road between Dufferin Street and Bathurst Street north or south of the proposed extension would still require that traffic use Dufferin and Bathurst Streets and congestion and travel time concerns would remain unresolved.

The assessments conducted by three different groups of analysts clearly demonstrated the need for the extension of Kirby Road and that there is no reasonable alternative.

2. Impact on the Environment

The policies of the ORMCP require the following with respect to impacts on the natural environment.

- **"*The area of construction disturbance be kept to a minimum*" (Policy 41(2)(b)(1))**

As discussed earlier, the screening of the nine potential alignments included an examination of grading impacts outside of the right-of-way and alignments that required a significant amount of grading were removed from further consideration.

Additional measures to ensure that construction disturbance will be kept to a minimum will be outlined in the final design of the extension.

- **"*Right of way widths will be kept to the minimum*" (Policy 41(2)(b)(2))**

Included in the Assessment was an evaluation of potential road cross-section designs, including a design that would require a 45 m wide right-of-way. Following an evaluation of the net effects, it was determined that a right-of-way width of 36 m is sufficient to meet the proposed design criteria, including stormwater management and erosion and sediment control requirements, and that all of the infrastructure uses can be located within a single corridor.

- **"*The project will allow for wildlife movement*" (Policy 41(2)(b)(3))**

Wildlife movement will be accommodated and directed through one or more eco-passages, to be addressed through detailed design.

- **"*Lighting will be focused downwards and away from Natural Core Areas*" (Policy 41(2)(b)(4))**

Lighting will generally be focused downwards and away from Natural Core Areas and addressed through detailed design.

- **"*The planning, design and construction practices adopted will keep any adverse effects on the ecological integrity of the Plan Area to a minimum*" (Policy 41(2)(b)(5), 41(5)(b))**

The ORCMP definitions state that “ecological integrity”, which includes hydrological integrity, means the condition of ecosystems in which,

(a) the structure, composition and function of the ecosystems are unimpaired by stresses from human activity,

(b) natural ecological processes are intact and self-sustaining, and

(c) the ecosystems evolve naturally;

Also, “ecological functions” means the natural processes, products or services that living and non-living environments provide or perform within or between species, ecosystems and landscapes, including hydrological functions and biological, physical, chemical and socio-economic interactions.

Based on the above, the ORCMP recognises and requires minimizing adverse effects to all parts of the environment, including socio-economic interactions.

As discussed, following a full review and evaluation of all the net effects within the four environments, the alignments have been scored within their individual respective disciplines. The alternatives were then based on a cumulative score across all four environments with Alignment 5 being the most recommended and Alignment 6A being the least recommended. That does not mean that Alignment 5 scored highest in all respects because with respect to the impacts on the natural environment, for example, it scored lower than Alignments 4, 6 and 6A. However, the EAA requires that consideration be given to all "environments", including the social, economic and cultural condition that influence the life of humans or a community.

The ORMCP requires that adverse effects be kept to a minimum. That requires an examination and consideration of the effects on the natural, social, economic and cultural conditions. In the context of that broad review, ecological effects will be minimized.

Neither the EAA nor the ORMCA contain wording that qualifies the Environmental Assessment process where infrastructure is proposed in the Oak Ridges Moraine. The policies of the Oak Ridges Moraine Conservation Plan are not intended to supersede or supplant the requirements of the EAA, and while Section 25 of the Oak Ridges Moraine Act, 2001 states that in the event of conflict between Oak Ridges Moraine Act and any other general or special Act, the Oak Ridges Moraine Act prevails, the Oak Ridges Moraine Act and the EAA are not in conflict, in this instance.

Policy 41(1.2)(a) of the ORMCP states that municipalities must ensure that the development of new infrastructure or the upgrading or extension of existing infrastructure is supported by the necessary studies, assessments and documentation such as infrastructure master plans, asset management plans, land use and financial scenarios, watershed studies and subwatershed plans, **environmental assessments** and other relevant studies (emphasis added).

The identification of Alignment 5 as the most recommended option was based on an evaluation of impacts on all environments, including the natural environment. This evaluation included planning, design and construction practices that will keep the effects of Alignment 5 to a minimum. These include, for example, a proposed structure that will span the PSW instead of removing it and is designed to accommodate wildlife movement. In addition, Alignment 5 west of the PSW will run along the edge of the Natural Core Area (see attached). It should also be noted that Alignment 5 requires the least amount of grading outside the proposed 36m right of way.

- "***The project does not include and will not in the future require a highway interchange or a transit or railway station in a Natural Core Area***" **(Policy 41(3)(b))**

The proposed extension of Kirby Road does not and will not require a highway interchange or transit or railway station.

- ***"The project is located as close to the edge of the Natural Core Area as possible"*** **(Policy 41(3)(c))**

As noted, regardless of which alignment option is chosen, the extension of Kirby Road will pass through lands designated Natural Core Area and lands designated Natural Linkage Area. Efforts were made to ensure that the crossing of the Natural Core feature occurred at its narrowest, and all four of the shortlisted options do that. In the western portion of the study area, Alignments 4 and 5, which utilize the existing Kirby Road right-of-way, are located within the forested area but for the most part at the edge of the core feature.

- ***"The design practices adopted will maintain, and where possible improve or restore, key ecological and recreational linkages, including the trail system referred to in section 39***" **(Policy 42(5)(c))**

- "***The landscape design will be adapted to the circumstances of the site and use native plant species as much as possible, especially along rights of way***" **(Policy 41(5)(d))**

- "***The long-term landscape management approaches adopted will maintain, and where possible improve or restore, the health, diversity, size and connectivity of the key natural heritage feature or key hydrologic feature***" **(Policy 41(5)(e))**

The three requirements above will be addressed and incorporated through the detailed design and mitigation measures.

3. Impact on Prime Agricultural Lands Policy 41(2.1)

The Ontario Ministry of Agriculture, Food and Rural Affairs identifies that the lands located in the northeast portion of the Study Area (Parcels 2 and 7 in the SEIA) are within a prime agricultural area. However, since the most recommended alternative for the Kirby Road extension does not fall within the prime agricultural area, the proposal is exempt from the ORMCP requirement for a separate Agricultural Impact Assessment.

4. Ensure that Infrastructure is Supported by the Necessary Studies, etc. and is Economically Feasible and Sustainable.

The ORMCP requires that new Infrastucture be supported by the necessary studies, assessments and documentation, such as infrastructure master plans, asset management plans, land use and financial scenarios, watershed studies and subwatershed plans, environmental assessments and other relevant studies.

As discussed previously, the extension of Kirby Road between Dufferin Street and Bathurst Street has been identified in both the Region of York Transportation Master Plan (2016) and the City of Vaughan Master Transportation Plan (2012). The need for the project was also confirmed through a Transportation Analysis Study undertaken by Poulos and Chung Ltd. In addition the extension is also subject to an Environmental Assessment.

These studies, assessments, etc., are required to address the following:

- **"*Demonstrate that infrastructure will be financially feasible and sustainable over the long-term*" (Policy 41(1) (1.2) (a)**

The assessment included a considerable effort evaluating financial feasibility of the four short-listed alignments, including the costs associated with acquiring privately owned lands. It was concluded that Alignments 6 and 6A have the greatest impact on privately owned lands and will require the acquisition of lands approved for residential development, the cost of which is significant. Based on the Assessment Team's analysis, the preliminary land acquisition costs alone for Alignments 6 and 6A is estimated at $27 Million and $51 Million, respectively.

The City of Vaughan estimates the cost to extend Kirby Road at approximately $38 Million in their 2018 Development Charge Background Study (see Figure 4: Capital Program Excerpt). The Development Charge Background Study estimate informs the definition of "financially feasible" by virtue of the fact that the study establishes the development charge rate on the premise that what is collected in development charges will pay for the works identified in the study.

The following are estimates of the total preliminary cost for the four short-listed alignments as follows:

Alignment 4: $33,859,826
Alignment 5: $32,018,318
Alignment 6: $42,267,810
Alignment 6A: $66,522,466

Logically, Alignment 5 which utilizes all of the existing road allowance and requires the least amount of land acquisition, and is the most cost effective, followed closely by Alignment 4. It should be noted that the costs of Alignment 4 and 5 include the construction and long-term maintenance of a structure that spans the PSW for its preservation.

Alignments 6 and 6A are in the order of $10 and $24 million are more expensive, even though these alignments do not require construction of a bridge. The higher costs are attributed primarily to the

significant land acquisition costs resulting in a total preliminary cost that exceeds the City of Vaughan's budget for the Kirby Road extension.

- "***Demonstrate that an adequate water supply is available for the development, and that there is sufficient assimilative capacity to deal with the sewage from the development, without compromising the ecological integrity of the Plan Area***" **(Policy 41(1) (1.2) (b))**

This policy is not applicable to the proposed extension of Kirby Road.

- "***Address stormwater management at appropriate scales throughout the land use planning process***" **(Policy 41(1) (1.2) (c))**

- "***Utilise appropriate low impact development techniques and green infrastructure***" **(Policy 41(1) (1.2) (d))**

The two requirements above will be addressed and incorporated through the detailed design and mitigation measures. A comprehensive Stormwater Management Plan will be prepared.

- "***Assess actions to reduce greenhouse gas emissions and to adapt to climate change impacts***" **(Policy 41(1) (1.2) (e))**

A climate change impact assessment will be prepared as part of finalising the recommended road alignment. Actions to reduce greenhouse emission were considered and support Alignment 5, which is the shortest and most direct alignment resulting in shorter travel times and lower greenhouse gas emission.

Policy 41(4) states that the development of new infrastructure, including the opening of a road within an unopened road allowance, is prohibited in a key natural heritage feature or key hydrolic features unless the requirements of Policy 41(5) are met. How those requirements are satisfied is outlined in Section 2 of the this technical paper.

Policy 41(6) requires that service and utility trenches for infrastructure be planned, designed and constructed so as to keep disruption of natural groundwater flow to a minimum. This requirement will be addressed and incorporated through the detailed design of the preferred alignment.

Landform Conservation Policies

The Study Area contains lands identified in the ORMCP as Landform Conservation Area - Category 1 and Landform Conservation Area - Category 2. Policy 30 of the ORMCP sets out the Plan's policies regarding landform conservation in the Oak Ridges Moraine.

Policy 30(5) states:

> *"An application for development or site alteration with respect to land in a landform conservation area (Category 1) shall identify planning, design, and construction practices that will keep disturbance to landform character to a minimum, including,*
>
> *a) maintaining significant landform features such as steep slopes, kames, kettles, ravines and ridges in their natural undisturbed form;*
> *b) limiting the portion of the net developable area of the site that is disturbed to not more than 25 per cent of the total area of the site; and*
> *c) limiting the portion of the net developable area of the site that has impervious surfaces to not more than 15 per cent of the total area of the site.*

Policy 30(6) states:

> *"An application for development or site alteration with respect to land in a landform conservation area (Category 2) shall identify planning, design, and construction practices that will keep disturbance to landform character to a minimum, including,*
>
> *a) maintaining significant landform features such as steep slopes, kames, kettles, ravines and ridges in their natural undisturbed form;*
> *b) limiting the portion of the net developable area of the site that is disturbed to not more than 50 per cent of the total area of the site; and*
> *c) limiting the portion of the net developable area of the site that has impervious surfaces to not more than 20 per cent of the total area of the site.*

Policy 30(8) states:

> *"An application for major development with respect to land in a landform conservation area of either category shall be accompanies by a landform conservation plan that shows, on one or more maps,*
>
> *a) elevation contours in sufficient detail to show the basic topographic character of the site, with an interval of not more than two metres,*
> *b) analysis of the site by slope type (for example, moderate to steep);*
> *c) significant landform features such as kames, kettles, ravines and ridges; and*
> *d) all water bodies including intermittent streams and ponds.*

The ORMCP defines development as follows:

"means the creation of a new lot, a change in land use, or the construction of buildings and structures requiring approval under the Planning Act but does include,

a) activities that create or maintain infrastructure authorized under an environmental assessment process, or
b) works that are subject to the Drainage Act;

Since infrastructure created or maintained under an environmental assessment process is not considered development, the proposed extension of Kirby Road is not subject to the landform conservation policies of the ORMCP. In addition, it should be noted that Policy 41 of the ORMCP, which sets out specific policies related to infrastructure in the Oak Ridges Moraine, does not include any policies related to landform conservation.

5. CONCLUSIONS

As outlined in this memo, the Kirby Road Environmental Assessment carried out as a municipal Class EA under the EAA must consider all 'environments' including the technical, natural, social, economic and cultural environments. The ORCMP specifically permits infrastructure to cross/alter the protected areas, if authorized under an EA process.

The natural environment and policies related to the development of infrastructure in the Oak Ridges Moraine were a major consideration in the determining the short-list of potential alignments. These policies were also given due consideration in the more detailed evaluation of the 4 short-listed options.

The ORMCP also requires that municipalities demonstrate that the infrastructure project be financially feasible. The significant land acquisition cost associated with Alignments 6 and 6A is an important consideration when evaluating the alignments. It would not be in the public's interest to recommend an option that is financially unviable or would place an untenable financial burden on the residents of Vaughan.

Given these significant costs and the measures to mitigate the potential effects associated with Alignments 4 and 5 on the natural environment, Alignment 5 is clearly supported as the preferred option followed closely by Alignment 4. Alignment 5 conforms with the policies of the ORMCP.

Figure 1: Study Area Existing Land Use (Figure 3 - Study Area Land Use, Kirby Road Extension Socio-Economic Impact Assessment, April 2018)

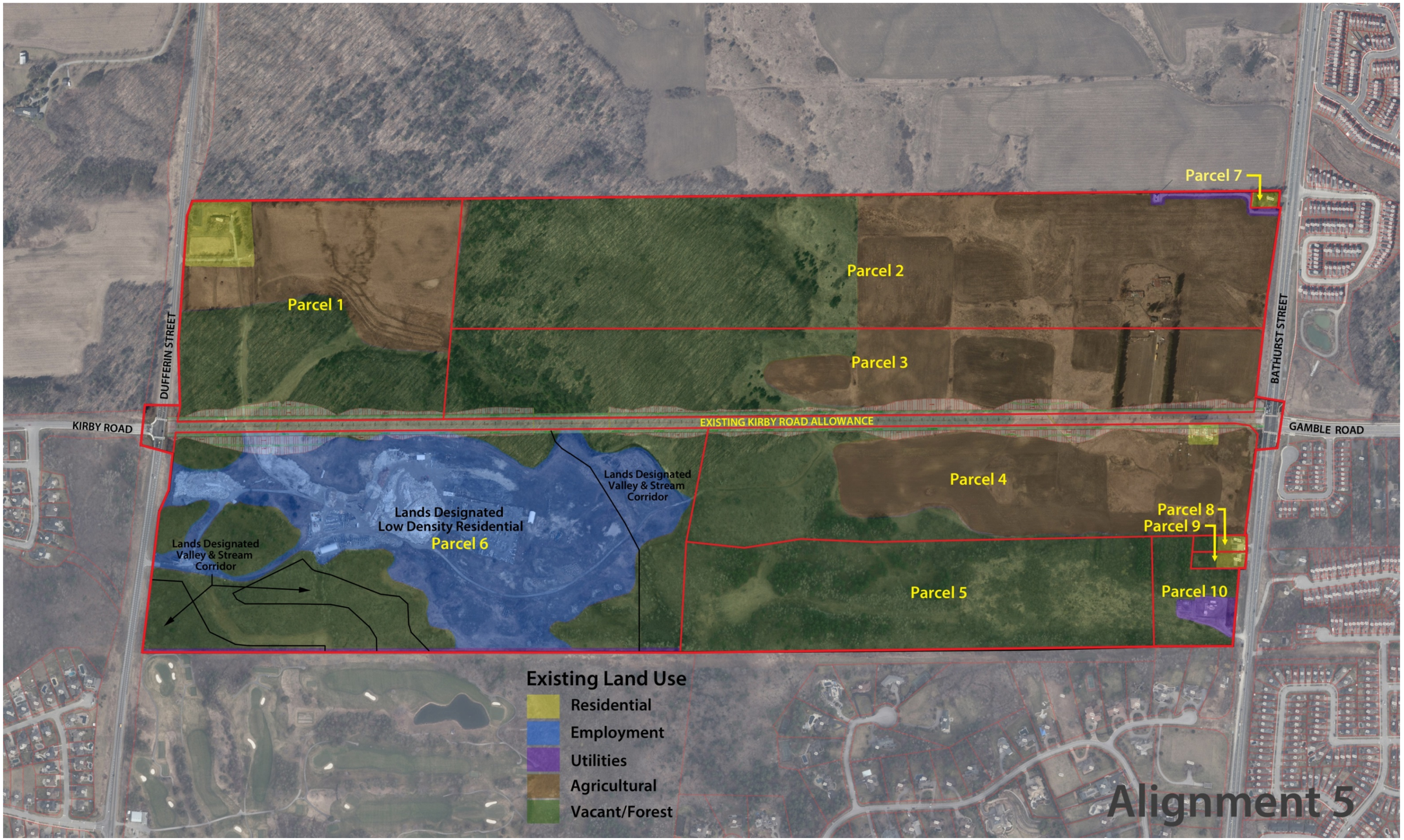


Figure 2: ORMCP Designations – Long List

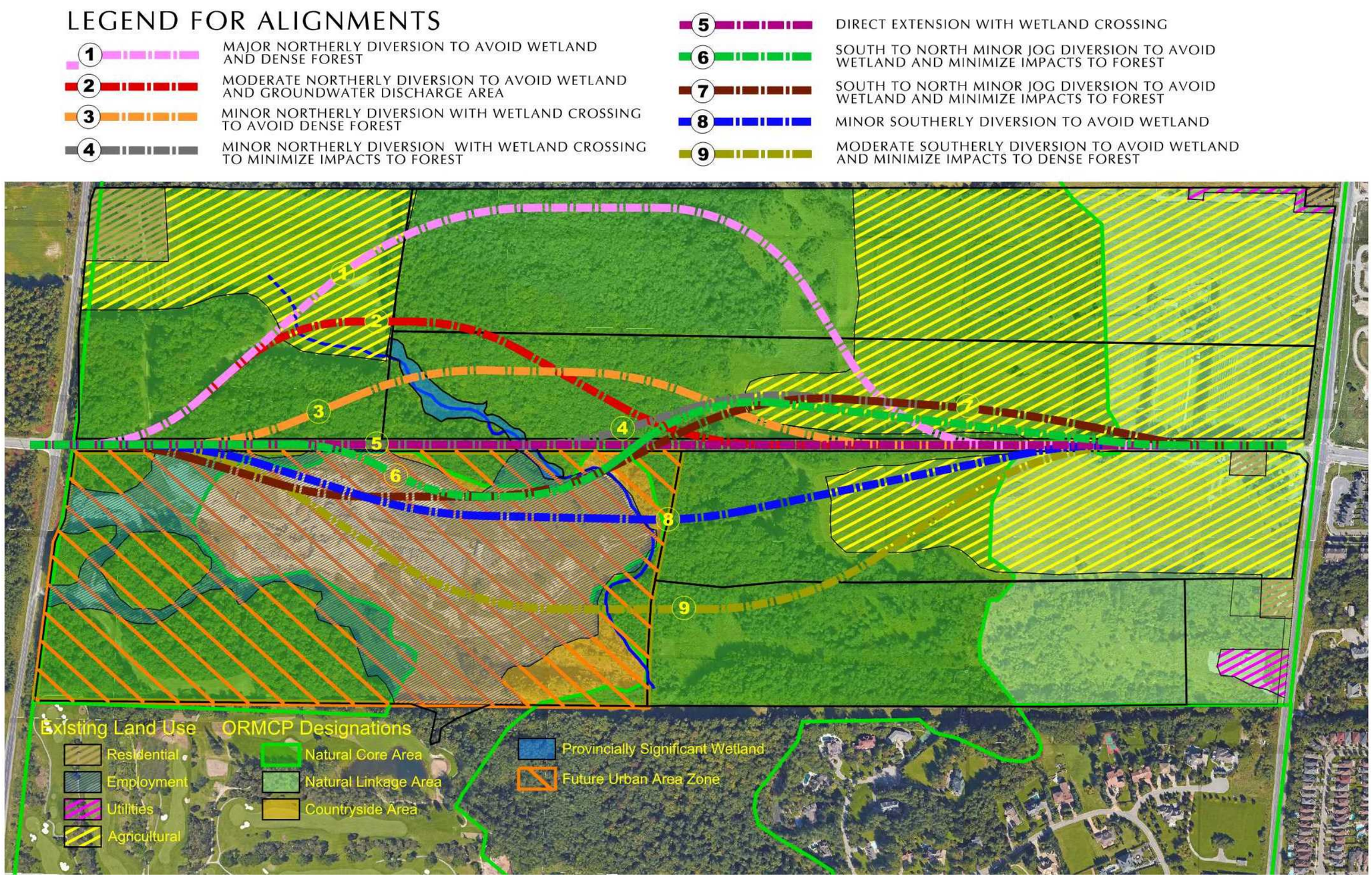


Figure 3: ORMCP Designations - Updated Short List

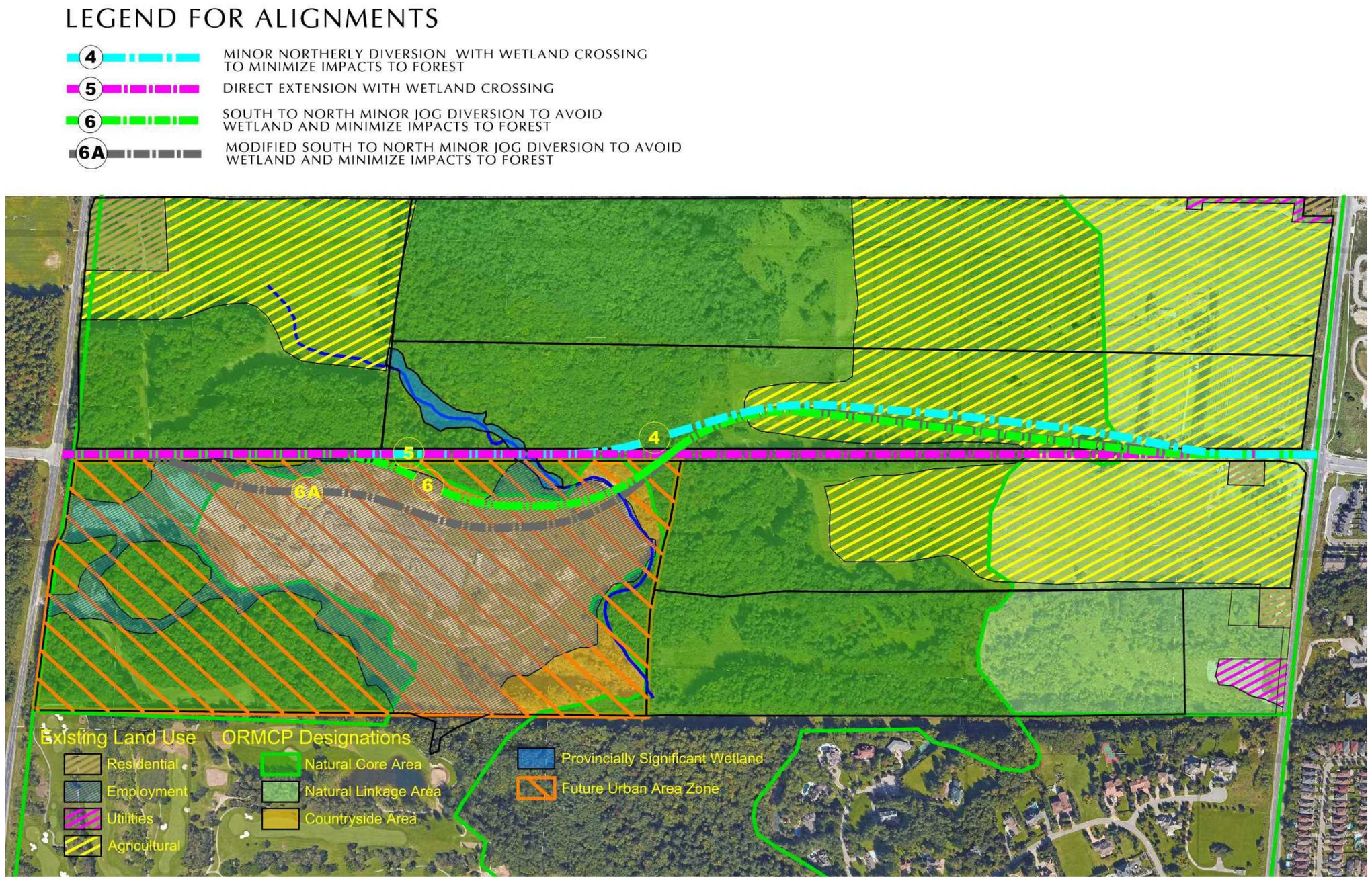


Figure 4: Capital Program Excerpt (Appendix G - City of Vaughan Development Charges Background Study, April 25, 2018)

APPENDIX G
TABLE 3 - PAGE 3

CITY-WIDE ENGINEERING DEVELOPMENT-RELATED CAPITAL PROGRAM

Item#	Road	From	To	Timing	Total Cost**	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	Post 2031
L - Maple GO Station Secondary Plan					**$4,464,903**	**$446,490**	**$446,490**	**$446,490**	**$446,490**	**$446,490**	**$446,490**	**$446,490**	**$446,490**	**$446,490**	**$446,490**	**$0**	**$0**	**$0**	**$0**	**$0**
91	Hill Street	Eagle Rock Way	Hill Street	2021	**$4,464,903**	$446,490	$446,490	$446,490	$446,490	$446,490	$446,490	$446,490	$446,490	$446,490	$446,490					
M - Barrie GO Grade-Separated Railway Crossings (RER)					**$183,873,649**	**$0**	**$0**	**$0**	**$22,255,292**	**$22,255,292**	**$22,255,292**	**$22,255,292**	**$22,255,292**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$72,597,190**
92	McNaughton Road at Barrie GO Rail *	Falvro Street	Troon Avenue	2026	**$23,642,683**				$4,728,537	$4,728,537	$4,728,537	$4,728,537	$4,728,537							
93	Block 27 Street 2	Street 6	Street 8	2026	**$35,217,632**				$7,043,526	$7,043,526	$7,043,526	$7,043,526	$7,043,526							
94	Kirby Road	Street 6	Keele Street	2026	**$38,416,144**				$7,683,229	$7,683,229	$7,683,229	$7,683,229	$7,683,229							
95	Rivermede Road at Barrie GO Rail *	Bowes Road	Ortona Court	2026	**$86,597,190**				$2,800,000	$2,800,000	$2,800,000	$2,800,000	$2,800,000							$72,597,190
N - Jog Elimination					**$2,004,884**	**$200,488**	**$200,488**	**$200,488**	**$200,488**	**$200,488**	**$200,488**	**$200,488**	**$200,488**	**$200,488**	**$200,488**	**$0**	**$0**	**$0**	**$0**	**$0**
96	Pine Valley Drive and Kirby Road			2026	**$2,004,884**	$200,488	$200,488	$200,488	$200,488	$200,488	$200,488	$200,488	$200,488	$200,488	$200,488					
O - North Vaughan + Northern Communities TMP (Blocks 27, 41, and 55)					**$389,596,047**	**$6,960,133**	**$6,960,133**	**$6,960,133**	**$16,871,617**	**$24,955,991**	**$24,955,991**	**$24,955,991**	**$24,955,991**	**$15,044,507**	**$33,989,521**	**$27,029,388**	**$27,029,388**	**$27,029,388**	**$27,029,388**	**$94,868,484**
97	Block 27 Street 1 Valley Crossing	Jane Street	Street 6 (Block 27)	2026	**$4,785,429**					$334,980	$334,980	$334,980	$334,980	$334,980	$334,980	$334,980	$334,980	$334,980	$334,980	$1,435,629
98	Block 27 Street 2	Jane Street	Keele Street	2026	**$24,040,657**				$4,808,131	$4,808,131	$4,808,131	$4,808,131	$4,808,131							
99	Block 27 Street 3 Valley Crossings	Jane Street	Street 7 (Block 27)	2026	**$14,356,287**					$1,004,940	$1,004,940	$1,004,940	$1,004,940	$1,004,940	$1,004,940	$1,004,940	$1,004,940	$1,004,940	$1,004,940	$4,306,886
100	Block 27 Street 5	Kirby Road	Teston Road	2026	**$11,823,103**				$2,364,621	$2,364,621	$2,364,621	$2,364,621	$2,364,621							
101	Block 27 Street 6 Valley Crossings	Kirby Road	Teston Road	2026	**$8,731,151**					$611,181	$611,181	$611,181	$611,181	$611,181	$611,181	$611,181	$611,181	$611,181	$611,181	$2,619,345
102	Block 27 Street 7 Valley Crossing	Street 6	Teston Road	2026	**$1,504,852**					$105,340	$105,340	$105,340	$105,340	$105,340	$105,340	$105,340	$105,340	$105,340	$105,340	$451,456
103	Block 27 Street 8	Vista Gate	Keele Street	2026	**$13,693,662**				$2,738,732	$2,738,732	$2,738,732	$2,738,732	$2,738,732							
104	Block 41 Street 2 Valley Crossings	Teston Road	Weston Road	2026	**$14,085,414**					$985,979	$985,979	$985,979	$985,979	$985,979	$985,979	$985,979	$985,979	$985,979	$985,979	$4,225,624
105	Block 41 Street 3 Valley Crossing	Street 2	Street 4	2026	**$1,504,852**					$105,340	$105,340	$105,340	$105,340	$105,340	$105,340	$105,340	$105,340	$105,340	$105,340	$451,456
106	Block 41 Street 4 Valley Crossing	Kirby Road	Weston Road	2026	**$1,504,852**					$105,340	$105,340	$105,340	$105,340	$105,340	$105,340	$105,340	$105,340	$105,340	$105,340	$451,456
107	Pine Valley Drive	Kirby Road	Teston Road	2026	**$31,441,633**	$3,144,163	$3,144,163	$3,144,163	$3,144,163	$3,144,163	$3,144,163	$3,144,163	$3,144,163	$3,144,163	$3,144,163					
108	Kirby Road	Highway 27	Weston Road	2031	**$96,625,507**					$4,831,275	$4,831,275	$4,831,275	$4,831,275	$4,831,275	$4,831,275	$4,831,275	$4,831,275	$4,831,275	$4,831,275	$48,312,753
109	Kirby Road	Weston Road	Jane Street	2026	**$32,613,880**															$32,613,880
110	Kirby Road	Jane Street	Dufferin Street	2026	**$64,591,392**										$12,918,278	$12,918,278	$12,918,278	$12,918,278	$12,918,278	
111	Kirby Road	Dufferin Street	Bathurst Street	2021	**$38,159,699**	$3,815,970	$3,815,970	$3,815,970	$3,815,970	$3,815,970	$3,815,970	$3,815,970	$3,815,970	$3,815,970	$3,815,970					
112	Kirby Road	Highway 400		2026	**$30,133,680**										$6,026,736	$6,026,736	$6,026,736	$6,026,736	$6,026,736	
P - Additional Transportation Infrastructure Projects					**$83,548,646**	**$17,145,592**	**$12,645,592**	**$12,645,592**	**$5,381,627**	**$5,381,627**	**$5,381,627**	**$5,381,627**	**$5,381,627**	**$4,411,404**	**$4,411,404**	**$1,345,231**	**$1,345,231**	**$1,345,231**	**$1,345,231**	**$0**
113	Weston Rd and Hwy 7 -Collector Road	Winges Road	Famous Avenue	2021	**$922,641**	$307,547	$307,547	$307,547												
114	McNaughton Road	Major Mackenzie Drive	Keele Street	2026	**$10,009,497**	$1,000,950	$1,000,950	$1,000,950	$1,000,950	$1,000,950	$1,000,950	$1,000,950	$1,000,950	$1,000,950	$1,000,950					
116	Ortona Court	Rivermede Rd	340M south	2026	**$794,875**				$158,975	$158,975	$158,975	$158,975	$158,975							
117	Ortona Court	340M South Rivermede	490M South Rivermede	2026	**$2,728,934**				$545,787	$545,787	$545,787	$545,787	$545,787							
118	Ortona Court incl Storm Sewer Diversion	490M South Rivermede	Hwy No. 7	2026	**$4,527,806**				$905,561	$905,561	$905,561	$905,561	$905,561							
119	Grand Trunk Avenue	District Ave	Maurier Blvd	2021	**$4,170,369**	$417,037	$417,037	$417,037	$417,037	$417,037	$417,037	$417,037	$417,037	$417,037	$417,037					
120	Promenade N-S Collector	Promenande Circle	Promenande Circle	2031	**$1,646,361**									$274,393	$274,393	$274,393	$274,393	$274,393	$274,393	
121	Promenade East-West Collector	Promenande Circle	Promenande Circle	2031	**$2,194,242**									$365,707	$365,707	$365,707	$365,707	$365,707	$365,707	
122	Highway 400 Midblock Crossing	Block 33		2021	**$5,620,017**	$1,873,339	$1,873,339	$1,873,339												
123	Highway 400 NB Ramp Extension		Major Mackenzie	2021	**$18,080,208**	$6,026,736	$6,026,736	$6,026,736												
124	Block 11 Valley Road Crossings			2021	**$4,500,000**	$4,500,000														
125	Vaughan Healthcare Precinct Related Roadworks			2021	**$2,000,000**	$666,667	$666,667	$666,667												
126	Carrville District Centre - Dufferin St Streetscaping			2031	**$1,403,990**	$100,285	$100,285	$100,285	$100,285	$100,285	$100,285	$100,285	$100,285	$100,285	$100,285	$100,285	$100,285	$100,285	$100,285	
127	Carrville District Centre - Rutherford Road Streetscaping			2031	**$1,418,946**	$101,353	$101,353	$101,353	$101,353	$101,353	$101,353	$101,353	$101,353	$101,353	$101,353	$101,353	$101,353	$101,353	$101,353	
128	Carrville District Centre - Marc Santi Streetscaping			2031	**$1,040,685**	$74,335	$74,335	$74,335	$74,335	$74,335	$74,335	$74,335	$74,335	$74,335	$74,335	$74,335	$74,335	$74,335	$74,335	
129	Carrville District Centre - Grand Trunk Streetscaping Standard			2031	**$783,941**	$55,996	$55,996	$55,996	$55,996	$55,996	$55,996	$55,996	$55,996	$55,996	$55,996	$55,996	$55,996	$55,996	$55,996	
130	Carrville District Centre - Grand Trunk Enhanced Standard			2031	**$231,593**	$16,542	$16,542	$16,542	$16,542	$16,542	$16,542	$16,542	$16,542	$16,542	$16,542	$16,542	$16,542	$16,542	$16,542	
131	Carrville District Centre - Crimson Forest Streetscaping			2031	**$540,907**	$38,636	$38,636	$38,636	$38,636	$38,636	$38,636	$38,636	$38,636	$38,636	$38,636	$38,636	$38,636	$38,636	$38,636	
132	Carrville District Centre - Local A Standard Streetscaping			2031	**$352,711**	$25,194	$25,194	$25,194	$25,194	$25,194	$25,194	$25,194	$25,194	$25,194	$25,194	$25,194	$25,194	$25,194	$25,194	
133	Carrville District Centre - Local A Premium Streetscaping			2031	**$1,426,424**	$101,887	$101,887	$101,887	$101,887	$101,887	$101,887	$101,887	$101,887	$101,887	$101,887	$101,887	$101,887	$101,887	$101,887	
134	Carrville District Centre - Local E Premium Streetscaping			2031	**$1,335,375**	$95,384	$95,384	$95,384	$95,384	$95,384	$95,384	$95,384	$95,384	$95,384	$95,384	$95,384	$95,384	$95,384	$95,384	
135	Carrville District Centre - Local E Enhanced Streetscaping			2031	**$1,337,263**	$95,519	$95,519	$95,519	$95,519	$95,519	$95,519	$95,519	$95,519	$95,519	$95,519	$95,519	$95,519	$95,519	$95,519	
136	Centre Street Enhanced Streetscaping			2028	**$11,216,163**	$1,121,616	$1,121,616	$1,121,616	$1,121,616	$1,121,616	$1,121,616	$1,121,616	$1,121,616	$1,121,616	$1,121,616					
137	Concord West - Keele Street Streetscaping			2028	**$971,491**	$97,149	$97,149	$97,149	$97,149	$97,149	$97,149	$97,149	$97,149	$97,149	$97,149					
138	Concord West - Highway 7 Standard Streetscaping			2028	**$2,344,345**	$234,434	$234,434	$234,434	$234,434	$234,434	$234,434	$234,434	$234,434	$234,434	$234,434					
139	Concord West - Highway 7 Enhanced Streetscaping			2028	**$1,949,864**	$194,986	$194,986	$194,986	$194,986	$194,986	$194,986	$194,986	$194,986	$194,986	$194,986					

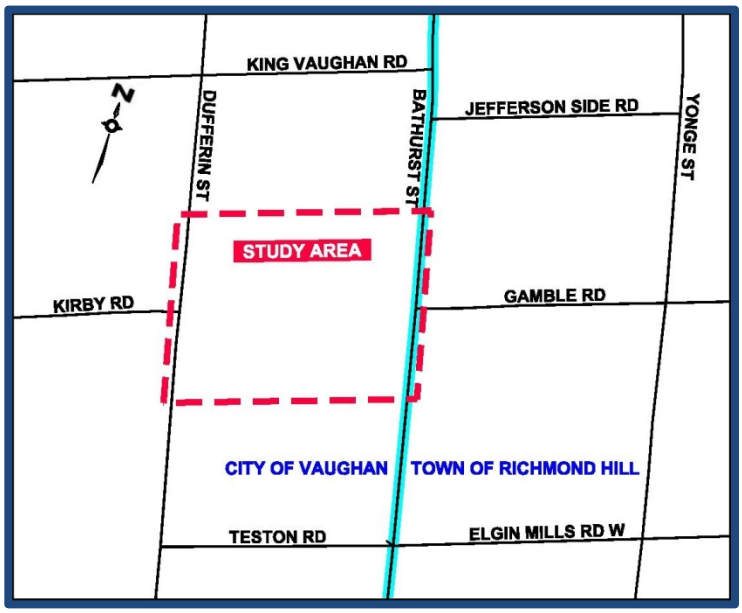
HEMSON

KIRBY ROAD EXTENSION
ENVIRONMENTAL ASSESSMENT STUDY

ADDENDUM

OAK RIDGES MORAINE POLICY CONFORMITY

Technical Paper



May 2019

LUCAS & ASSOCIATES
Consultants in Planning and Land Development
24 Debra Crescent
Barrie, Ontario
L4N 3T1
(705) 727-8335

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1. INTRODUCTION

In August 2018, Lucas and Associates prepared a technical paper that documents how the policies of the Oak Ridges Moraine Conservation Plan (ORMCP) 2017 were considered in assessment of the alignment options of the proposed extension of Kirby Road between Dufferin Street and Bathurst Street in the City of Vaughan. It also summarizes the comprehensive approach to the selection, screening and evaluation of alternative road alignments.

Nine horizontal road alignment options were identified and screened. Identification of the nine potential alignments was undertaken to provide a range of options, including utilizing the existing unopened Kirby road allowance and alignments options located both north and south from the municipal Right of Way (RoW).

Three of the nine options (Alignments 4, 5 and 6) were short-listed following the June 2017 Public Information Center (PIC) #1 and were carried forward for further evaluation. Based on an agency site meeting in August of 2017 a fourth alignment (Alignment 6A) was added to the short-list in response to agency input with respect to avoiding existing natural features. Alignment 6A is similar to Alignment 6 but swings to the south sooner to avoid existing wooded areas within the exiting road allowance and travels further south into the Parcel 6 to avoid the PSW and the PSW buffer.

The four short-listed alignments went through a detailed comparative evaluation analysis. This analysis examined the options from a natural environment perspective, social environment perspective, transportation environment perspective and economic environment perspective. Following the analysis, Alignment 5 was chosen as the preferred option.

Following completion of the draft Environmental Study Report (ESR), members of the Technical Review Committee (TAG) were circulated for comment. One of the primary comments received from the TAG was with respect to conformity with the ORMCP. More specifically, the TAG was concerned with respect to the policy that states that infrastructure may be permitted to cross a key natural heritage feature or key hydrolic feature only if certain key requirements are satisfied, including that the planning, design and construction practices adopted will keep any adverse effects on the ecological integrity of the Plan Area to a minimum.

Although Alignment 5 scored highest overall and recommended as the preferred alignment, it did not score highest with respect to effects on the natural environment. One of the primary comments received from the TAG was with respect to conformity with the ORMCP. More specifically, the TAG was concerned with respect to the policy that states that infrastructure may be permitted to cross a key natural heritage feature or key hydrolic feature only if certain key requirements are satisfied, including that the planning, design and construction practices adopted will keep any adverse effects on the ecological integrity of the Plan Area to a minimum.

2. ALIGNMENT 5a

In order to minimize any adverse effects on the ecological integrity of the Plan Area, Alignment 5A shifts the Kirby Road extension to the south to avoid two key natural heritage features in the central portion of the Study Area. Alignment 5 proposes to span a Provincially Significant Wetland (PSW) with a bridge and would impact a 200 metre buffer around an existing interior forest area. Shifting the alignment south would eliminate the need for the bridge and would maintain the existing 200 m buffer. Shifting this portion of Kirby Road will require the acquisition of additional privately owned lands currently designated for residential development. The remainder of the 5a Alignment would follow the existing Kirby Road right of way as proposed by Alignment 5.

3. CONFORMITY OF ALIGNMENT 5A TO THE ORMCP

As set out in the initial ORMCP Conformity Technical Paper, the policies regarding ORMCP conformity of Alignment 5a have been summarized as follows:

1. Demonstrate the Need and there is no reasonable alternative
2. Keep Impact on the Environment to a minimum;
3. Minimize Impact on Prime Agricultural Lands; and,
4. Ensure that Infrastructure is Supported by the Necessary Studies and is Economically Feasible and Sustainable.

1. Demonstration of Need and There is no Reasonable Alternative (Policy 41(2)(a), 41(5)(a))

As outline in the initial report, the need for the project has been demonstrated in both the Region of York Transportation Master Plan (2016) and the City of Vaughan Master Transportation Plan (2012). The need for the project was also confirmed through a Transportation Analysis Study undertaken by Poulos and Chung Ltd. The study verified the need for Kirby Road extension, concluded that it must be completed by 2021, and that it must have two lanes in each direction.

In addition, there is no reasonable alternative to the proposed Kirby Road extension. A new road between Dufferin Street and Bathurst Street north or south of the proposed extension would still require that traffic use Dufferin and Bathurst Streets and congestion and travel time concerns would remain unresolved.

2. Impact on the Environment

The policies of the ORMCP require the following with respect to impacts on the natural environment.

- **"*The area of construction disturbance be kept to a minimum*" (Policy 41(2)(b)(1))**

The difference between Alignment 5 and 5a is shifting the Kirby Road extension south in the central portion of the Study Area to avoid the PSW and the interior forest buffer. This shift will extend Kirby Rad into an area that have been disturbed form previous aggregate extraction activities and lands that will be developed for residential uses. Since Alignment 5 was identified as creating the least area of construction disturbance, Alignment 5a, which extends into an area that has been disturbed will not result in increase on the area of disturbance.

- **"*Right of way widths will be kept to the minimum*" (Policy 41(2)(b)(2))**

Alignment 5 and 5a propose a right of way width of 36m, which has been determined to the narrowest width necessary for the Kirby Road extension.

- **"*The project will allow for wildlife movement*" (Policy 41(2)(b)(3))**

Alignment 5a will accommodate wildlife movement through eco-passages. This will be addressed further through detailed design.

- **"*Lighting will be focused downwards and away from Natural Core Areas*" (Policy 41(2)(b)(4))**

Lighting will generally be focused downwards and away from Natural Core Areas and addressed through detailed design for Alignment 5a.

- **"*The planning, design and construction practices adopted will keep any adverse effects on the ecological integrity of the Plan Area to a minimum*" (Policy 41(2)(b)(5), 41(5)(b))**

The ORCMP definitions state that "ecological integrity", which includes hydrological integrity, means the condition of ecosystems in which,

(a) the structure, composition and function of the ecosystems are unimpaired by stresses from human activity,

(b) natural ecological processes are intact and self-sustaining, and

(c) the ecosystems evolve naturally.

The evaluation system scored Alignment 5 as the most preferred alignment considering the net effects within the 4 environments, including socio-economic and transportation environments. However, Alignment 5 did not score highest with respect to effects on the natural environment.

To minimize the effects on the natural environment, consideration was given to measures that would reduce the effects of Alignment 5 on the natural environment and a refined alignment (Alignment 5a) was created that shifts a portion of the Kirby Road extension south to avoid the PSW and to maintain a 200 setback from existing interior forest.

- **"*The project does not include and will not in the future require a highway interchange or a transit or railway station in a Natural Core Area*" (Policy 41(3)(b))**

Alignment 5a does not and will not require a highway interchange or transit or railway station.

- ***"The project is located as close to the edge of the Natural Core Area as possible"* (Policy 41(3)(c))**

The preferred alignment will occupy the existing Kirby Road right of way in the western portion of the Study Ares to align with the existing Kirby Road and Dufferin Street interchange. Although much of the road allowance is covered by forest and will be removed, the right of way is located along the edge of the core forest.

It is inevitable that the extension of Kirby Road will pass through lands designated Natural Core Area in the centre of the Study Area. Alignment 5a does cross where the existing forest is narrow, which will minimize the potential effects.

- ***"The design practices adopted will maintain, and where possible improve or restore, key ecological and recreational linkages, including the trail system referred to in section 39*"** **(Policy 42(5)(c))**

- "***The landscape design will be adapted to the circumstances of the site and use native plant species as much as possible, especially along rights of way*" (Policy 41(5)(d))**

- "***The long-term landscape management approaches adopted will maintain, and where possible improve or restore, the health, diversity, size and connectivity of the key natural heritage feature or key hydrologic feature*" (Policy 41(5)(e))**

The three requirements have been considered and will be addressed further and incorporated through the detailed design and mitigation measures for Alignment 5a.

3. Impact on Prime Agricultural Lands Policy 41(2.1)

The Ontario Ministry of Agriculture, Food and Rural Affairs identifies that the lands located in the northeast portion of the Study Area are within a prime agricultural area. Alignment 5a follows the existing Kirby Road allowance, which requires the least amount of grading and represents the least impact on the existing land uses in the eastern portion of the Study Area.

4. Ensure that Infrastructure is Supported by the Necessary Studies, etc. and is Economically Feasible and Sustainable.

The ORMCP requires that new Infrastucture be supported by the necessary studies, assessments and documentation, such as infrastructure master plans, asset management plans, land use and financial scenarios, watershed studies and subwatershed plans, environmental assessments and other relevant studies.

As discussed previously, the extension of Kirby Road between Dufferin Street and Bathurst Street has been identified in both the Region of York Transportation Master Plan (2016) and the City of Vaughan Master Transportation Plan (2012). The need for the project was also confirmed through a Transportation Analysis Study undertaken by Poulos and Chung Ltd. In addition, the extension is also subject to an Environmental Assessment.

These studies, assessments, etc., are required to address the following:

- "***Demonstrate that infrastructure will be financially feasible and sustainable over the long-term***" **(Policy 41(1) (1.2) (a)**

Preferred Alignment 5a shifts the Kirby Road extension south into privately owned lands designated for future residential development (Figure 1). This will require the acquisition of additional lands at a preliminary cost of approximately $16.6 Million, as calculated below.

Low Density Residential lands	1.11 ha x $8,030,640 = $8,914,010
Residual Low Density Residential lands	0.85 ha x $8,030,640 = $6,826,044
Valley and Stream Corridor lands	0.66 ha x $124,000 = $81,840
Residual Valley and Stream Corridor lands	1.23 ha x $124,000 = $152,520
Agricultural or Open Space lands	4.70 ha x $124,000 = $582,800
Residual Agricultural or Open Space lands	0.06 ha x $124,000 = $7,440
TOTAL	**$16,564,654**

It should be noted that a portion of the additional costs associated with acquisition of additional lands will be offset by the capital costs saved by not building a bridge to span the PSW and the life cycle costs of the bridge over time.

The City of Vaughan estimated the cost to extend Kirby Road at approximately $38 Million in their 2018 Development Charge Background Study. Preliminary total costs for the Preferred 5a Alignment is approximately $42 Million, which is only slightly larger than the City's estimate making the proposed alignment feasible and sustainable.

- "***Demonstrate that an adequate water supply is available for the development, and that there is sufficient assimilative capacity to deal with the sewage from the development, without compromising the ecological integrity of the Plan Area***" **(Policy 41(1) (1.2) (b))**

This policy is not applicable to the proposed extension of Kirby Road.

- "***Address stormwater management at appropriate scales throughout the land use planning process***" **(Policy 41(1) (1.2) (c))**

- "***Utilise appropriate low impact development techniques and green infrastructure***" **(Policy 41(1) (1.2) (d))**

A preliminary examination of these two requirements was undertaken for Alignment 5a. Measures to conform to these policies will be addressed further and incorporated through detailed design.

- **"*Assess actions to reduce greenhouse gas emissions and to adapt to climate change impacts*" (Policy 41(1) (1.2) (e))**

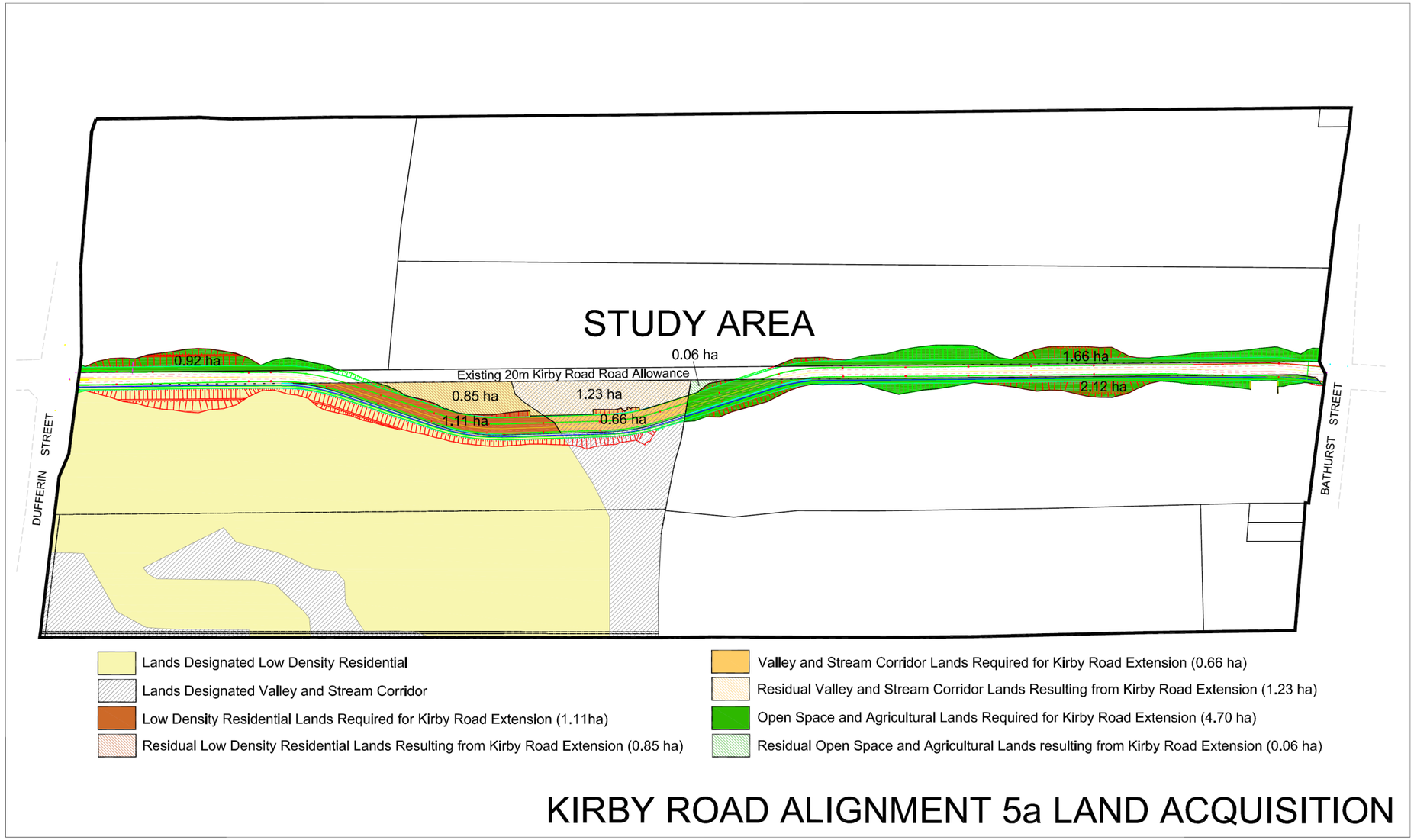
A preliminary examination of measures to reduce emission and to adapt to climate change impacts were undertaken for Alignment 5a. Measures to conform to these policies will be addressed further and incorporated through detailed design. Preferred Alignment 5a is only slightly longer than Alignment 5 and any increase in emissions and climate change impacts are expected to be negligible.

4. CONCLUSIONS

One of the primary comments received from the TAG was with respect to the policy that the adverse effects of the infrastructure be kept to a minimum on the ecological integrity of the Plan Area. Although Alignment 5 scored highest in the detailed comparative evaluation analysis of the four proposed Kirby Road extension options and was initially preferred by the Team, Alignment 5 scored lowest with respect to conformity with the ORMCP.

An adjustment of Alignment 5 that shifts the extension south to avoid the PSW and avoid the 200 buffer to the interior forests was examined, and Alignment 5a has been recommend by the team as appropriate to address the concern. A review of the ORMCP confirms that Alignment 5a does conform to the policies of the Plan.

Figure 1: Preferred Alignment 5a Land Acquisition



APPENDIX C3.3

Cost Estimates

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KIRBY ROAD EA
PRELIMINARY COST ESTIMATE FOR 4 SHORT-LISTED ALIGNMENT OPTIONS

Item	Description	Unit Price	Unit	Alignment 4		Alignment 5		Alignment 6		Alignment 6A	
				Quantity	Total	Quantity	Total	Quantity	Total	Quantity	Total
Engineering Fees											
A-1	Detail Engineering Design Permits & Approvals Contract Administration & Inspection	20%	L.S.	1	$2,550,789	1	$2,515,705	1	1,644,747	1	1,556,013
Engineering Fees Totals					**$2,550,789**		**$2,515,705**		**$1,644,747**		**$1,556,013**
Site Preparation											
B-1	Clear and Grub including Tree Removal	$1	SQ.M.	110,160	$110,160	109,449	$109,449	118,422	$118,422	120,816	$120,816
B-2	Erosion & Sediment Control	$4	SQ.M.	110,160	$440,640	109,449	$437,796	118,422	$473,688	120,816	$483,264
B-3	Topsoil Stripping	$20	CU.M.	33,048	$660,960	32,835	$656,694	35,527	$710,532	36,245	$724,896
Site Preparation Totals					**$1,211,760**		**$1,203,939**		**$1,302,642**		**$1,328,976**
Earthworks											
C-1	Cut and Fill in Low Areas	$5	CU.M.	145,657	$728,285	201,407	$1,007,035	151,670	$758,350	138,324	$691,620
C-2	Import Fill Material	$10	CU.M.	201,930	$2,019,300	90,061	$900,610	227,945	$2,279,450	307,447	$3,074,470
Earthworks Totals					**$2,747,585**		**$1,907,645**		**$3,037,800**		**$3,766,090**
Services											
D-1	Construction Layout for All Services	$10	L.M.	2,040	$20,400	2,023	$20,230	2,079	$20,790	2,095	$20,950
D-2	Storm Sewer Pipe	$400	L.M.	2,040	$816,000	2,023	$809,200	2,079	$831,600	2,095	$838,000
D-3	Storm Manhole or CBMH	$10,000	EACH	40	$400,000	40	$400,000	41	$410,000	42	$420,000
D-4	Street Catch Basins Including Lead	$3,000	EACH	40	$120,000	40	$120,000	41	$123,000	42	$126,000
D-5	Oil Grit Separator	$100,000	EACH	6	$600,000	6	$600,000	6	$611,471	6	$600,000
D-6	300mm Watermain Pipe	$170	L.M.	2,040	$346,800	2,005	$340,850	2,079	$353,430	2,095	$356,150
D-7	Valve Chamber	$12,000	EACH	10	$120,000	10	$120,000	10	$120,000	10	$120,000
D-8	Headwall Including Rip-Rap Treatment	$25,000	EACH	6	$150,000	6	$148,750	6	$152,868	6	$154,044
D-9	LID Measures	$12	L.M.	2,040	$24,480	2,023	$24,276	2,079	$24,948	2,095	$25,140
Services Totals					**$2,597,680**		**$2,583,306**		**$2,648,106**		**$2,660,284**
Roadworks											
E-1	Construction Layout for Road Works	$10	L.M.	2,040	$20,400	2,023	$20,230	2,079	$20,790	2,095	$20,950
E-2	Subgrade Fine Grading	$2	SQ.M.	32,640	$65,280	32368	$64,736	33,264	$66,528	33,520	$67,040
E-3	600 mm depth of Granular B	$20	SQ.M.	19,584	$391,680	14565.6	$291,312	14,969	$299,376	15,084	$301,680
E-4	150 mm depth of Granular A	$10	SQ.M.	4,896	$48,960	4855.2	$48,552	4,990	$49,896	5,028	$50,280
E-5	100 mm depth of Base Asphalt	$20	SQ.M.	3,264	$65,280	3236.8	$64,736	3,326	$66,528	3,352	$67,040
E-6	50 mm depth of Top Asphalt	$100	TONNE	1,632	$163,200	1618.4	$161,840	1,663	$166,320	1,676	$167,600
E-7	Curb & Gutter	$70	L.M.	4,080	$285,600	4046	$283,220	4,158	$291,060	4,190	$293,300
E-8	Subdrain	$15	L.M.	4,080	$61,200	4046	$60,690	4,158	$62,370	4,190	$62,850
E-9	Concrete Median	$100	SQ.M.	84	$8,400	83	$8,330	86	$8,561	86	$8,626
E-10	Road Sign	$400	EACH	22	$8,800	22	$8,727	22	$8,968	22	$8,800
E-11	Concrete Sidewalk	$90	L.M.	4,080	$367,200	4046	$364,140	4,158	$374,220	4,190	$377,100
E-12	Multi-use Trail	$120	L.M.	3,980	$477,600	3946	$473,520	4,158	$498,960	4,190	$502,800
E-13	Bus Pad	$3,000	EACH	4	$12,000	4	$12,000	4	$12,000	4	$12,000
E-14	Pavement Markings	$15	L.M.	2,040	$30,600	2,023	$30,345	2,079	$31,185	2,095	$31,425
E-15	Guide Rail	$175	L.M.	195	$34,125	195	$34,125	227	$39,725	75	$13,125
Roadworks Totals					**$2,040,325**		**$1,926,503**		**$1,996,487**		**$1,984,616**
Structure											
F-1	Culvert Structure *	$800	L.M.	349	$279,200	300	240,000	349	279,200	346	$276,800
F-2	Creek Crossing Culverts	$35,000	L.M.	0	$0	0	0	43	1,498,000	38	$1,312,500
F-3	Retaining Wall	$450	SQ.M.	770	$346,500	770	346,500	943	424,350	315	$141,750
F-4	Bridge Structure	$6,000	SQ.M.	1,034	$6,204,000	1,034	6,204,000	0	0	0	$0
Structures Totals					**$6,829,700**		**$6,790,500**		**$2,201,550**		**$1,731,050**
Miscellaneous											
G-1	Traffic Control	$50,000	L.S.	1	$50,000	1	$50,000	1	$50,000	1	$50,000
G-2	Mud & Dust Control	$12	L.M.	2,040	$24,480	2,023	$24,276	2,079	$24,948	2,095	$25,140
Miscellaneous Totals					**$74,480**		**$74,276**		**$74,948**		**$75,140**
Contingency											
H-1	Contingency	20%	Ha		$3,610,464		$3,400,375		$2,581,256		$2,620,434
Contingency Totals					**$3,610,464**		**$3,400,375**		**$2,581,256**		**$2,620,434**
Capital Cost											
I-1	Capital cost				$21,662,783		$20,402,248		$15,487,536		$15,722,604
Capital Cost Totals					**$21,662,783**		**$20,402,248**		**$15,487,536**		**$15,722,604**
Land Acquisition											
J-1	Low Density Residential Lands[1]	$8,030,640	Ha	13,800	$11,082,283	13,600	$10,921,670	28,300	$22,726,711	42,100	$33,808,994
J-2	Remnant Low Density Residential Lands[1]	$8,030,640	Ha	0	$0	0	$0	3,800	$3,051,643	19,800	$15,900,667
J-3	Valley and Stream Corridor Lands [1]	$124,000	Ha	1,400	$17,360	3,200	$39,680	9,200	$114,080	10,000	$124,000
J-4	Remnant Valley and Stream Corridor Lands[1]	$124,000	Ha	0	$0	0	$0	9,300	$115,320	12,300	$152,520
J-5	Agricultural and Open Space Lands[1]	$124,000	Ha	70,500	$874,200	52,800	$654,720	54,400	$674,560	50,900	$631,160
J-6	Remnant Agricultural and Open Space Lands[1]	$124,000	Ha	18,000	$223,200	0	$0	7,900	$97,960	9,300	$115,320
Land Acquisition Totals					**$12,197,043**		**$11,616,070**		**$26,780,274**		**$50,732,662**
GRAND TOTAL					**$33,859,826**		**$32,018,318**		**$42,267,810**		**$66,455,265**

COMMENTS

[1] Land Acquisition Costs provided by Lucas & Associates

* The size of culverts are preliminary

KIRBY ROAD EA

PRELIMINARY COST ESTIMATE FOR ALIGNMENT 5A (OPTION-1)

Item	Description	Unit Price	Unit	Alignment 5A	
				Quantity	Total
Engineering Fees					
A-1	Detail Engineering Design Permits & Approvals Contract Administration & Inspection	20%	L.S.	1	$3,358,071.80
Engineering Fees Totals					**$3,358,072**
Tree Removal					
B-1	Tree Removal	$40,000	Ha	7.45	$298,000
Tree Removal Totals					**$298,000**
Site Preparation					
C-1	Clear and Grub Removal	$1	SQ.M.	117,501	$117,501
C-2	Erosion & Sediment Control	$4	SQ.M.	117,501	$470,004
C-3	Topsoil Stripping	$20	CU.M.	35,250	$705,000
Site Preparation Totals					**$1,292,505**
Earthworks					
D-1	Cut and Fill in Low Areas	$5	CU.M.	157,906	$789,530
D-2	Import Fill Material	$10	CU.M.	224,221	$2,242,210
Earthworks Totals					**$3,031,740**
Services					
E-1	Construction Layout for All Services	$10	L.M.	2,062	$20,620
E-2	Storm Sewer Pipe	$400	L.M.	2,062	$824,800
E-3	Storm Manhole or CBMH	$10,000	EACH	40	$400,000
E-4	Street Catch Basins Including Lead	$3,000	EACH	44	$132,000
E-5	Oil Grit Separator	$100,000	EACH	6	$600,000
E-6	300mm Watermain Pipe	$170	L.M.	2,062	$350,540
E-7	Valve Chamber	$12,000	EACH	10	$120,000
E-8	Headwall Including Rip-Rap Treatment	$25,000	EACH	13	$325,000
E-9	Bioswale	$400	L.M.	1,000	$400,000
Services Totals					**$3,172,960**
Roadworks					
F-1	Intersection Improvemrnt Buthurst and Dufferin	$350,000	lumpsum	1	$350,000
F-2	Construction Layout for Road Works	$10	L.M.	2,062	$20,620
F-3	Subgrade Fine Grading	$5	SQ.M.	32,992	$164,960
F-4	600 mm depth of Granular B	$60	CU.M.	19,795	$1,187,700
F-5	150 mm depth of Granular A	$80	CU.M.	4,949	$395,920
F-6	100 mm depth of Base Asphalt	$300	CU.M.	3,299	$989,760
F-7	50 mm depth of Top Asphalt	$150	TONNE	1,650	$247,440
F-8	Curb & Gutter	$70	L.M.	4,124	$288,680
F-9	Subdrain	$15	L.M.	4,124	$61,860
F-10	Concrete Median	$150	SQ.M.	84	$12,600
F-11	Road Sign	$400	EACH	22	$8,800
F-12	Concrete Sidewalk	$90	L.M.	0	$0
F-13	Multi-use Trail (including underpass trail)	$120	L.M.	4,284	$514,080
F-14	Bus Pad	$3,000	EACH	4	$12,000
F-15	Pavement Markings	$15	L.M.	2,062	$30,930
F-16	Guide Rail	$175	L.M.	284	$49,700
Roadworks Totals					**$4,335,050**
Structure					
G-1	Culvert Structure *	$800	L.M.	165	$131,600
G-2	Creek Crossing Culverts	$25,000	L.M.	153	$3,812,500
G-3	Retaining Wall	$450	SQ.M.	940	$423,000
G-4	Trail Underpass Culverts	$20,000	L.M.	160	$3,200,000
Structures Totals					**$7,567,100**
Miscellaneous					
H-1	Traffic Control	$100,000	L.S.	1	$100,000
H-2	Mud & Dust Control	$12	L.M.	2,062	$24,744
Miscellaneous Totals					**$124,744**
Contingency					
I-1	Contingency	15%	Ha		$3,477,025.62
Contingency Totals					**$3,477,026**
Capital Cost					
J-1	Capital cost				$26,657,196
Capital Cost Totals					**$26,657,196**
Land Acquisition					
K-1	Low Density Residential Lands[1]	$8,030,640	SQ.M.	11,100	$8,914,010
K-2	Remnant Low Density Residential Lands[1]	$8,030,640	SQ.M.	8,500	$6,826,044
K-3	Valley and Stream Corridor Lands [1]	$124,000	SQ.M.	6,600	$81,840
K-4	Remnant Valley and Stream Corridor Lands[1]	$124,000	SQ.M.	12,300	$152,520
K-5	Agricultural and Open Space Lands[1]	$124,000	SQ.M.	47,000	$582,800
K-6	Remnant Agricultural and Open Space Lands[1]	$124,000	SQ.M.	600	$7,440
Land Acquisition Totals					**$16,564,654**
Grand Total					**$43,221,851**

Comments

[1] Land Acquisition Costs provided by Lucas & Associates

* The size of culverts are preliminary

Note: 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 (including for stormwater management design options for water balance, quantity and quality control),utility relocation requirements and streetscaping opportunities.

KIRBY ROAD EA

PRELIMINARY COST ESTIMATE FOR ALIGNMENT 5A (OPTION-2)

Item	Description	Unit Price	Unit	Alignment 5A	
				Quantity	Total
Engineering Fees					
A-1	Detail Engineering Design Permits & Approvals Contract Administration & Inspection	20%	L.S.	1	$3,302,671.80
Engineering Fees Totals					**$3,302,672**
Tree Removal					
B-1	Tree Removal	$40,000	Ha	7.45	$298,000
Tree Removal Totals					**$298,000**
Site Preparation					
C-1	Clear and Grub Removal	$1	SQ.M.	117,501	$117,501
C-2	Erosion & Sediment Control	$4	SQ.M.	117,501	$470,004
C-3	Topsoil Stripping	$20	CU.M.	35,250	$705,000
Site Preparation Totals					**$1,292,505**
Earthworks					
D-1	Cut and Fill in Low Areas	$5	CU.M.	157,906	$789,530
D-2	Import Fill Material	$10	CU.M.	224,221	$2,242,210
Earthworks Totals					**$3,031,740**
Services					
E-1	Construction Layout for All Services	$10	L.M.	2,062	$20,620
E-2	Storm Sewer Pipe	$400	L.M.	2,062	$824,800
E-3	Storm Manhole or CBMH	$10,000	EACH	40	$400,000
E-4	Street Catch Basins Including Lead	$3,000	EACH	44	$132,000
E-5	Catch Basins Shields	$12,000	EACH	44	$528,000
E-6	300mm Watermain Pipe	$170	L.M.	2,062	$350,540
E-7	Valve Chamber	$12,000	EACH	10	$120,000
E-8	Headwall Including Rip-Rap Treatment	$25,000	EACH	13	$325,000
E-9	Tree Pits	$130	SQ.M.	1,500	$195,000
Services Totals					**$2,895,960**
Roadworks					
F-1	Intersection improvement -bathurst and Dufferin	$350,000	lumpsum	1	$350,000
F-2	Construction Layout for Road Works	$10	L.M.	2,062	$20,620
F-3	Subgrade Fine Grading	$5	SQ.M.	32,992	$164,960
F-4	600 mm depth of Granular B	$60	CU.M.	19,795	$1,187,700
F-5	150 mm depth of Granular A	$80	CU.M.	4,949	$395,920
F-6	100 mm depth of Base Asphalt	$300	CU.M.	3,299	$989,700
F-7	50 mm depth of Top Asphalt	$150	TONNE	1,650	$247,500
F-8	Curb & Gutter	$70	L.M.	4,124	$288,680
F-9	Subdrain	$15	L.M.	4,124	$61,860
F-10	Concrete Median	$150	SQ.M.	84	$12,600
F-11	Road Sign	$400	EACH	22	$8,800
F-12	Concrete Sidewalk	$90	L.M.	0	$0
F-13	Multi-use Trail (including underpass trail)	$120	L.M.	4,284	$514,080
F-14	Bus Pad	$3,000	EACH	4	$12,000
F-15	Pavement Markings	$15	L.M.	2,062	$30,930
F-16	Guide Rail	$175	L.M.	284	$49,700
Roadworks Totals					**$4,335,050**
Structure					
G-1	Culvert Structure *	$800	L.M.	165	$131,600
G-2	Creek Crossing Culverts	$25,000	L.M.	153	$3,812,500
G-3	Retaining Wall	$450	SQ.M.	940	$423,000
G-4	Trail Underpass Culverts	$20,000	L.M.	160	$3,200,000
Structures Totals					**$7,567,100**
Miscellaneous					
H-1	Traffic Control	$100,000	L.S.	1	$100,000
H-2	Mud & Dust Control	$12	L.M.	2,062	$24,744
Miscellaneous Totals					**$124,744**
Contingency					
I-1	Contingency	15%	Ha		$3,427,165.62
Contingency Totals					**$3,427,166**
Capital Cost					
J-1	Capital cost				$26,274,936
Capital Cost Totals					**$26,274,936**
Land Acquisition					
K-1	Low Density Residential Lands[1]	$8,030,640	SQ.M.	11,100	$8,914,010
K-2	Remnant Low Density Residential Lands[1]	$8,030,640	SQ.M.	8,500	$6,826,044
K-3	Valley and Stream Corridor Lands [1]	$124,000	SQ.M.	6,600	$81,840
K-4	Remnant Valley and Stream Corridor Lands[1]	$124,000	SQ.M.	12,300	$152,520
K-5	Agricultural and Open Space Lands[1]	$124,000	SQ.M.	47,000	$582,800
K-6	Remnant Agricultural and Open Space Lands[1]	$124,000	SQ.M.	600	$7,440
Land Acquisition Totals					**$16,564,654**
Grand Total					**$42,839,591**

Comments

[1] Land Acquisition Costs provided by Lucas & Associates

* The size of culverts are preliminary

Note: 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 (including for stormwater management design options for water balance, quantity and quality control),utility relocation requirements and streetscaping opportunities.

Schaeffer and Associates Ltd.
Project: 2015-4339

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Preliminary 50 Year Lifecycle cost analysis

Removal and Replacement Costs

Kirby Road Extension - Option 1

Calculated by: P.R.
Checked by: L.G.

Table 1: Removal and replacement costs

Capital Cost Item	Effective Life n	Current Project Cost* (2019 Dollars)	Removal and Replacement Cost** (2019 Dollars)	Inflated cost incurred at end of effective life (Future dollars)**	Annual reserve contribution (Sinking Fund Method) ***
Engineering [1]	50	$3,358,072	$3,015,188	$13,218,299	$63,140
Contingency [2]	50	$3,477,026	$3,015,188	$13,218,299	$63,140
Land Acquisition	One time	$16,564,654	$0	$0	$0
Soft Cost Subtotal		$23,399,752	$6,030,375	$26,436,598	$126,281
Tree Removal	One time	$298,000	$0	$0	$0
Removals [3]	50	$0	$989,700	$4,338,752	$20,725
Site Preparation [4]	50	$1,292,505	$470,004	$2,060,453	$9,842
Earthworks [5]	One time	$3,031,740	$0	$0	$0
Services	80	$3,172,960	$3,172,960	$33,763,120	$34,763
Road works [3]	50	$4,335,050	$2,751,430	$12,062,011	$57,617
Structures	75	$7,567,100	$7,567,100	$69,457,848	$91,796
Miscellaneous	50	$124,744	$124,744	$546,866	$2,612
Construction Cost Subtotal		$19,822,099	$15,075,938	$122,229,050	$217,356
Total		$43,221,851	$21,106,313	$148,665,648	$343,637

Cost Assumptions

(1) Soft Cost based on 20% of project cost

(2) Contingency cost based on 20% of project cost

(3) Subgrade will not require replacement/removal, Granular A and B not removed or replaced.

(4) Assumed only Erosion control required for replacement in future year.

(5) Assumed no future earthworks required

Notes

*Current Project costs encompasses the capital costs associated with the current project

** Removal and Replacement Cost encompasses the future works require for a like-for-like replacement of the road and associated assets at the end of their useful life. See assumptions.

Inflated Cost in future dollars was calculated using $F = P*(1+i)^n$

*** Annual contribution to Reserve Funds required to meet cost of future project at future year

Annual Cost was calculated using $A = F*(r/((1+r)^n-1))$

Where A is the annual cost, P is the cost in current dollars, and F is the future cost, accounting for inflation, i = 3% based on 20 average statistics canada index (table 327-0043), r = 5% based on assumed rate of return in reserve fund

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Preliminary 50 Year Lifecycle cost analysis

Operation and Maintenance Costs

Kirby Road Extension - Option 1

Calculated by: P.R.
Checked by: L.G.

Table 2: Operation and Maintenance Costs

Scheduled maint. year	Item	Quantity	Price per unit (2019 Dollars)	Total Cost (2019 Dollars)	Yearly total cost (2019 Dollars)	Yearly Total Cost (Future Dollars)*	Annual Reserve Contribution (Sinking Fund Method) **
3	Rout and Seal	500 m	$10.00	$5,000	$5,000	$5,464	$1,836
8	Rout and Seal Mill and Patch	1800 m 3299 m^2	$10.00 $26.20	$18,000 $86,434	$104,434	$132,294	$2,785
12	Rout and Seal Mill and Patch	1800 m 3299 m^2	$10.00 $26.20	$18,000 $86,434	$104,434	$148,898	$2,031
16	Full Resurface	32990 m^2	$56.20	$1,854,038	$1,854,038	$2,975,187	$171,072
19	Rout and Seal	500 m	$10.00	$5,000	$5,000	$8,768	$414
24	Rout and Seal Mill and Patch	1800 m 3299 m^2	$10.00 $26.20	$18,000 $86,434	$104,434	$212,292	$1,304
28	Rout and Seal Mill and Patch	1800 m 3299 m^2	$10.00 $26.20	$18,000 $86,434	$104,434	$238,937	$1,208
32	Full Resurface	32990 m^2	$56.20	$1,854,038	$1,854,038	$4,774,301	$117,324
35	Rout and Seal	500 m	$10.00	$5,000	$5,000	$14,069	$305
40	Rout and Seal Mill and Patch	1800 m 3299 m^2	$10.00 $26.20	$18,000 $86,434	$104,434	$340,667	$1,049
44	Rout and Seal Mill and Patch	1800 m 3299 m^2	$10.00 $26.20	$18,000 $86,434	$104,434	$383,424	$1,019
48	Full Resurface	32990 m^2	$56.20	$1,854,038	$1,854,038	$7,661,352	$102,562
Annual Costs							
Per Annum Over 50 Years	Structure Inspections	5 hours	$200.00	$1,000	$1,000		$2,739
	Road Inspections	5 hours	$200.00	$1,000	$1,000		$2,739
	OGS Maintenance	2 units	$1,600.00	$3,200	$3,200		$8,764
	Bioswale Maintenance	0.2 ha	$17,350.00	$3,470	$3,470		$9,504

Total Annual reserve contribution over 50 years***	$426,656

Assumptions

(1) $10/$m^2$ For Milling

(2) Route and Seal at $10/m

(3) SP12.5 at $135/tonne

(4) SP19.0 at $300/$m^3$

Notes

*Yearly Cost in Future Dollars was calculated with $F = P*(i+1)^n$

**Annualized amount is calculated based on $A = P*(r*(1+r)^n)/((1+r)^n-1)$

***Annual Costs will be reduced over time as scheduled maintenance items are completed

Where i = 3% based on 20 year average statistics canada index (table 327-0043), r = 5% based on assumed rate of return in reserve fund, P is cost in current dollars (2019), F is cost in future dollars, A is annualized cost

Abbreviations

OGS - Oil Grit Separator

LID - Low Impact Development

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Preliminary 50 Year Lifecycle cost analysis

Summary of Annual Costs

Kirby Road Extension - Option 1

Calculated by: P.R.
Checked by: L.G.

Table 3: Preliminary Annual Reserve Fund Contribution Summary

Item	Annual Reserve Contribution
Removal and Replacement	$343,637
Operation and Maintenance	$426,656
Total	$770,293

Notes:
Summary does not include Initial Project Costs
Operation an Maintenance costs may decrease over time as scheduled items are completed

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Preliminary 50 Year Lifecycle cost analysis

Removal and Replacement Costs

Kirby Road Extension - Option 2

Calculated by: P.R.
Checked by: L.G.

Table 1: Removal and replacement costs

Capital Cost Item	Effective Life n	Current Project Cost* (2019 Dollars)	Removal and Replacement Cost** (2019 Dollars)	Inflated cost incurred at end of effective life (Future dollars)**	Annual reserve contribution (Sinking Fund Method) ***
Engineering [1]	50	$3,302,672	$2,959,788	$12,975,431	$61,980
Contingency [2]	50	$3,427,166	$2,959,788	$12,975,431	$61,980
Land Acquisition	One time	$16,564,654	$0	$0	$0
Soft Cost Subtotal		$23,294,492	$5,919,575	$25,950,861	$123,960
Tree Removal	One time	$298,000	$0	$0	$0
Removals [3]	50	$0	$989,700	$4,338,752	$20,725
Site Preparation [4]	50	$1,292,505	$470,004	$2,060,453	$9,842
Earthworks [5]	One time	$3,031,740	$0	$0	$0
Services	80	$2,895,960	$2,895,960	$30,815,593	$31,728
Road works [3]	50	$4,335,050	$2,751,430	$12,062,011	$57,617
Structures	75	$7,567,100	$7,567,100	$69,457,848	$91,796
Miscellaneous	50	$124,744	$124,744	$546,866	$2,612
Construction Cost Subtotal		$19,545,099	$14,798,938	$119,281,523	$214,321
Total		$42,839,591	$20,718,513	$145,232,385	$338,282

Cost Assumptions

(1) Soft Cost based on 20% of project cost

(2) Contingency cost based on 20% of project cost

(3) Subgrade will not require replacement/removal, Granular A and B not removed or replaced.

(4) Assumed only Erosion control required for replacement in future year.

(5) Assumed no future earthworks required

Notes

*Current Project costs encompasses the capital costs associated with the current project

** Removal and Replacement Cost encompasses the future works require for a like-for-like replacement of the road and associated assets at the end of their useful life. See assumptions.

Inflated Cost in future dollars was calculated using $F = P*(1+i)^n$

*** Annual contribution to Reserve Funds required to meet cost of future project at future year

Annual Cost was calculated using $A = F*(r/((1+r)^n-1))$

Where A is the annual cost, P is the cost in current dollars, and F is the future cost, accounting for inflation, i = 3% based on 20 average statistics canada index (table 327-0043), r = 5% based on assumed rate of return in reserve fund

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Operation and Maintenance Costs

Kirby Road Extension - Option 2

Calculated by: P.R.
Checked by: L.G.

Table 2: Operation and Maintenance Costs

Scheduled maint. year	Item	Quantity	Price per unit (2019 Dollars)	Total Cost (2019 Dollars)	Yearly total cost (2019 Dollars)	Yearly Total Cost (Future Dollars)*	Annual Reserve Contribution (Sinking Fund Method) **
3	Rout and Seal	500 m	$10.00	$5,000	$5,000	$5,464	$1,836
8	Rout and Seal Mill and Patch 50mm	1800 m 3299 m^2	$10.00 $26.20	$18,000 $86,434	$104,434	$132,294	$2,785
12	Rout and Seal Mill and Patch 50mm	1800 m 3299 m^2	$10.00 $26.20	$18,000 $86,434	$104,434	$148,898	$2,031
16	Full Resurface	32990 m^2	$56.20	$1,854,038	$1,854,038	$2,975,187	$171,072
19	Rout and Seal	500 m	$10.00	$5,000	$5,000	$8,768	$414
24	Rout and Seal Mill and Patch 50mm	1800 m 3299 m^2	$10.00 $26.20	$18,000 $86,434	$104,434	$212,292	$1,304
28	Rout and Seal Mill and Patch 50mm	1800 m 3299 m^2	$10.00 $26.20	$18,000 $86,434	$104,434	$238,937	$1,208
32	Full Resurface	32990 m^2	$56.20	$1,854,038	$1,854,038	$4,774,301	$117,324
35	Rout and Seal	500 m	$10.00	$5,000	$5,000	$14,069	$305
40	Rout and Seal Mill and Patch 50mm	1800 m 3299 m^2	$10.00 $26.20	$18,000 $86,434	$104,434	$340,667	$1,049
44	Rout and Seal Mill and Patch 50mm	1800 m 3299 m^2	$10.00 $26.20	$18,000 $86,434	$104,434	$383,424	$1,019
48	Full Resurface	32990 m^2	$56.20	$1,854,038	$1,854,038	$7,661,352	$102,562
Annual Costs							
Per Annum Over 50 Years	Structure Inspections	5 hours	$200.00	$1,000	$1,000		$2,739
	Road Inspections	5 hours	$200.00	$1,000	$1,000		$2,739
	CB Shield Maintenance	44 units	$25.00	$1,100	$1,100		$3,013
	Tree Pit Maintenance	0.15 ha	$17,100.00	$2,565	$2,565		$7,025
					Total Annual reserve contribution over 50 years***		$418,426

Assumptions

(1) $10/$m^2$ For Milling

(2) Route and Seal at $10/m

(3) SP12.5 at $135/tonne

(4) SP19.0 at $300/$m^3$

(5) Full Resurface indicates 50mm of SP12.5 and 100mm of SP 19.0

Notes

*Yearly Cost in Future Dollars was calculated with $F = P*(i+1)^n$

**Annualized amount is calculated based on $A = P*(r*(1+r)^n)/((1+r)^n-1)$

***Annual Costs will be reduced over time as scheduled maintenance items are completed

Where i = 3% based on 20 year average statistics canada index (table 327-0043), r = 5% based on assumed rate of return in reserve fund, P is cost in current dollars (2019), F is cost in future dollars, A is annualized cost

Abbreviations

CB Shield - Catch Basin Shield

LID - Low Impact Development

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Preliminary 50 Year Lifecycle cost analysis

Summary of Annual Costs

Kirby Road Extension - Option 2

Calculated by: P.R.
Checked by: L.G.

Table 3: Preliminary Annual Reserve Fund Contribution Summary

Item	Annual Reserve Contribution
Removal and Replacement	$338,282
Operation and Maintenance	$418,426
Total	$756,707

Notes:

Summary does not include Initial Project Costs

Operation an Maintenance costs may decrease over time as scheduled items are completed