

Environmental Study Report

Volume 1: Report

East Boundary Road Corridor Study from Dundas Street South (Highway 8) to Townline Road (Regional Road 33) Schedule C Class Environmental Assessment

Project Location:
City of Cambridge, Township of North Dumfries

Prepared for:



Region of Waterloo

Region of Waterloo
150 Frederick St., Kitchener, ON N2G 4J3

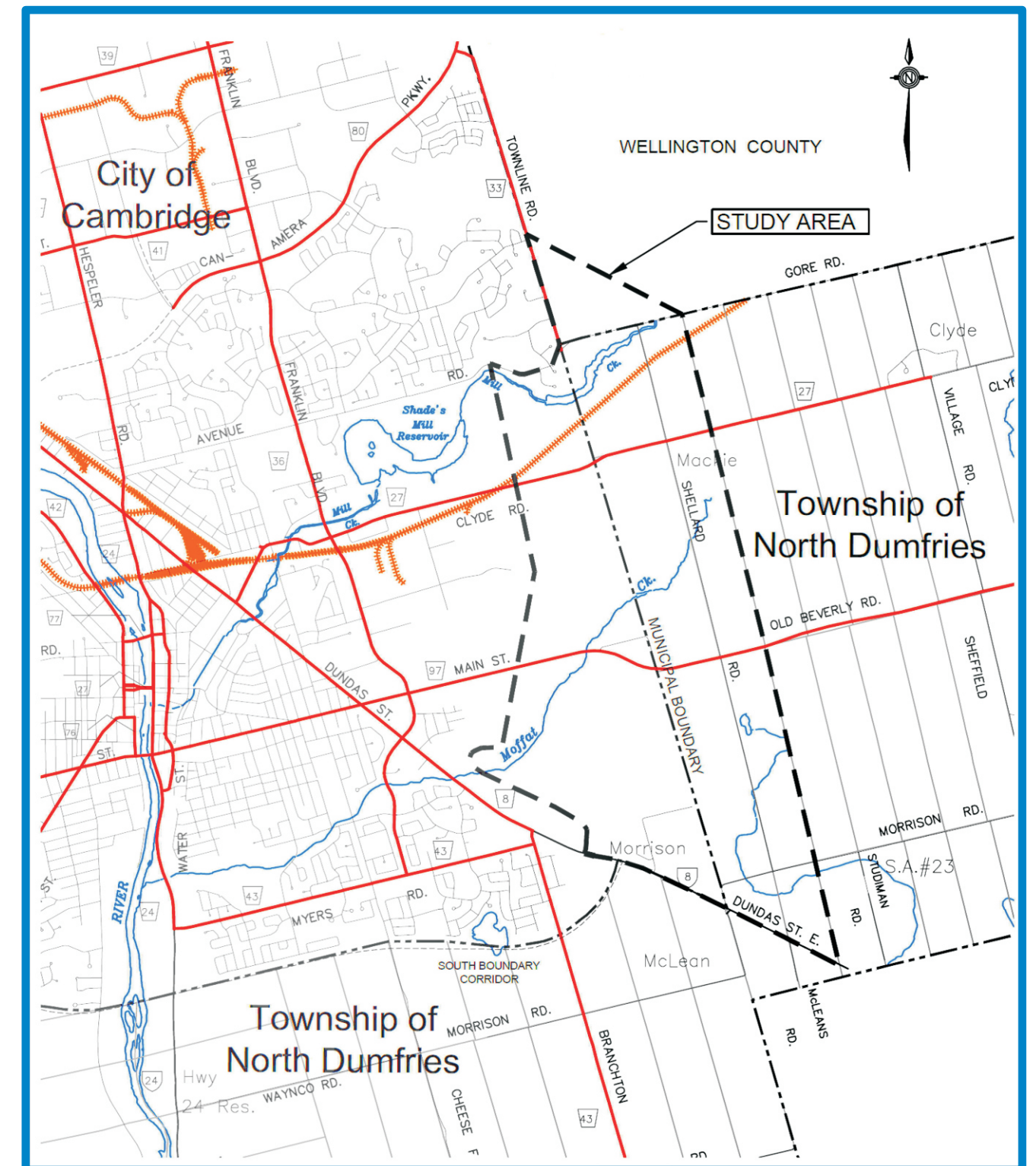
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May 2019

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EXECUTIVE SUMMARY

The Region of Waterloo has undertaken a Schedule C Class Environmental Assessment (Class EA) study in the City of Cambridge and Township of North Dumfries to identify a corridor for an arterial road connection on the east side of Cambridge between the south end of the City and Highway 401. The Study Area for the East Boundary Road Class EA is illustrated in **Figure ES1.1**.

Regional transportation studies dating back to the 1960s have all identified a future need for an arterial road connection on the east side of Cambridge between the south end of the city to Highway 401. This arterial road has commonly been referred to as the “East Boundary Road”. Transportation demand modelling results have confirmed that an arterial road on the east side of Cambridge will be needed to alleviate forecasted north-south roadway capacity deficiencies on Hespeler Road and Franklin Boulevard, as well as to improve access to the Regional road network for residents of the southeast Cambridge area, improve the active transportation network, and provide an alternative for goods movements to help manage traffic congestion in the downtown Galt area of Cambridge.

The East Boundary Road Class EA was initiated in 2013 to address the need for improvements to the Region’s transportation network and facilitate planned development in southeast Cambridge. This project is being planned as a Schedule ‘C’ Class EA project, per the Municipal Class EA guidelines.

Five (5) preliminary alignment alternatives for the East Boundary Road corridor study were developed by the Project Team and evaluated based on the following criteria:

- Natural environment;
- Social environment;
- Heritage/archaeological/cultural impact;
- Traffic capacity, operations, and safety; and
- Cost.

The alternatives included:

- Do nothing;
- Route A (Eastern Alignment);
- Route B (Western Alignment);
- Route C (Central Alignment); and
- Route D (Hydro One Corridor Alignment).

The five (5) preliminary alignment alternatives are illustrated in **Figure ES1.2**. All alignments connect to the intersection of Dundas Street South and future South Boundary Road at the south end and Townline Road at the north end.

The alternative alignments and their evaluations were presented to the public and stakeholders along with identification of the Project Team’s Preferred Design Alternative (alignment). In addition to extensive consultation with various stakeholders and agencies, the study has included three (3)

public consultation sessions. Comments received from the public and other stakeholders were generally supportive of the evaluation of alternatives. Some concerns were expressed regarding property impacts, including traffic noise, as well as impacts to the natural environment.

In consideration of the technical information and public comments gathered during this study, the Project Team developed various alternative alignments that attempted to address the comments and concerns brought forward. As such, the Project Team Recommended Design Alternative alignment is (Route) B4 shown in **Figure ES1.3**, as well as other alternative alignments.

The Recommended Design Alternative B4 cross-section is illustrated in **Figure ES1.4**, and includes:

- Four (4) traffic lanes;
- Raised centre medians; and
- Multi-use trails along both sides of the road.

Other Recommended Design Alternative B4 design elements include:

- Roundabouts at the intersections of the East Boundary Road and each of Wesley Boulevard, Main Street, Clyde Road, and Avenue Road/Gore Road;
- A bridge at each of the Moffatt Creek and Mill Creek crossings; and
- A grade-separated crossing (overpass) of the Canadian Pacific (CP) rail line.

The Recommended Design Alternative B4 provides:

- The required capacity for long-term traffic needs in the Region’s transportation network by linking traffic from South Boundary Road and Dundas Street South to Townline Road;
- Facilitates planned development in the southeast Cambridge area;
- Improves traffic operations throughout the City of Cambridge; and
- Provides enhanced active transportation and transit facilities as recommended in the Region’s Transportation Master Plan.

A preliminary cost estimate to complete the Recommended Alternative Alignment B4 is approximately \$59 million and will depend primarily on property acquisition costs and timing of construction.

On May 29, 2018 the Region of Waterloo Planning and Works Committee recommended Design Alternative B4 for the East Boundary Road be presented for approval to Region of Waterloo Council. On June 6, 2018 Region of Waterloo Council approved the following Recommendation shown in **Appendix I**:

“That the Regional Municipality of Waterloo take the following actions with respect to the Class Environmental Assessment for the East Boundary Road Corridor Study, in the City of Cambridge and Township of North Dumfries:

- a) Approve the Recommended Design Alternative for the proposed construction of an East Boundary Road from Dundas Street South (Highway 8) to Avenue Road/Gore Road as described in Report TES-DCS-18-11, dated May 29, 2018; and
- b) Direct staff to file the Notice of Completion with the Ministry of Environment and Climate Change (MOECC) for this Class Environmental Assessment study and place the Environmental Study Report on the public record for a review period of 30 days.”

A Notice of Study Completion for this Class EA has been filed to the Ministry of Environment, Conservation and Parks (MECP, formerly MOECC), as well as provided to the public, agencies, and stakeholders by means of advertisements in local newspapers and mailings to adjacent property owners, tenants, and review agencies, with the Environmental Study Report (ESR) placed on public record for a thirty (30) day review period. Copies of the ESR will be made available at the Clerks’ office in the Region of Waterloo, City of Cambridge, Township of North Dumfries, and County of Wellington for the review period, as noted in the Notice of Study Completion.

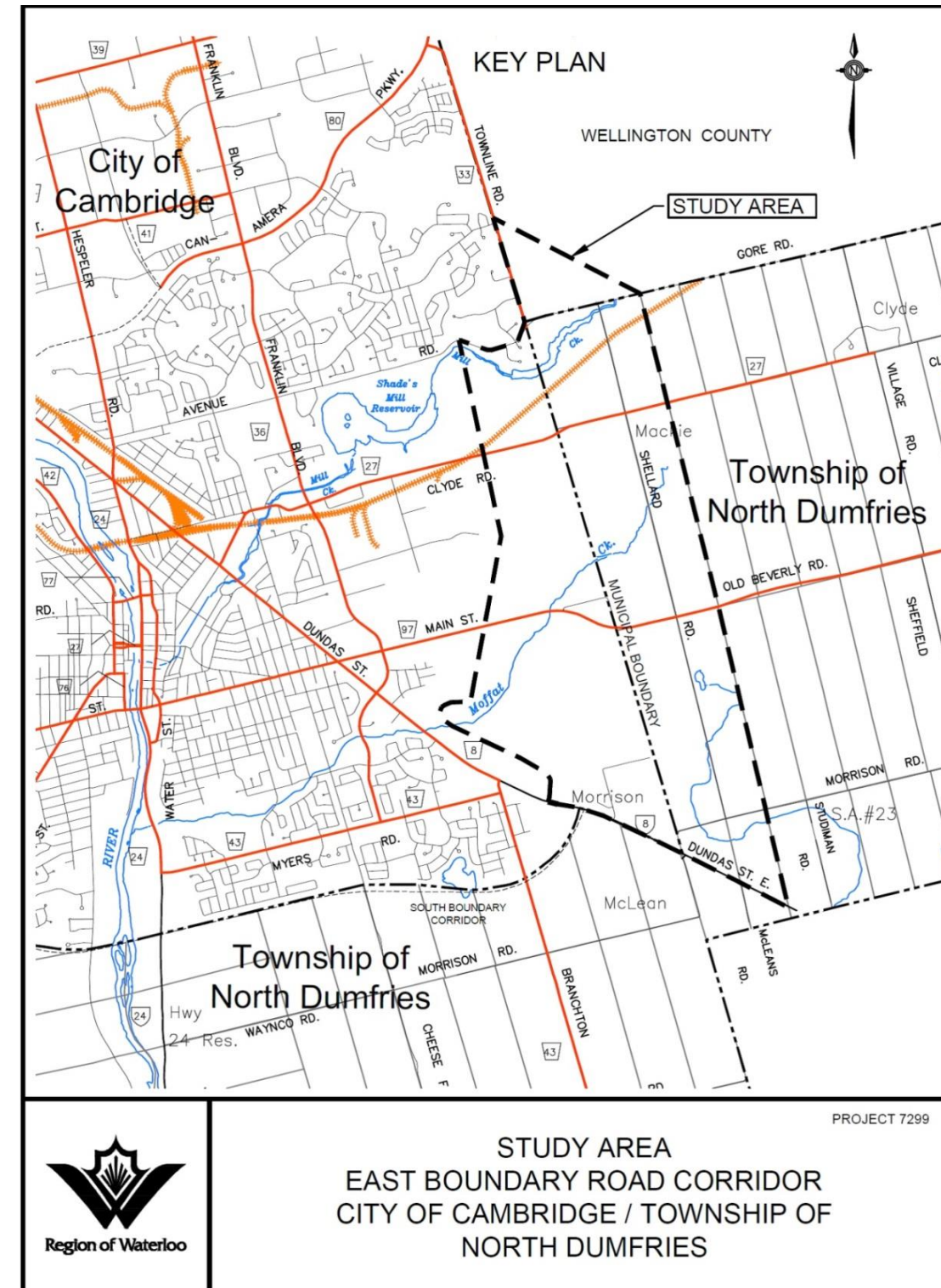


Figure ES1.1: East Boundary Road Study Area

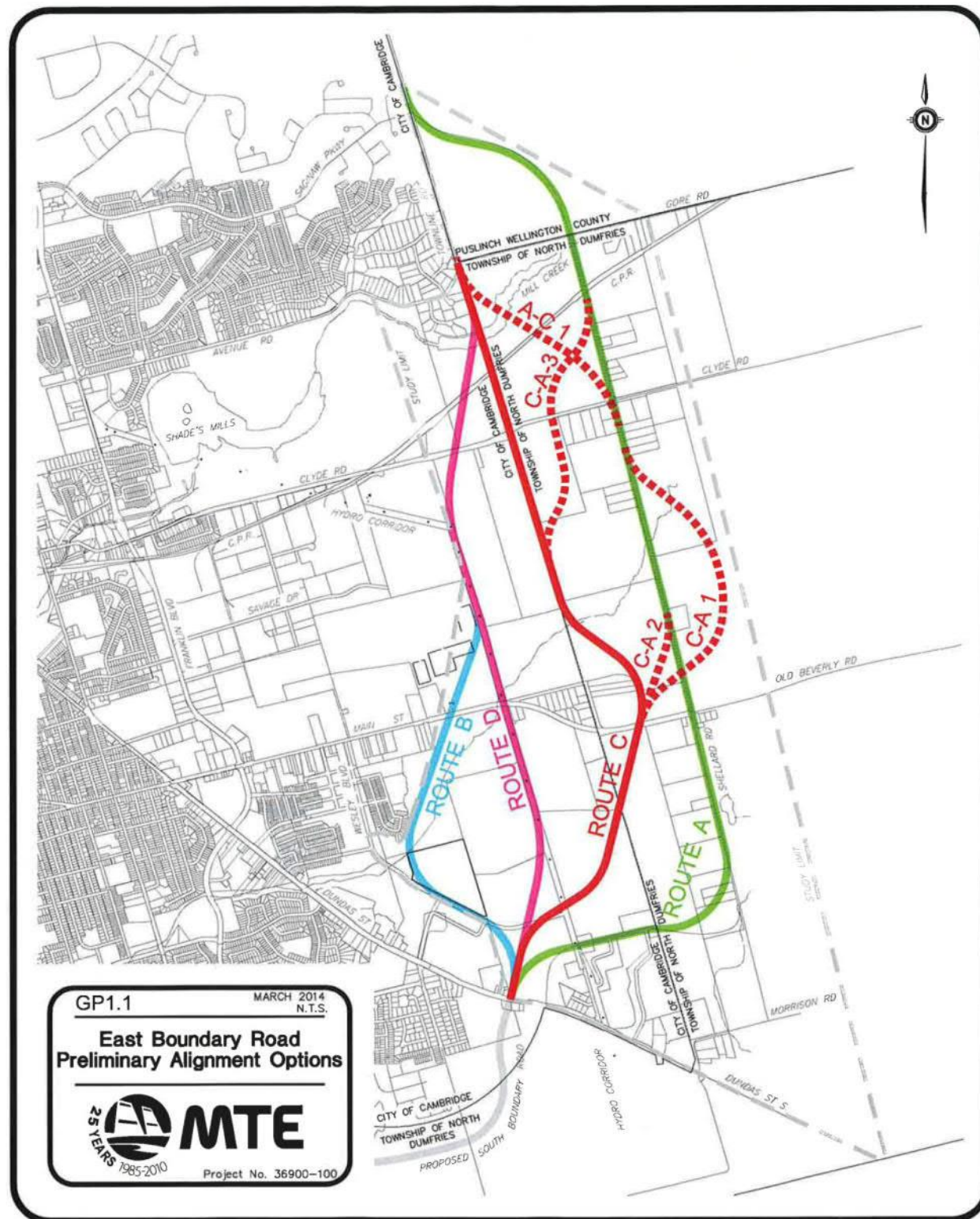


Figure: ES1.2: Five (5) Preliminary Alignment Alternatives

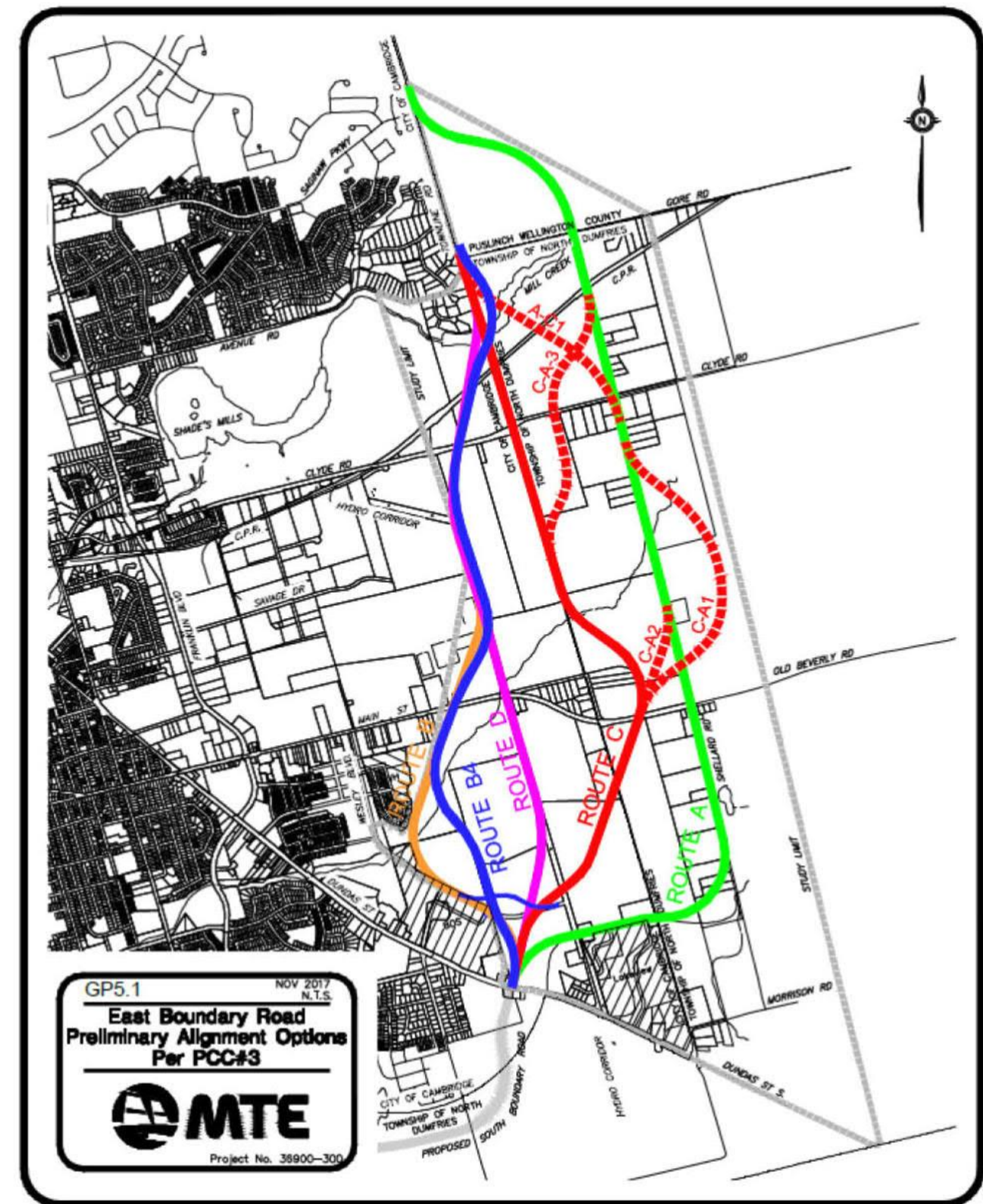


Figure ES1.3: Recommended Design Alternative Alignment (Route B4)

EAST BOUNDARY ROAD CLASS EA

PUBLIC CONSULTATION CENTRE (PCC) No. 3

East Boundary Road Preliminary Cross-Section

Ultimate 4 Lanes and Multi-Use Trail
40m-50m Right-of-Way Width (To be Determined)

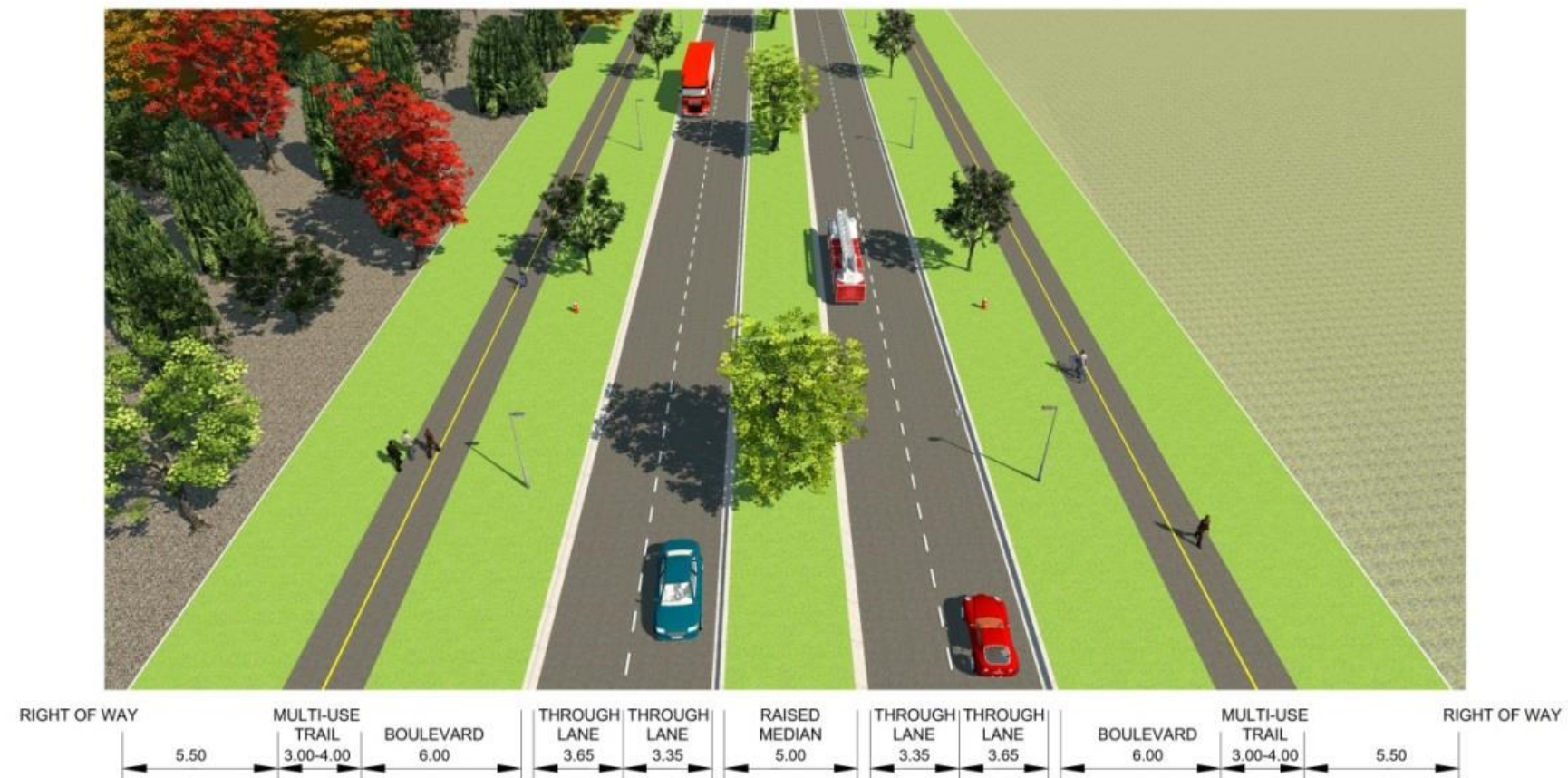


Figure ES1.4: Recommended Design Alternative Cross-Section

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1.0 INTRODUCTION AND BACKGROUND

This Environmental Study Report (ESR) documents the Regional Municipality of Waterloo’s (the Region’s) Schedule C Municipal Class Environmental Assessment (Class EA) process undertaken for the East Boundary Road Corridor Study in the City of Cambridge (Cambridge) and Township of North Dumfries (North Dumfries). The Study Area is illustrated in **Figure 1.1** and includes the southeast portion of Cambridge; a portion of the eastern section of North Dumfries east of Cambridge; and, a triangular portion in southwest portion of Puslinch in Wellington County. The boundary limits of the Study Area are as follows:

- North:** Avenue Road east of Shade’s Mills Conservation Area to Townline Road and Gore Road;
- East:** 500 m east of Shellard Road (or Shellard Sideroad/Township Road 17) in North Dumfries;
- South:** Dundas Street South (Highway 8) south of Myers Road; and
- West:** East of Franklin Boulevard/Dundas Street South minimizing impacts to the Moffat Creek Wetland Complex, Cambridge Waste Management Site, and Mill Creek Wetland Complex.

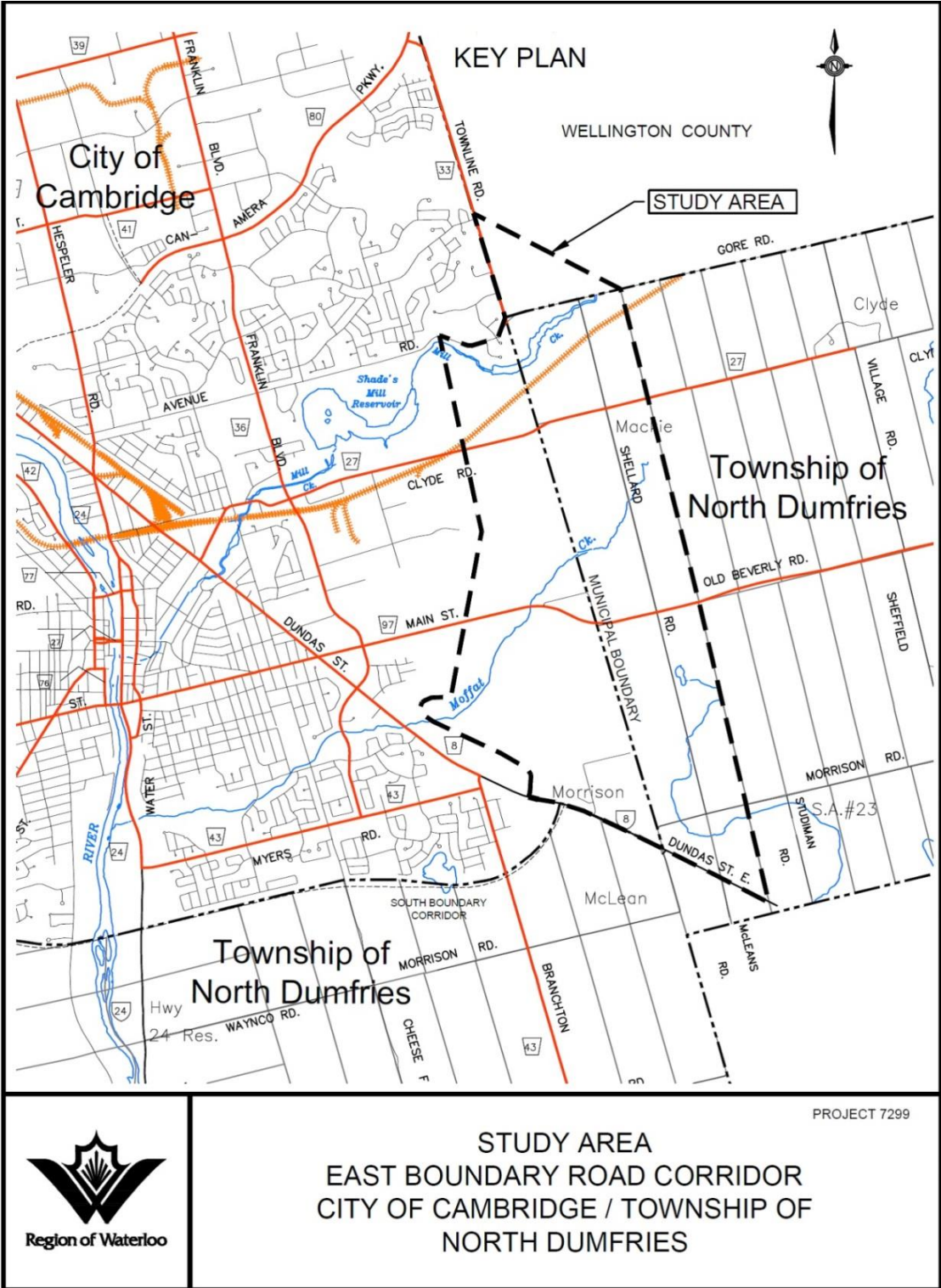


Figure 1.1 - East Boundary Road Study Area

1.1 Previous Studies

The City of Cambridge has been growing rapidly for the past 15 years; with annual growth rates higher than the provincial average. Population growth is putting pressure on Cambridge transportation infrastructure, and as a result the transportation network needs to be upgraded to meet current demands and to accommodate future growth as identified in many studies and policies. In particular, the need for an “East Boundary” transportation facility has been documented in several previous transportation studies including:

- **Report on a Traffic Planning Study for the Joint Area of Galt and Preston (Damas and Smith, 1967)**
This 1967 report recommended several new transportation facilities including a ring road or bypass of Galt and Preston and that a “road allowance be protected for the north-south freeway east of Galt.” The plans for this bypass identified a rough corridor just east of the eastern Galt Boundary.
- **Cambridge Area Transportation Study (CATS) (Region of Waterloo, 1996)**
CATS identified a north–south bypass east of the Cambridge Boundary in North Dumfries connecting Townline Road, realigned to the east to connect with Shellard Road at Gore Road, to the South Boundary Road at Highway 8 (Dundas Street South).
- **Cambridge Area Route Selection Study (CARSS) (Region of Waterloo, 2002)**
CARSS identified a number of east side corridors near the Cambridge/North Dumfries boundary. All east side alternatives utilized Townline Road north of Avenue Road and also included several other alternative routes that basically followed the eastern Cambridge boundary with deviations to the west using the existing Hydro Corridor and to the east into North Dumfries and Puslinch Townships.
- **Detailed Transportation Network Review of the Cambridge Area (DTNR) (Region of Waterloo, 2004)**
The DTNR identified the need for an “East Side Bypass”, but indicated that the planning for this route would be incorporated into the MTO’s Highway 24 Route Planning Study.

It should be noted that a Schedule C Class EA for the South Boundary Road between Highway 24 (Water Street South) and Highway 8 (Dundas Street South) was completed in November 2011 and indicated a future connection to an “East Boundary Road” at Highway 8/Dundas Street South.

In summary, since at least 1967 an east-side roadway has been recognized as a long-term need to provide north-south Highway 401 access for southeast Cambridge. Most of these alignments had been illustrated to be near the Cambridge/North Dumfries municipal boundary.

The MTO Highway 24 study referred to in the 2004 DTNR, is not progressing as planned and is currently “on hold”. Development plans are proceeding for southeast Cambridge, requiring the need to examine an east side transportation facility in detail to address future development and traffic requirements for the City of Cambridge. As a result the Region identified the need for the Schedule C Class EA Study for the East Boundary Road independent of the MTO Study.

1.1.1 East Boundary Road Pre-Project Scoping Report

In April 2012 MTE Consultants Inc. (MTE) was retained by the Region to complete a Schedule C Class EA Study for the East Boundary Road. Prior to commencing the Class EA Study, the Region and City of Cambridge agreed that a Pre-Project Scoping Report of the proposed Study Area be completed given that parts of the identified Study Area were developed or proposed to be developed.

In February 2013 MTE completed a Pre-Project Scoping Report which examined several issues in the proposed Study Area such as: current and proposed land use; cultural heritage and archaeological sites; contaminated sites and the natural environment consisting mainly of desktop studies and literature reviews. Based on the results of the desktop and literature review, the Scoping Report made a recommendation for a revised Study Area for the East Boundary Road Schedule C Class EA and serves as a foundation for the more detailed process to be completed as part the East Boundary Road Class EA Study. The final Study Area shown in **Figure 1.1**, is the primary result of the Pre-Project Scoping Report, and reduced the original “pre-project” Study Area by eliminating an area east of Dundas Street South and Franklin Boulevard south of Avenue Road. In addition, the area in the northeast corner (County of Wellington/Township of Puslinch) was added to the Study Area for Phase 2 consideration (i.e. Identify Alternative Solutions).

A copy of the *East Boundary Road Pre-Project Scoping Report* (MTE, February 2013) is contained in **Appendix A**. This report provides additional background information and explanations regarding this Class EA Study, as well as the rationale for the Study Area.

It is important to note that the revised Study Area for the East Boundary Road Class EA is for the actual location of a new transportation facility/facilities only. As with any transportation Class EA, investigation of travel demand and potential additional expansion of other transportation facilities outside the actual Study Area must be considered to develop a complete and comprehensive solution.

1.2 The Class Environmental Assessment (EA) Process

All municipalities in Ontario are subject to the provisions of the Environmental Assessment Act (EAA) and its requirements to follow the Environmental Assessment Process for most public works projects. The Ontario Municipal Engineers Association (MEA) *Municipal Class Environmental Assessment* document (June 2000, as amended in 2007), provides municipalities with a five-phase planning procedure approved under the EAA to plan and undertake all municipal road, sewage, stormwater management, water, and transit projects. The Class EA document also serves as a public statement of the decision making process followed by municipalities in the planning and implementation of needed infrastructure.

Based on the MEA Class EA document, projects are classified as either Schedule “A”, “A+”, “B”, or “C” projects according to their environmental significance and the effects they may impose on the environment, as well as their relative financial costs. The main difference between the classifications/schedule types is the degree to which each project may adversely affect the existing environment. Schedule “A” and “A+” projects have minimal adverse effects, while Schedule “C” projects have the potential for significant environmental effects. Accordingly each of these classifications requires a different level of review to complete the requirements of the Class EA, and

thus comply with the EAA. **Figure 1.2** illustrates the process followed in the planning and design of projects covered by a Class EA. The Class EA process incorporates Phases considered essential for compliance with the requirements of the EAA, including public consultation, which is summarized below:

Phase 1 • Identify the problem or opportunity.

Phase 2 • Identify alternative solutions to address the problem or opportunity by taking into consideration the existing environment, select the project Schedule, and establish the preferred solution.

- Mandatory public and agency contact, normally in the form of a Notice of Commencement for Schedule B and C projects and as a Public Consultation Centre (PCC) for Schedule C projects. Notice is the first mandatory point of contact.

Phase 3 • Examine alternative methods of implementing the preferred solution based on the environment, public and government agency input, anticipated environmental effects, and methods of mitigating negative effects.

- Mandatory public and agency contact, normally in the form of a PCC for Schedule C projects or as a Notice of Completion for Schedule B projects. This is the second mandatory point of contact.

Phase 4 • Mandatory Notice of Completion of ESR (Schedule C projects only). This is the third mandatory contact point for Schedule C projects and also carries a mandatory requirement to include notification of the provision on how to submit a Part II Order Request.

- Document, in an Environmental Study Report (ESR), a summary of the rationale and the planning, design, and consultation process followed in the project and make such documentation available for scrutiny by review agencies and the public.

Phase 5 • Complete contract drawings and documents; proceed to construction and operation and monitor construction and operation (as required) for adherence to environmental provisions/commitments. This phase is optional and typically completed closer to construction.

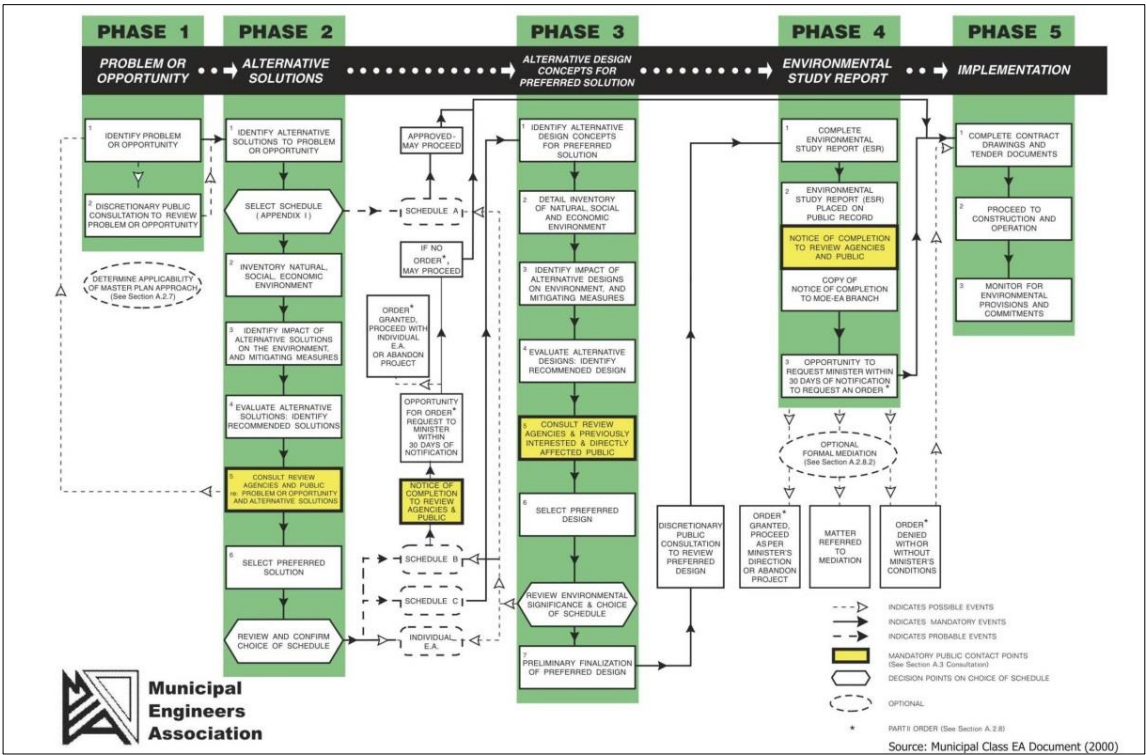


Figure 1.2 - Class Environmental Assessment (EA) Process

Public and agency consultation is an important part of the planning process. The proponent is encouraged to resolve all concerns with the public prior to issuing a Notice of Completion and commencing the public review period. This applies to addendums and full projects. However, if members of the public or review agencies feel that significant outstanding issues have not been addressed during the Class EA process they may request the Minister of the Environment, Conservation and Parks (MECP) to require a proponent to comply with Part II of the EA Act (which addresses individual EAs), before proceeding with a proposed undertaking – this is what is known as a “Part II Order”.

Additional details on the Part II Order process, where to send requests, timelines, and factors for the Minister making a decision can be found in Section 11.0 of this Environmental Study Report.

1.3 Project Team Organization

The Region retained MTE Consultants Inc. (MTE) as their Prime Consultant to assist in completion of this Class EA Study. The “Project Team” consisted of members from the Region of Waterloo, City of Cambridge, Township of North Dumfries, Township of Puslinch, Wellington County, MTE Consultants, and Grand River Conservation Authority. The Project Team, as identified below, changed due to various staff changes over the course of the study. The following is a list of all Project Team members involved in the project:

Region of Waterloo:

Regional Councillor (Cambridge) Jane Brewer
Regional Councillor (Cambridge) Karl Kiefer

Marcos Kroker, Head Transportation Expansion, Design & Construction
Justin Armstrong, Project Manager, Design & Construction
Paula Sawicki, Transportation Planning
Geoffrey Keyworth, Transportation Planning
Sylvia Rafalski-Misch, Principal Planner, Community Planning
Bridget Coady, Planner, Community Planning
John Holowackyj, Water Services - Engineering and Planning
Kevin Dolishny, Servicing and Development Planning - Water Services
Bob Henderson, Transportation Services
Steve Van De Keere, Director Transportation

City of Cambridge:

City Councillor Gary Price
City Councillor Frank Monteiro
Trevor McWilliams, Senior Operations Planner
Yogesh Shah, Engineering
James Etienne, Engineering
Elaine Brunn Shaw, Planning
Shannon Noonan, Engineering

Township of North Dumfries

Mayor Sue Foxton
Township Councillor Neil Ritchie
Andrew McNeely, CAO
Keith Schiedel, Director of Public Works
Mark Smuck, Public Works
David Harsh, K. Smart Associates, (Township of North Dumfries Engineer)
Steven Stone, Director of Planning

Puslinch Township

Mayor Dennis Lever
Don Creed, Director of Public Works and Parks

County of Wellington

Aldo Salis, Manager of Development Planning

Grand River Conservation Authority

John Brum, Resource Planner
Beth Brown, Planning

MTE Consultants Inc.

Dave Hallman, Project Manager
Vince Pugliese, Project Coordinator

1.4 Data Collection

A major portion of the study involved the collection and review of existing information to determine the need for potential improvements within the identified Study Area in order to develop and evaluate alternative solutions and design concepts.

As part of the data collection phases, stakeholder consultation was undertaken through the study process. Target participants included property owners within the Study Area, the general public, technical agencies and stakeholder/interest groups. Information related to land use, traffic operations, the natural and social environment, existing utilities and other engineering related components was gathered. For ease of reference, the details pertaining to the public and agency consultation undertaken through the study is found in **Section 10.0 – Public and Agency Consultation**.

A list of background documents, including historical planning documents utilized in the development of the study recommendations and preparation of this ESR are as follows:

- ✓ Municipal Class Environmental Assessment, June 2000
- ✓ Municipal Class Environmental Assessment, October 2000, as amended in 2007,
- ✓ Traffic Planning Study for the Joint Area of Galt and Preston, 1967 (Damas and Smith)
- ✓ Cambridge Area Transportation Study (CATS), 1996 (Region of Waterloo)
- ✓ Cambridge Area Route Selection Study, 2002 (Region of Waterloo)
- ✓ Detailed Transportation Network Review (DTNR), 2004 (Region of Waterloo)
- ✓ Regional Official Policies Plan, 2004 (Region of Waterloo)
- ✓ Regional Transportation Master Plan, 2010 (Region of Waterloo)
- ✓ Highway 24 Class Environmental Assessment Study from the City of Brantford to Highway 401 (ongoing; currently on hold) (MTO).

Additional discussion and review of these documents are contained in the East Boundary Road Pre-Project Scoping Report (**Appendix A**). In summary, as far back as 1967 an east-side roadway has been recognized as a long term need, to provide north-south access for the east side of Cambridge to Highway 401. Most of the historical alignments were illustrated to be near the eastern boundary of the City of Cambridge.

2.0 EXISTING AND FUTURE CONDITIONS

2.1 Natural Environment

A Natural Environment Report was completed by Savanta Inc. in 2015 (**Appendix B**) which summarizes the natural environment investigations undertaken for this project. Included in the investigations were discussions and meetings with both the Grand River Conservation Authority (GRCA) and Ministry of Natural Resources and Forestry (MNRF).

2.1.1 Natural Heritage Corridor Areas and Wetlands, Subwatersheds, Aquatic Habitat, and Fisheries

Two (2) major natural heritage system corridors traverse the Study Area; specifically, the Mill Creek Wetland Complex and the Moffat Creek Swamp Wetland, which are both Significant Wetland complexes. These two (2) Wetland Complexes are illustrated in **Figure 2.1**, which also illustrates all Natural Environmental Constraints within the Study Area. A smaller wetland complex, the Sheffield Rockton Wetland Complex, also overlaps the southeast corner of the Study Area.

The Mill Creek Wetland Complex surrounds Mill Creek proper and its tributaries, entering the north boundary of the Study Area at the intersection of Gore Road and Shellard Road. Immediately to the northeast of the Study Area in Puslinch Township, a large portion of the Mill Creek Wetland Complex also contains the Forests Life Science Area of Natural and Scientific Interest (ANSI); the ANSI is outside of the Study Area boundary.

The Moffat Creek Swamp Wetland surrounds the main stem of Moffat Creek. It enters the middle portion of the Study Area at Shellard Road, south of Clyde Road, and traverses the mid-portion of the Study Area in a northeast to southwest direction.

In the southeast corner of the Study Area to the south of Old Beverly Road, are several smaller wetland pockets associated with the Sheffield Rockton Wetland Complex near Dundas Street South. These wetland areas are associated with the headwaters of Fairchild Creek, a warmwater stream system that enters the Grand River downstream of Brantford.

Three (3) main subcatchments comprise the drainage of the Study Area: Mill Creek, Moffatt Creek, and Fairchild Creek.

Mill Creek, a coldwater stream supporting brook trout and brown trout, flows to Shade's Mills reservoir, a 32 hectare (ha) flood control facility and dam owned and operated by the Grand River Conservation Authority (GRCA). The Shade's Mills Conservation Area is located on the north side of the reservoir.

Approximately 2,100 metres (m) upstream of the Shade's Mill Dam, a small dam is present on Mill Creek behind residences on Grandy Lane. This dam has created a backwater reaching as far upstream as Shellard Road, and is privately owned and operated; however, any modifications or alterations to the dam would require permits from both GRCA and MNRF.

Moffat Creek enters the middle portion of the Study Area at Shellard Road. Throughout the Study Area, Moffat Creek is classified as a warmwater stream, supporting primarily baitfish species.

The wetland areas of the Sheffield Rockton Complex in the southeast corner of the Study Area are associated with the headwaters of Fairchild Creek, a warmwater stream system that enters the Grand River downstream of Brantford. Based on MNRF records, many of the culvert and channel areas examined over time exhibit intermittent conditions and, at best, may provide seasonal habitat for species of cyprinids (minnows).

No Environmentally Significant/Sensitive Areas (ESAs) have been identified within or adjacent to the Study Area.

2.1.2 Natural Heritage Results of Data Collection Completed for this Study

Savanta completed various field surveys and natural environment inventories in 2012, 2013, and 2014. Field data collections in 2012 and 2013 were preliminary and investigative. A finalized Study Area and preliminary route alternatives were provided in late winter, 2013. Following confirmation of preliminary route alternatives, a targeted and comprehensive field program was completed in 2014.

All field investigations were conducted only where property access was provided. The field investigations included Ecological Land Classification (ELC) of vegetation communities, botanical inventories, salamander habitat assessments, salamander trapping and tissue sampling, amphibian call count surveys, reptile surveys, breeding bird surveys, and incidental wildlife observations.

2.1.2.1 Ecological Land Classification (ELC)

The Study Area has a diverse vegetation cover of forests, wetlands, and meadows within the matrix of agricultural fields and rural and sub-urban settlements. **Figure 2.2** maps the ELC communities, and also notes areas where access for surveying was not granted by the property owner/s.

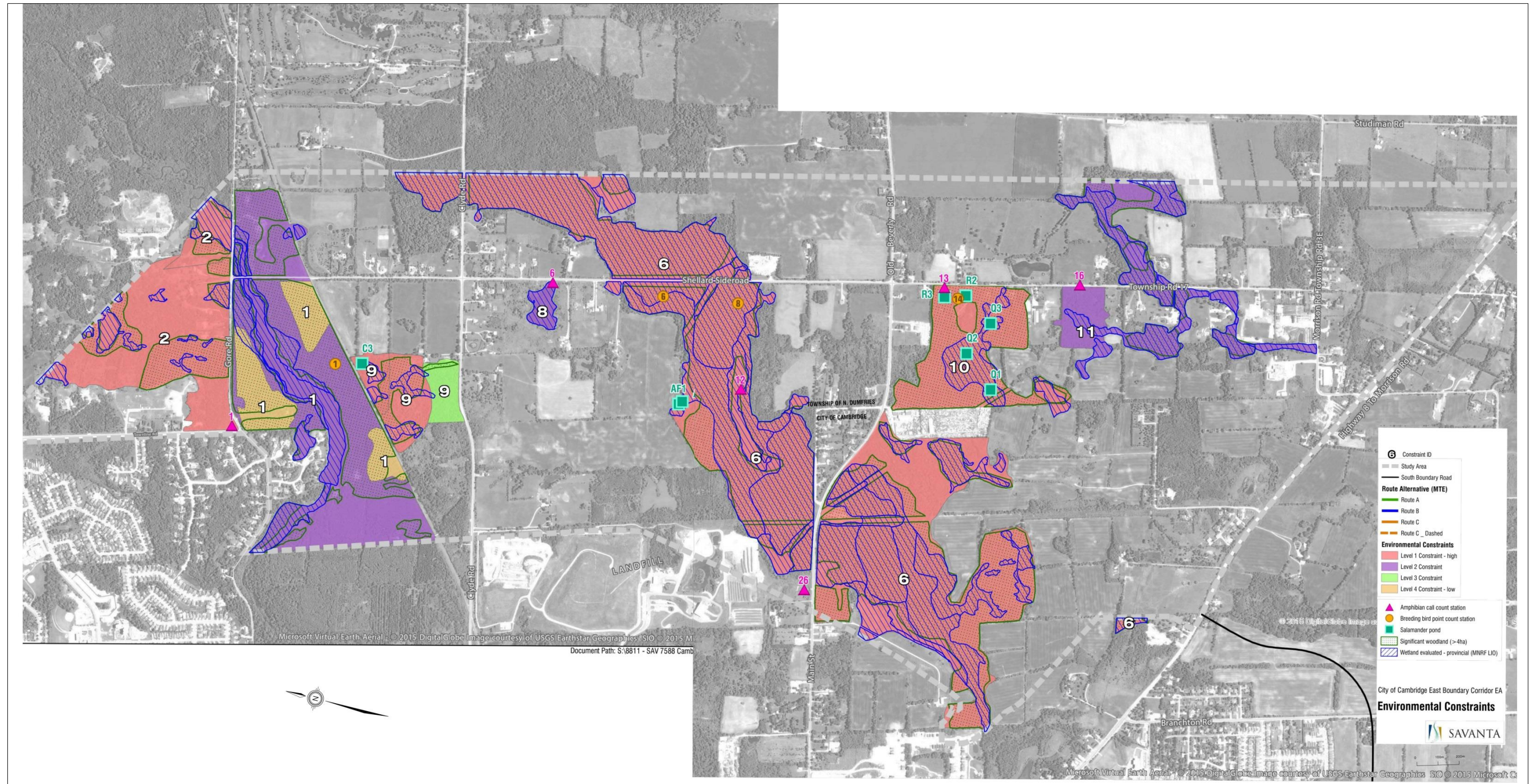
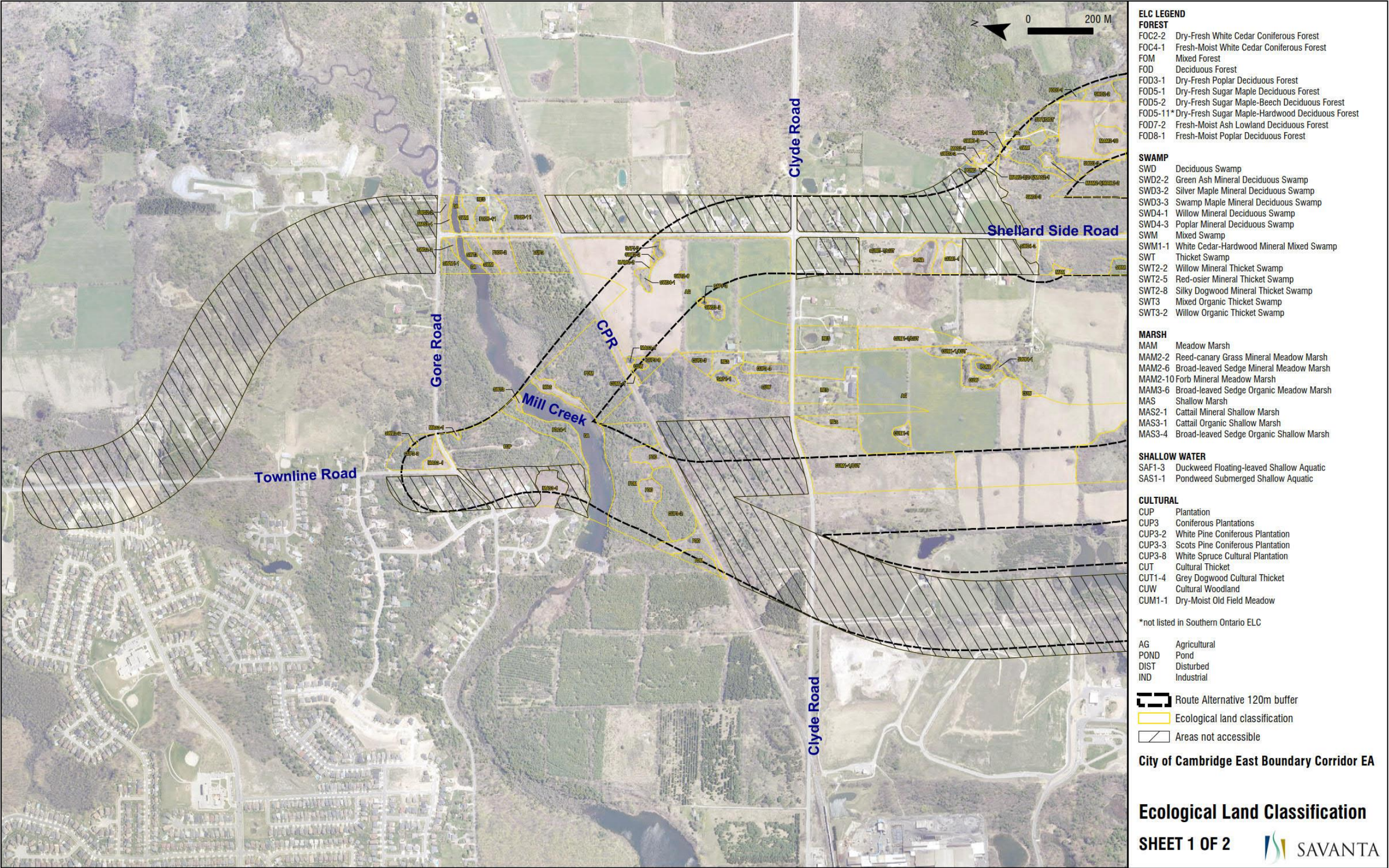


Figure 2.1: Environmental Constraints



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Figure 2.2 – Ecological Land Classification (ELC) Communities

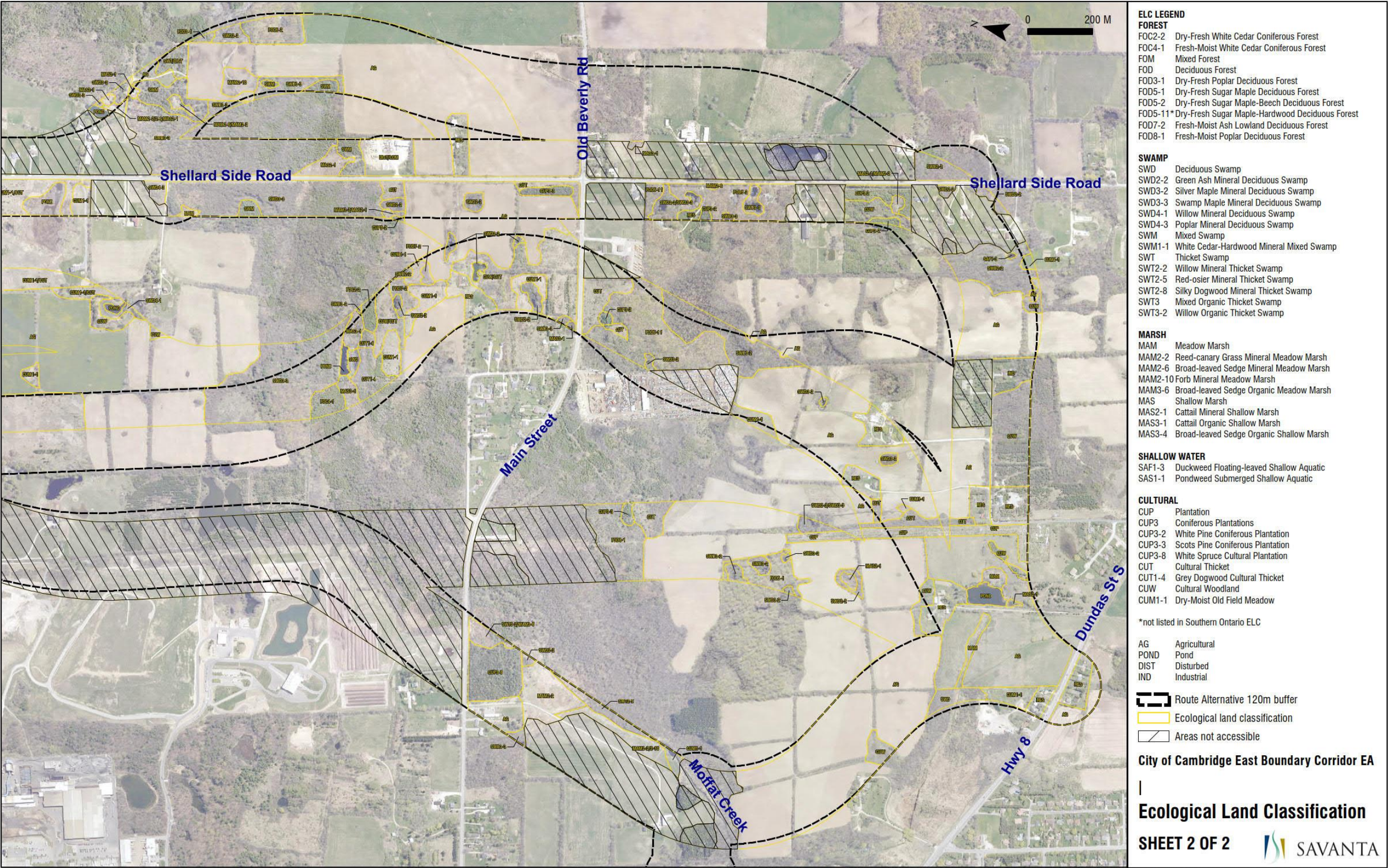


Figure 2.2 – Ecological Land Classification (ELC) Communities - continued

2.1.2.2 Botanical Inventory

A total of 261 species of vascular plants were identified within the Study Area. Of that number, 171 species (66%) are provincially native and 90 species (34%) are exotic.

The majority (94%) of the native species are ranked S5 (Secure – common, widespread and abundant in Ontario). The following 10 species (6%) are ranked S4 (Apparently Secure – uncommon, but not rare in Ontario):

- Arrow-leaved Aster (*Aster urophyllus*);
- Giant Blue Cohosh (*Caulophyllum giganteum*);
- American Beech (*Fagus grandifolia*);
- Black Walnut (*Juglans nigra*);
- White Ash (*Fraxinus americana*);
- Northern Evening-primrose (*Oenothera parviflora*);
- Long-fruited Anemone (*Anemone cylindrica*);
- Tuckerman’s Sedge (*Carex tuckermanii*);
- Big Bluestem (*Andropogon gerardii*); and
- Herbaceous Carrion Flower (*Smilax herbacea*).

15 locally (Region of Waterloo) rare species were recorded (rankings for the neighbouring County of Wellington are also provided for comparison; however, they are not analyzed since they are outside the Study Area). Species denoted with an asterisk (*) are deemed to be significant “but with the expectation that additional research may prove otherwise”:

- Interrupted Fern (*Osmunda claytoniana*);
- Common Juniper* (*Juniperus communis*);
- White Spruce* (*Picea glauca*);
- Speckled Alder* (*Alnus incana* ssp. *rugosa*);
- Cow-parsnip (*Heracleum maximum*);
- Longleaf Stitchwort (*Stellaria longifolia*);
- Black Walnut* (*Juglans nigra*);
- Long-fruited Anemone (*Anemone cylindrica*);
- Wild Licorice (*Galium circaezans*);
- American Prickly-ash* (*Zanthoxylum americanum*);
- Broad-leaved Sedge (*Carex platyphylla*);
- Burreed Sedge* (*Carex sparganioides*);
- Tuckerman’s Sedge (*Carex tuckermanii*);
- Big Bluestem (*Andropogon gerardii*); and
- Sheathed Dropseed (*Sporobolus vaginiflorus*).

No nationally or provincially rare, threatened, or endangered species were recorded in the Study Area. A full species list is included in the Savanta Report (Appendix B).

2.1.2.3 Amphibians (Salamanders)

Due to the potential presence of Jefferson Salamander in the Study Area, a comprehensive survey program was undertaken to sample various vernal and permanent pools in areas affected by route alternatives. The salamander surveys required various forms of Provincial approval.

Sampling methods were derived from the ‘Sampling Protocol for Determining the Presence of Jefferson Salamander (*Ambystoma jeffersonianum*) in Ontario’ prepared by the Jefferson Salamander Recovery Team (June 2013), as well as through consultation with Guelph District MNRF staff in March 2014. Salamander habitat suitability assessments were completed in all accessible properties that contained potentially suitable habitat conditions. Guelph District MNRF staff provided survey guidelines, and other conditions and characteristics of ponds were recorded to thoroughly assess each potential pond.

Minnow traps were set in suitable ponds/vernal pools to collect salamanders. Tissue samples (3 mm to 5 mm tail tips) were collected from each salamander caught, and all trapped salamanders were immediately released to the breeding pond/vernal pool after the tail tip was collected and properly documented. The tissue samples were delivered to Dr. James Bogart at the University of Guelph to conduct genetic analyses for each sample.

A total of 43 ponds/vernal pools were identified as suitable salamander habitat and were sampled using the above methods. Figure 2.3 illustrates identified Salamander Ponds. Of the 43 ponds/vernal pools, salamanders and tissue samples were collected from 11 sites, and a total of 68 tissue samples were collected and sent for genetic analysis. Table 2.1 illustrates the number of salamanders that were collected and sampled at the following ponds:

Table 2.1- Number of Salamanders Collected and Sampled

POND	# COLLECTED	# SAMPLED
AF	19	19
C3	11	11
D1	1	1
Q	12	11
R	49	23
V1	1	1
Y2	1	1

All collected samples were identified as Blue-spotted salamanders. No Jefferson Salamanders (JESA) were found within the sampled ponds/vernal pools.

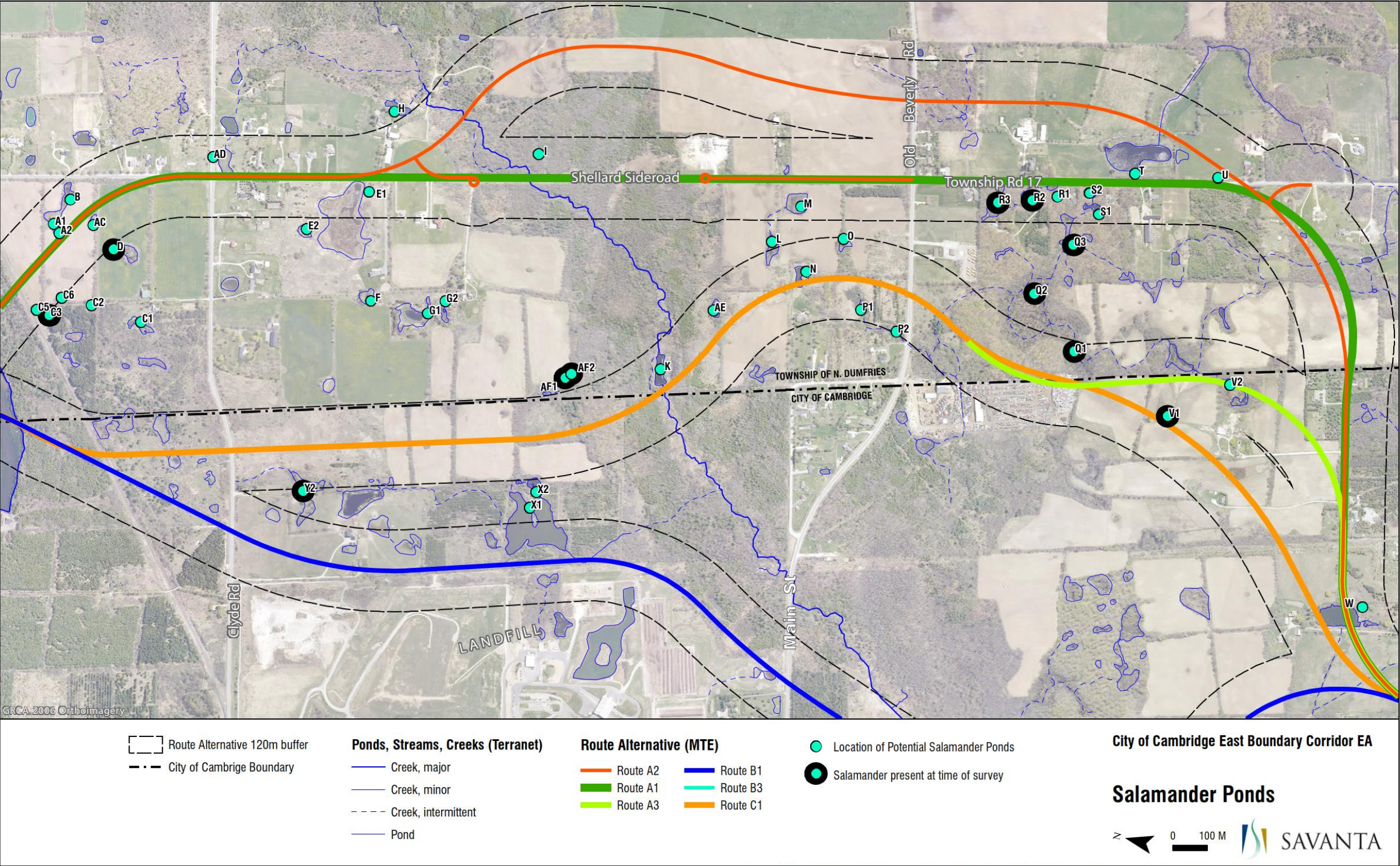


Figure 2.3 - Salamander Ponds

2.1.2.4 Amphibian Call Count Surveys

Amphibian call count surveys were conducted in April, May, and June of 2014 on three (3) separate occasions. Survey station locations were determined through a combination of ortho-photography assessments, vegetation communities, and ground observations. Locations of survey stations are found in the Natural Environment Report (**Appendix B**).

A total of 28 amphibian call count stations were surveyed. A total of 7 amphibian species were heard calling within the Study Area during the 3 rounds of call count surveys, as follows:

- American Frog;
- Gray Tree Frog;
- Spring Peeper;
- Wood Frog;
- Northern Leopard Frog;
- Pickerel Frog; and
- Green Frog.

All of these species are provincially ranked S5 (common and secure) or S4 (apparently common and secure).

2.1.2.5 Turtles

Reptile surveys were completed at 3 different ponds in June 2014. Water bodies were observed for ten minutes from each observation point for turtle presence. The edges of the water body, rocks, and logs were scanned for basking turtles using binoculars to confirm species and number. The surface of water bodies were scanned for submerged shells and emergent heads. Approximately 50 m of the Mill Creek shoreline was also walked and surveyed for signs of turtles. Additionally, roadsides were surveyed for mortalities, test pits and predated nests. Additional details of the turtle surveys are found in the Natural Environment Report (**Appendix B**).

Near the intersection of Shellard Road and Gore Road, no turtles were observed; however, 3 predated nests (2 Midland Painted Turtle nests and 1 Snapping Turtle nest) were recorded.

At a large pond located at the southeast corner of the intersection of Shellard Road and Clyde Road, a total of 24 Midland Painted Turtle observations and 4 Snapping Turtle observations were recorded. 2 Midland turtle test pits, as well as possible signs of Snapping Turtle nesting were also observed along Clyde Road.

3 Midland Painted Turtles (2 adults and 1 young of the year) were observed dead on the road near a pond along the west side of Shellard Road.

2.1.2.6 Breeding Birds

Breeding bird surveys were conducted in May and June of 2014 at a total of 13-point count stations. Stations were located within lowland deciduous forests, pine plantations, open meadow, wetlands, hayfields, wet meadows, and thickets. Details of the breeding bird survey methods and findings are contained in the Natural Environment Report (**Appendix B**).

A total of 69 bird species were observed. Of this total, 11 species are confirmed breeders, 41 are probable breeders, and 16 are possible breeders. The remaining bird species (1) is considered a non-breeder, flyover, or migrant. A total of 64 of the confirmed, probable, or possible breeders (93%) are provincially ranked S5 (common and secure) and S4 (apparently common and secure) or SNA (introduced species such as Rock Pigeon and European Starling).

The remaining 5 bird species are considered S1 – S3 (critically imperiled to vulnerable), as follows:

- Barn Swallow (threatened);
- Bobolink (threatened);
- Eastern Meadowlark (threatened);
- Eastern Woo Peewee (special concern); and
- Wood Thrush (special concern).

The following area sensitive species were recorded in the Study Area;

- Cooper’s Hawk;
- Hairy Woodpecker;
- Pileated Woodpecker;
- White-breasted Nuthatch;
- Brown Creeper;
- Veery;
- Ovenbird;
- Northern Waterthrush;
- American Redstart;
- Pine Warbler; and
- White-throated Sparrow.

26 of the breeding bird species are listed as regionally significant (Region of Waterloo):

- Wood Duck;
- Hooded Merganser;
- Pied-billed Grebe;
- Green Heron;
- Cooper’s Hawk;
- Turkey Vulture;
- Black-billed Cuckoo;
- Ruby-throated Hummingbird;

- Red-bellied Woodpecker;
- Hairy Woodpecker;
- Pileated Woodpecker;
- Willow Flycatcher;
- Red-breasted Nuthatch;
- Brown Creeper;
- Veery;
- Ovenbird;
- Northern Waterthrush;
- Blue-winged Warbler;
- American Redstart;
- Pine Warbler;
- Swamp Sparrow;
- White-throated Sparrow;
- Orchard Oriole; and
- Purple Finch.

2.1.3 Summary

Section 9.0, Table 9.1 identifies potential impacts to the Natural Environment as a result of the proposed East Boundary Road, as well as mitigating and/or monitoring measures to reduce net impacts.

2.2 Socio-Economic Environment

Existing land use and planned developments are a key component of the social-economic environment. URS completed an *Overview of Existing and Planned Land Uses* report in December 2012 as part of the Pre-Project Scoping Report (**Appendix C**). This Section summarizes the finding of this URS report.

2.2.1 Existing Land Use

The *Growth Plan for the Greater Golden Horseshoe* (Growth Plan) was released by the Ministry of Public Infrastructure Renewal in June 2006. This document provides policies for managing growth and urban sprawl and building complete communities in the Greater Golden Horseshoe (GGH) to 2031. The Growth Plan specifies density and intensification targets that must be met by GGH municipalities, but also includes policies for infrastructure planning such as the development of new transportation corridors in order to support growth. The Region of Waterloo and the City of Cambridge have prepared their Official Plans in conformity to the *Growth Plan*.

The *Greenbelt Act and Plan* came into effect in December 2004. The *Greenbelt Plan* includes 800,000 acres of land protected by the *Niagara Escarpment Plan* and the *Oak Ridges Moraine Conservation Plan*. The *Greenbelt Plan* identifies where urbanization should not occur in order to provide permanent protection to the agricultural land base and the ecological features and functions occurring on this landscape. The *Greenbelt Plan* is a cornerstone of the *Growth Plan for the*

Greater Golden Horseshoe. The southern tip of the Study Area is located within the area governed by the *Greenbelt Plan*.

The Study Area is not located within areas governed by the *Oak Ridges Moraine Conservation Plan* or the *Niagara Escarpment Plan*.

Based on the 2012 City of Cambridge Official Plan, the portion of the Study Area within the City of Cambridge is a mix of developed area and designated greenfield area. Between Avenue Road/Gore Road and Clyde Road/Regional Road 27, the land surrounding Shade’s Mill Conservation Area is natural open space, with low/ medium density residential on the periphery. Between Clyde Road/Regional Road 27 and Main Street East/Old Beverly Road/Regional Road 97 toward the eastern boundary, an area is designated as future urban reserve bounded by pockets of natural open space, cemetery, and open space. A small pocket of low/medium density residential is present along the southeast edge of this area. Between Main Street East/Old Beverly Road/Regional Road 97 and Dundas Street South/Highway 8, the lands are a mix of low/medium residential and natural open space. There is one pocket of future urban reserve along the eastern City of Cambridge boundary.

The 1999 City of Cambridge Official Plan classified the portion of the Study Area within the City of Cambridge as “city urban area”. The general land uses identified in the 1999 City of Cambridge Official Plan are generally the same as those identified in the 2012 City of Cambridge Official Plan.

The portion of the Study Area within the Township of North Dumfries is mainly rural area/agricultural. There is a small pocket of rural area/open space on the west side of Shellard Road north of Morrison Road.

The portion of the Study Area within the Township of Puslinch is rural area and consists of secondary agricultural lands.

Two pockets of high density residential are present within or near the Study Area: in the vicinity of Maple Bush Drive off of Dundas Street South/Highway 8 and in the Little Corners area where Branchton Road connects to Dundas Street South/Highway 8. The remaining residential areas of low/medium density residential are located on the periphery of Shade’s Mill Conservation Area, and in the area bounded by Main Street East/Old Beverly Road/Regional Road 97, Dundas Street South/Highway 8, and the Study Area’s eastern boundary.

The 2012 City of Cambridge Official Plan highlights one provincially identified former waste disposal site near the Study Area, located south of Clyde Road/Regional Road 27 and east of the termination of Savage Drive. This former City of Cambridge Landfill Site is currently a Region of Waterloo waste transfer site.

The most notable community and recreational feature within or near the Study Area is Shade’s Mill Conservation Area, located between Avenue Road/Gore Road and Clyde Road/Regional Road 27. Shade’s Mill Conservation Area is managed by the Grand River Conservation Authority (GRCA) and hosts many leisure and recreational activities. The GRCA’s head offices are also located at this site.

Within the Study Area, the new City of Cambridge Official Plan identifies a number of areas with site specific policies. The specific policies for each area are listed below. The site numbers for each referenced area is the Site number in the Cambridge Official Plan, detailed further in the *Overview of Existing and Planned Land Uses (URS, December 2012)* (**Appendix C**).

✓ **Dundas Street South/Highway 8 at the City of Cambridge Southeast Boundary (Site 22)**

The lands designated as low medium density residential may also be used for a landscape-garden centre. This area is also identified in the City of Cambridge Official Plan as the Dundas Street South Special District.

✓ **North of Main Street East/Old Beverly Road/Regional Road 97 Along the City of Cambridge Eastern Boundary (Site 30)**

The site designated as low medium density residential may also be used for business and professional offices. This area is also identified in the City of Cambridge Official Plan as the Robinson Road Special District.

✓ **North of Clyde Road/Regional Road 27 West of the City of Cambridge Eastern Boundary (Site 41)**

The lands designated as industrial may be serviced by private sanitary services and may be used for a building materials yard for the storage of reclaimed and new building materials; and general industrial uses that do not use water as part of the industrial process.

✓ **At the Easterly End of Savage Drive (Site 46)**

The identified lands are a portion of the site of the former City of Cambridge Landfill, which is now a Regional Waste Transfer Site. These lands are permitted for use as a waste transfer station. Any future additional or alternative development uses for this property will require an amendment to the Official Plan.

This current Region of Waterloo Waste Transfer Site encompasses an inactive landfill area at the north end of the site, a waste transfer station near the middle portion of the site, and a composting area towards the south end of the site. All yard waste composting undertaken by the Region of Waterloo occurs at the Cambridge site.

✓ **South of Clyde Road/Regional Road 27 at the City of Cambridge Eastern Boundary (Site 51)**

The lands designated as future urban reserve located at 975 Clyde Road/Regional Road 27 may also be used for those uses permitted in the recreation, cemetery and open space designation. Also the lands designated future urban reserve located at 935 and 855 Clyde Road/Regional Road 27 may also be used for those uses permitted in the prime agriculture designation.

The Township of North Dumfries Official Plan allows some growth in rural settlement areas. However, within the Study Area, there are 2 settlement areas that have specific policies which do not permit expansion. The first is the Mackie Settlement Area located in the southwest quadrant of Shellard Road and Clyde Road/Regional Road 27. The second is the Morrison Settlement Area located in the vicinity of Shellard Road and Morrison Road. In addition to the restrictive specific policies, any development on lands designated as dry industrial/commercial in the Morrison Settlement Area must be compatible with surrounding residential development, and must conform to the Official Plan.

The Township of North Dumfries also has general policies regarding development applications to expand industrial/commercial areas. However, the Township Road No. 17 Industrial/Commercial Area has an area-specific policy which does not permit any expansions within the boundary. This area is located on the west side of Shellard Road to the north of Main Street East/Old Beverly Road/Regional Road 97. The Township of North Dumfries also has zoning by-laws for properties along Shellard Road.

2.2.2 Pre-Submission Consultations and Concept Plans

Pre-submission Consultations are recommended for all development proposals in the City of Cambridge. A Concept Plan provides a detailed layout of an anticipated development on a single lot or a subdivision based on expected road design, location of services, drainage needs, and density or type of development. A Concept Plan is also commonly used to guide or coordinate the development of lands owned by various parties, or to outline the development of future neighbourhoods.

A number of pre-submission consultations have been held for development proposals (with Concept Plans) on lands within the Study Area. At the time of this Environmental Study Report, the following development plans have proceeded to various stages of approvals:

- Laurelview-Hammersley Plan (30T-13101) - Moffatt Creek Estates: located at 1395 Main Street East/Old Beverly Road/Regional Road 97, for which a plan of subdivision application has been submitted to the Region;
- Collishaw Plan (30T-14102) - Morrison Creek Estates: located at the south end of the Study Area between Dundas Street South/Highway 8 and the City of Cambridge/Township of North Dumfries border;
- Bos Plan (30T-13103) - Bosdale: located to the north of Dundas Street South/Highway 8 where it intersects with Branchton Road; and
- The City of Cambridge also owns lands adjacent to the Bos Plan within the *Southeast Galt Community Plan* (City of Cambridge, 1999) intended for a future development of a multi-purpose facility.

2.2.3 Southeast Galt Community Plan

The *Southeast Galt Community Plan* (City of Cambridge, 1999) includes the lands within the City of Cambridge between Dundas Street South/Highway 8 and Main Street East/Old Beverly

Road/Regional Road 97. This Plan was approved by City Council in 1999. The purpose of the Plan was to guide and direct future development applications in the area bounded by Main Street East, Dundas Street South/Highway 8, Franklin Boulevard, and the municipal boundary with the Township of North Dumfries. The *Southeast Galt Community Plan* (City of Cambridge, 1999) identified a Study Area for the East Boundary Road, which coincides with the location of the Proposed Regional Corridor as shown on Map No. 9 in the ROPP and on Map 5b in the new ROP. The *Southeast Galt Community Plan* (City of Cambridge, 1999) is neither a secondary Plan, nor does it have recognized status within the City of Cambridge Official Plan.

2.2.4 Draft Approved Plan of Subdivision

Greengate Village Limited has a draft approved plan of subdivision (30T-03102) within the Study Area, located between Dundas Street South/Highway 8 and Main Street East/Old Beverly Road/Regional Road 97. The plan covers part of lots 4 and 5, Concession 10 within the City of Cambridge.

2.2.5 Registered Plan of Subdivision

Greengate Village Limited has registered 3 phases of their draft approved plan of subdivision 30T-03102 located within the Study Area between Dundas Street South/Highway 8 and Main Street East/Old Beverly Road/Regional Road 97.

2.2.6 Summary

Section 9.0, Table 9.1 identifies potential impacts to the Socio-Economic Environment as a result of the proposed East Boundary Road, as well as mitigating and/or monitoring measures to reduce net impacts.

2.3 Cultural Heritage and Archaeological Environment

2.3.1 Cultural Heritage

As part of the *East Boundary Road Project Pre-Scoping Report* (MTE, February 2013), (Appendix A), a *Preliminary Heritage Resources Report* (URS Canada, 2012) was completed and can be found therein. The preliminary heritage assessment review served as the basis for the *Built Heritage and Cultural Heritage Landscape Assessment Report* (URS/AECOM, June 2014) (Appendix D1), completed as part of this environmental assessment process.

Historic mapping, census records, land registry data, and other tools were used to assemble a profile of early settlement history. This was cross-referenced with recent aerial photography to locate and identify existing structures, in addition to those Listed on the Municipal Registers or Designated under the Act, which may have potential as heritage resources.

All of the data collected has been collated in **Table 2.2** Built Heritage Resources and Cultural Heritage Landscapes. Within the Study Area, and per **Table 2.2** there is/are:

- ✓ One (1) property that has been designated under Part IV of the Ontario Heritage Act (OHA);

- ✓ Ten (10) properties that have been Listed by the City of Cambridge, the Township of North Dumfries, or the Township of Puslinch as having potential to be protected under the OHA; and
- ✓ Five (5) properties that have high cultural heritage potential and should be investigated further.

Table 2.2: Built Heritage Resources and Cultural Heritage Landscapes

Preliminary Heritage Resources Report
East Boundary Road Corridor Study
The City of Cambridge, the Township of North Dumfries and the Township of Puslinch

Type/ Site no.	Property Description	Resource Description		Heritage Status	Citations/Notes
CHL 13	1654 Shellard Side Road, Township of North Dumfries N½ Lot I in the Gore/IX, Beverly/Wentworth	1½-storey stone house, set well back from the road and only partially visible; based on the east gable-end façade, it is coursed rubble masonry; windows have voussoirs in a flat arch, 6/6 sash windows (possibly replaced), low-pitched side gable roof with no central gable on the south façade, suggests it was built in the early 1850s.		None at present Further investigation warranted	Census 1851 (B29/20): Martin Nicol Gregory Map (1859): Robert Turnbull Census 1861 : Robert Turnbull, 39 b. Scotland, farmer, 1½-storey stone house, Atlas 1875 : Robert Turnbull Cornell : Lot 1 was occupied by Mr. Williamson in 1889 Census 1891 : Walter Williamson, 37 b. Ontario, 1½-storey stone house, 8 rooms
BHR 14	1711 Shellard Side Road, Township of North Dumfries N½ Lot 1/IX Beverly/Wentworth	View from the road is obstructed. 1½-storey stone house with low-pitched side-gable roof, gable over central entrance; visible window has an arched head, 2/2 sash; garage addition on the west side, another across the north.		None at present Further investigation warranted	Gregory Map (1859): John D. McKenzie Census 1861 : John D. McKenzie, 67 b. Scotland, farmer, log house, 100ac. N½ Atlas 1877 : James Cunningham Census 1891 : James Cunningham, 57 b. Scotland, farmer, 2-storey stone house, 9 rooms
BHR 15	563 Townline Road, Township of Puslinch, County of Wellington pt Lot 1/Rear Gore Puslinch, Wellington	Fieldstone 1½-storey house with symmetrical 3-bay façade looking south, originally with a side gable roof it was raised into a gambrel roof at some point to make the upper storey more spacious. The former roofline is visible in the masonry. Coursed rubble masonry, windows have been replaced.		None at present Further investigation warranted	Atlas 1877 : J. Milroy, NW part 55ac 1891 Census : John Milroy, 62, b. Scotland, 1½-storey stone house, 8 rooms
BHR 16	6526 Gore Road, Township of Puslinch, County of Wellington pt Lot 2/Front Gore Puslinch, Wellington	1½-storey fieldstone house with low-pitched side gable roof, original end chimneys, symmetrical 3-bay façade with centre entrance, single panel door with sidelights and flat transom; windows are 6/6 double-hung sash with stone sills and lintels. Built between 1851-61.		Listed, Puslinch Township	1851 census : Duncan McKellar, 47 b. Scotland, farmer, log house; also son Angus, 22 b. Scotland, labourer (A22/23ff) 1861 census : Duncan McKellar, 56 b. Scotland, farmer and son Alexander, 19, 1½-storey stone house, 136ac. (A74/12, B113/19) 1891 census : Archibald McKellar, 35 b. Ontario, 1½-storey brick (sic) house, 10 rooms



Table 2.2: Built Heritage Resources and Cultural Heritage Landscapes - continued

Preliminary Heritage Resources Report

East Boundary Road Corridor Study

The City of Cambridge, the Township of North Dumfries and the Township of Puslinch

Type/ Site no.	Property Description	Resource Description		Heritage Status	Citations/Notes
CHL 04	2371 Dundas Street South, City of Cambridge, Ontario Lot 1/IX North Dumfries	California bungalow with cobblestone piers, random stone (probably) veneer, recent windows; difficult to discern details from the road. Identified in ASI 2008 as a pre-1900 farmstead. No stone house is associated with this property historically. This may be a renovated 1920's house.		None at present Further investigation warranted	Young (33): Donald Fraser arrived at Shade's Mills in 1817 WRG: Donald Fraser b. 1791/2 in Canada ASI: Donald Fraser bought it in two parcels 1844 & 1853 Census 1851 (A33/19-28): log & frame, 1-storey Tremaine Map (1861): Daniel Fraser Census 1861: Donald Frazer, 1-storey frame house Waterloo Gazetteer (1867): Donald Fraser Jr. in Lot 1/IX Waterloo directory 1884: Donald and Thomas Fraser in Lot 1/IX Census 1891: Donald is gone (d. 1884), Thomas & family living in a 2-storey frame house, 10 rooms
CHL 05	2591 Dundas Street South, City of Cambridge, Ontario N½ Lot G/VII, Beverly	2 storey stone house with a hipped roof, 3-bay symmetrical façade, single panel door with flat transom and sidelights; squared rumble limestone masonry, one original limestone chimney; original windows have been replaced with 2/2 double-hung sash; full verandah features late 19 th century posts, treillage, brackets etc. Built between 1851-61		Listed, Township of North Dumfries	ASI: Granted to John Clement 1807 (absentee); sold to George Ramsey in 1809; John Grieg in 1816; John, Donald, William McKenzie in 1824; N½ to Thomas George Chapman 1836; Richard Bond 1844 Census 1851 (A9/24-30, B29/10): Richard Bond, 66 b. Scotland ca 1785, emigrated after 1837, log house, N½ 200ac Gregory Map (1859): R.S.H. Bond Census 1861: Richard Bond, 78 b. England, Gentleman, 2- storey stone house Atlas (1875): Henry Bond Census 1891: Henry Bond, 2-storey stone house with 8 rooms
BHR 06	5 Ripplewood Drive, City of Cambridge, Ontario Lot 1/X North Dumfries	As late as 1891 there is no evidence of a stone house at this location, nor any reference to a second house on the property. Much of the masonry appears to be veneer (the garage and the addition to the house directly behind it, for example). The aerial view of the roof configuration suggests that there may be an older structure at the core of the present building.		Listed, City of Cambridge	ASI: First owner in 1820 is James Keachie WRG: James Keachie b. Scotland ca. 1797, d. North Dumfries between 1842-51 Census 1851(A15/16): Widow Elizabeth Keachie, farmer, with sons James & Angus Keachie, in a frame 1½-storey house Tremaine Map (1861): J.A. and A.S. Keachie Census 1891: Alexander Keachie, wife and two adult sons in a frame house ASI: Property stayed in the family until at least 1907
BHR 07	29 Ripplewood Drive, Cambridge, Ontario Lot 1/X North Dumfries	"White sided farmhouse"	Not visible from the road	Listed, City of Cambridge	As above, BHR 15
BHR 08	105 Ripplewood Drive, Cambridge, Ontario Lot 1/X North Dumfries	"White sided farmhouse"	Not visible from the road	Listed, City of Cambridge	As above, BHR 15



Table 2.2: Built Heritage Resources and Cultural Heritage Landscapes - continued

Preliminary Heritage Resources Report
East Boundary Road Corridor Study
The City of Cambridge, the Township of North Dumfries and the Township of Puslinch

Type/ Site no.	Property Description	Resource Description		Heritage Status	Citations/Notes
BHR 09	130 Robinson Road, Township of North Dumfries Lot I in the Gore/IX Beverly/Wentworth	2½-storey stone house with hipped roofs, windows of different sizes and shapes, Italianate brackets; no stone residence is historically documented at this location. Possibly a late 19 th - early 20 th century eclectic design.		None at present Further investigation warranted	Census 1851 (B29/20): Martin Nicol, 100 ac Gregory Map (1859): Martin Nichol Atlas (1875): G.G. Nichol Census 1891: George G. Nichol , 1½-storey frame house, 6 rooms
BHR 10	1077 Shellard Side Road, Township of North Dumfries S½ Lot 1/VIII/Beverly/Wentworth	1½-storey yellow brick (load-bearing), 3-bay symmetrical façade with high upper storey, lancet window in the gable retaining some of its original glazing, muntins and surround. The soffits have been replaced, but treillage and decorative fascia treatment have been preserved; ground floor windows have been replaced with sympathetic sash, properly proportioned. Date stone below the gable window states construction in 1880; present owner, Mr. Gunn stated the rear wing was built in 1831, which was occupied in 1851 by widow, Mrs. A. Atkin.		None at present Further investigation warranted	Census 1851 : Mrs. A. Atkin, widow, 50 b. Scotland, farmer, log house S½ (A29/43, B29/?); son Robert, 22 b. Scotland, labourer Gregory Map (1859): Rob' Young S½ 1/VIII Census 1861 : Robert Young, 32 b. Scotland, farmer, log house, 100ac. Atlas Map (1875): R. Young in the S½ Cornell : Census 1891 : Robert Young, 61 b. Scotland, 2-storey brick house, 8 rooms
CHL 11	1337 Shellard Side Road, Township of North Dumfries Npt Lot 1/VIII Beverly/Wentworth	2½-storey stone house with hipped roof, symmetrical 3-bay façade, single panel door has flat transom and sidelights and a semi-circular porch with classical detailing; large 12/12 sash windows on the ground floor; second storey has round-arched central doorway with sidelights opening onto balcony with iron railing, flanked by windows slightly smaller than ground floor; attic storey windows are located in 3-light dormers all four sides, ornamented with pilasters; soffits feature modillions.		Listed, Township of North Dumfries	Cornell : Morris Shellard settled here in 1838 Census 1851 (B29/24): Morris Shellard, 100ac Gregory Map (1859): Shellard in the N½ Lot 1/VIII and E½ Lot H/VIII, no house indicated Atlas (1875): M. Shellard, house on the location ASI : dates house 1894 Census 1891: Morris Shellard (39), 2-storey stone house with 8 rooms
BHR 12	1481 Shellard Side Road, Township of North Dumfries S½ Lot 1/IX, Beverly/Wentworth	Italianate detailing, 2-storey stone house with hipped roof, rear wing; side hall plan; windows and front entrance have segmental arched windows; single panel door with transom; wooden frieze with paired brackets supporting the eaves .		Listed, Township of North Dumfries	Cornell : Henderson settled 1837-38 Census 1851 (B29/23): James Henderson, 100ac S½ Lot 1/IX Gregory Map (1859): Robert Henderson Census 1861: Robert Henderson, 25 b. C.W., farmer, log house 100ac. S½ Census 1871: Robert Henderson, 35 b. Scotland farmer Atlas (1875): Robert Henderson Cornell (68): between 1881-89 Henderson sold to John Caldwell of the Galt Nursery Census 1891: 2-storey stone house is occupied by James Brown & family, arrived from England between 1882-87

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Table 2.2: Built Heritage Resources and Cultural Heritage Landscapes - continued

Preliminary Heritage Resources Report
East Boundary Road Corridor Study
The City of Cambridge, the Township of North Dumfries and the Township of Puslinch

Type/ Site no.	Property Description	Resource Description		Heritage Status	Citations/Notes
CHL 13	1654 Shellard Side Road, Township of North Dumfries N½ Lot I in the Gore/IX, Beverly/Wentworth	1½-storey stone house, set well back from the road and only partially visible; based on the east gable-end façade, it is coursed rubble masonry; windows have voussoirs in a flat arch, 6/6 sash windows (possibly replaced), low-pitched side gable roof with no central gable on the south façade, suggests it was built in the early 1850s.		None at present Further investigation warranted	Census 1851 (B29/20): Martin Nicol Gregory Map (1859): Robert Turnbull Census 1861 : Robert Turnbull, 39 b. Scotland, farmer, 1½-storey stone house, Atlas 1875 : Robert Turnbull Cornell : Lot I was occupied by Mr. Williamson in 1889 Census 1891 : Walter Williamson, 37 b. Ontario, 1½-storey stone house, 8 rooms
BHR 14	1711 Shellard Side Road, Township of North Dumfries N½ Lot 1/IX Beverly/Wentworth	View from the road is obstructed. 1½-storey stone house with low-pitched side-gable roof, gable over central entrance; visible window has an arched head, 2/2 sash; garage addition on the west side, another across the north.		None at present Further investigation warranted	Gregory Map (1859): John D. McKenzie Census 1861 : John D. McKenzie, 67 b. Scotland, farmer, log house, 100ac. N½ Atlas 1877 : James Cunningham Census 1891 : James Cunningham, 57 b. Scotland, farmer, 2-storey stone house, 9 rooms
BHR 15	563 Townline Road, Township of Puslinch, County of Wellington pt Lot 1/Rear Gore Puslinch, Wellington	Fieldstone 1½-storey house with symmetrical 3-bay façade looking south, originally with a side gable roof it was raised into a gambrel roof at some point to make the upper storey more spacious. The former roofline is visible in the masonry. Coursed rubble masonry, windows have been replaced.		None at present Further investigation warranted	Atlas 1877 : J. Milroy, NW part 55ac 1891 Census : John Milroy, 62, b. Scotland, 1½-storey stone house, 8 rooms
BHR 16	6526 Gore Road, Township of Puslinch, County of Wellington pt Lot 2/Front Gore Puslinch, Wellington	1½-storey fieldstone house with low-pitched side gable roof, original end chimneys, symmetrical 3-bay façade with centre entrance, single panel door with sidelights and flat transom; windows are 6/6 double-hung sash with stone sills and lintels. Built between 1851-61.		Listed, Puslinch Township	1851 census : Duncan McKellar, 47 b. Scotland, farmer, log house; also son Angus, 22 b. Scotland, labourer (A22/23ff) 1861 census : Duncan McKellar, 56 b. Scotland, farmer and son Alexander, 19, 1½-storey stone house, 136ac. (A74/12, B113/19) 1891 census : Archibald McKellar, 35 b. Ontario, 1½-storey brick (<i>sic</i>) house, 10 rooms



Avoidance of these properties would be the preferred mitigation option, in keeping with the stated policy of the Waterloo Region Official Plan (ROP), paragraph 3.G.1: “The Region and Area Municipalities will ensure that cultural heritage resources are conserved using the provisions of the Heritage Act, the Planning Act, the Environmental Assessment Act, the Cemeteries Act and the Municipal Act.”

If the proposed alignment will have a direct impact (e.g. removal) on any Designated or Listed Heritage Property, Principle 2 of the Ontario Ministry of Tourism, Culture and Sports’ *Eight Guiding Principles in the Conservation of Built Heritage Properties* (2007) is applicable:

“Respect for the Original Location: Do not move buildings unless there is no other means to save them. Site is an integral component of a building or structure. Change in site diminishes cultural heritage value considerably.”

If the proposed alignment has an indirect impact (e.g. encroachment, setting) on any Designated (OHA, Part IV) or Listed Heritage Property (Municipal, Property of Interest), the Provincial Policy Statement (2005) 2.6.3 is applicable:

“Development and site alteration may be permitted on adjacent lands to protected heritage property where the proposed development and site alteration has been evaluated and it has been demonstrated that the heritage attributes of the protected heritage property will be conserved. Mitigative measures and/or alternative development approaches may be required in order to conserve the heritage attributes of the protected heritage property affected by the adjacent development or site alteration.”

If the proposed alignment has a direct or indirect impact on any property identified in this assessment, which has not been evaluated for heritage significance, a Cultural Heritage Evaluation Report should be prepared by a qualified (Built) Heritage specialist to determine whether or not it meets the criteria for protection under the Ontario Heritage Act.

Subsequent to completing the *Built Heritage and Cultural Heritage Landscape Assessment Report*, (URS/AECOM June 2014), (**Appendix D1**), the Ministry of Tourism, Culture and Sport (MTCS) provided comments dated June 6, 2014 and subsequent emails in February 2018 (**Appendix D2**) which indicated that a Cultural Heritage Evaluation Report should be undertaken to update the findings of the 2013 report, on any properties identified as potentially being impacted by the preferred alignment.

As a result, AECOM (formerly URS) completed a Cultural Heritage Evaluation Report for 1791 Dundas Street South. Although the structures located at 1791 Dundas Street South, are not directly impacted by East Boundary Road Alternative Alignment B4, the recommended alignment does pass through its property parcel. A *Cultural Heritage Evaluation Report William McArthur House, 1791 Dundas Street South (CHL10)*, was prepared and is provided as **Appendix D2**. The property owner was contacted numerous times to gain access to the property at 1791 Dundas Street South, without success. Therefore a complete evaluation of the house, outbuildings and property, per O.Reg.s 9.06 and 10/06, could not be completed at this time. However, prior to

detailed design, as part of property acquisition or construction impacts to the property, this detailed information will be obtained and added to the Cultural Heritage Evaluation Report.

In addition, AECOM also prepared a Documentation Report – *Clyde Road Roadscape (CHL17) and the former Credit Valley Railway Corridor (CHL18)*, (AECOM, January 2019) in response to MTCS comments, provided in **Appendix D3**. This report documented the heritage landscape of Clyde Road and the former Credit Valley Railway (now Canadian Pacific Railway). Both Clyde Road and the CPR line are crossed by the proposed East Boundary Road.

2.3.2 Archaeology

A Stage 1 Archaeological Assessment involves background research to describe the geography, land use history, previous archaeological fieldwork, and current condition of the lands within the Study Area in order to evaluate their archaeological potential. If archaeological potential is identified through a Stage 1 assessment, recommendations for Stage 2 assessment will be made, as appropriate. A copy of the *Stage 1 Archaeological Assessment* (URS/AECOM, 2013) for the East Boundary Road Class EA can be found in **Appendix E**.

In addition to the Stage 1 field review, satellite imagery, aerial photographs, thematic and historic maps, and past archaeological reports were analyzed in order to evaluate the archaeological potential of the East Boundary Road Corridor Study Area. The archaeological master plan for the Regional Municipality of Waterloo was also reviewed by URS Canada. This report, entitled *The Regional Municipality of Waterloo Archaeological Facilities Master Plan (1989)*, includes the City of Cambridge and the Townships of North Dumfries and Beverly. According to the updated master plan, large sections of the East Boundary Road Study Area have archaeological potential (Region of Waterloo, 2012).

Based on past archaeological findings in the province, the Ministry of Tourism, Culture and Sport has identified criteria that can be used to evaluate a property’s archaeological potential. These criteria are related to various geographic and cultural-historic features, which would have influenced land/resource use and settlement by past peoples (MTCS, 1997 and amended in 2011), and include such characteristics as:

- ✓ previously known archaeological sites within 300 metres of the subject property;
- ✓ water sources within 300 metres of the subject property, including primary (lakes, rivers, streams and creeks), secondary (springs, marshes, seasonal creeks and streams) and past (glacial shorelines or relic stream channels) water sources;
- ✓ elevated topography (drumlins, knolls, plateaus);
- ✓ areas of well-drained, sandy soils;
- ✓ distinctive land formations that might have been special or spiritual places (waterfalls, rock outcrops, caves, mounds and promontories and their bases);
- ✓ resource areas (animal migratory routes, spawning areas, raw material or plant procurement locations) and early Euro-Canadian industry (fur trade, logging and mining);

- ✓ areas of early Euro-Canadian pioneer settlement and / or transportation routes (trails, roads, railways, portage routes, wharf or dock complexes); and
- ✓ properties that local histories or informants have identified with possible archaeological sites, historical events, activities, or occupations.

By determining if one (or any) of these criteria are present, archaeologists are able to estimate whether a property has low, moderate, or high potential for containing archaeological remains.

The Stage 1 assessment documents the geographic, archaeological, and land use history of lands identified within the Study Area in order to assess the potential for them to contain archaeological resources. A property inspection was conducted on September 11, 2013 which indicated that portions of the Study Area were seemingly undisturbed and could potentially contain archaeological resources.

The results of the Stage 1 assessment indicate that, while some of the lands within the existing Study Area appear to have been disturbed by past development, much of the Study Area has high archaeological potential. This is based on the presence of historic homesteads, proximity of historic roads, certain physiographic features, a relatively high number of known archaeological sites inside or within one (1) kilometre of the Study Area, and the fact that most of this area is not disturbed and is indicated as having potential on the *Regional Municipality of Waterloo Archaeological Master Plan*.

The Stage 1 Archaeological Assessment recommends the following:

1. Once an alignment for the proposed East Boundary Road Corridor is identified, a Stage 2 Archaeological Assessment will be conducted by a licensed consultant archaeologist using the pedestrian survey method at 5m intervals in areas which have been recently ploughed and are in appropriate condition at the time of the survey (areas marked in orange on **Figure 2.4**).
2. Once an alignment for the proposed East Boundary Road Corridor is identified, a Stage 2 Archaeological Assessment will be conducted by a licensed consultant archaeologist using the test pit survey method at 5m intervals in areas which have not recently been ploughed or do not have appropriate conditions for pedestrian survey at the time of the Stage 2 assessment (areas marked in green on **Figure 2.4**).
3. No further Archaeological Assessments are recommended for areas that are marked in red on **Figure 2.4**, as these areas are disturbed or have been previously subject to an Archaeological Assessment.
4. Stage 2 Archaeological Assessment will follow the requirements set out in the 2011 *Standards and Guidelines for Consultant Archaeologists* (MTCS, 2011).

These recommendations will be carried out during the detailed design stage, prior to any proposed construction and within the corresponding areas of intersection/overlap with the proposed East Boundary Road right-of-way.

2.3.3 Summary

Section 9.0, Table 9.1 identifies potential impacts to the Cultural Environment as a result of the proposed East Boundary Road, as well as mitigating and/or monitoring measures to reduce net impact.

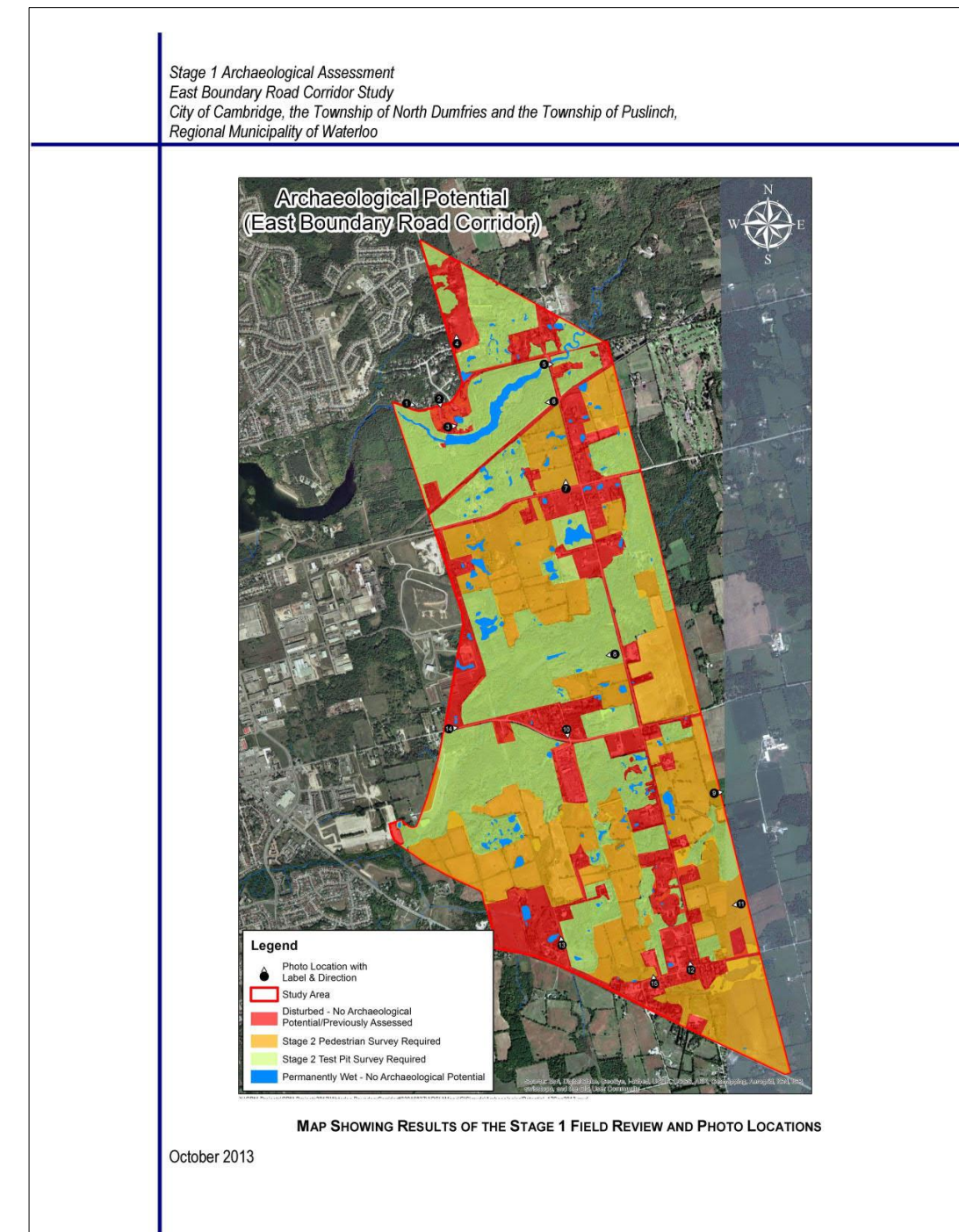


Figure 2.4 - Results of Stage 1 Archaeological Assessment

2.4 Transportation Conditions

The Region of Waterloo completed a *Transportation Report, East Boundary Road Corridor Protection Study, City of Cambridge* (December 2018). Additional detailed information summarized in Section 2.4 can be found in the *Transportation Report (Appendix F)*.

2.4.1 Background

Various policies over the years have identified a high capacity road on the east side of Cambridge connecting the south end of the city to Highway 401, and an east side road is consistent with current Regional policies including the Regional Official Plan (ROP) and Transportation Master Plan (RTMP). The Community Plan for the area approved by the City of Cambridge also includes the East Boundary Road.

Cambridge is located in the southeastern portion of the Region of Waterloo and is between Highways 401 and 403. There is significant inter-regional transportation demand between the Region of Waterloo, the Cities of Brantford and Hamilton, and Brant County. Both Highway 8 to Hamilton and Highway 24 to Brantford cross Cambridge and pass through the downtown area of Cambridge (Galt). Heavy Truck traffic is a concern because of narrow road corridors within the downtown Galt area of Cambridge.

There was an initial concept developed in 1967 for a Highway 8 bypass. It was part of a City of Galt plan for a ring road around the perimeter of the City. Responsibility for the ring road shifted to the Region of Waterloo in 1988. The East Boundary Road was part of the proposed ring road, and was subsequently identified in the following transportation planning policies:

- ✓ Cambridge Area Transportation Study (CATS) (Region, 1996)
- ✓ Regional Transportation Master Plan (RTMP) (Region, 1999)
- ✓ Cambridge Area Route Selection Study (CARSS) (Region, 2002)
- ✓ Detailed Transportation Network Review (DTNR) (Region, 2004)
- ✓ Regional Official Policies Plan (ROPP) (2004)
- ✓ Regional Transportation Master Plan (RTMP) (2010)
- ✓ Regional Official Plan (ROP) (2011)
- ✓ Cambridge Official Plan (2012)
- ✓ County of Wellington Official Plan (1999, revised 2015)

2.4.2 Existing Conditions

Within Cambridge (and North Dumfries), there are 3 existing arterial north-south corridors:

- ✓ Hespeler Road/Water Street (Highway 24);
- ✓ Franklin Boulevard; and
- ✓ Townline Road (Cambridge) and Shellard Road (North Dumfries).

King Street/Coronation Boulevard/Dundas Street is another corridor which serves north-south, as well as east-west, travel.

Hespeler Road/Water Street (Highway/Regional Road 24)

Through Cambridge, Highway 24's name, cross-section, and traffic volumes (AADT – Average Annual Daily Traffic) vary and are generally as follows:

- ✓ **Water Street South – (Future) South Boundary Road to Simcoe Street**
 - AADT = 11,000 to 20,000 vehicles
 - 2-lane cross-section (with auxiliary/turning lanes)
- ✓ **Water Street South - Ainslie Street North to Dundas Street North**
 - AADT = 30,000 to 38,000 vehicles
 - 4-lane cross-section
- ✓ **Hespeler Road - Dundas Street North to Can-Amara Parkway**
 - AADT = 32,000 to 35,000 vehicles,
 - 4-lane cross-section (with auxiliary/turning lanes)
- ✓ **Hespeler Road – Can-Amara Parkway to Highway 401**
 - AADT = 31,000 to 41,000 vehicles,
 - 6-lane cross-section (with auxiliary/turning lanes)

Franklin Boulevard

When construction of the Franklin Boulevard Improvements is complete, Franklin Boulevard will extend from the South Boundary Road to Highway 401. Between Highway 401 and South Boundary Road, 11 new roundabouts and other access management measures will be constructed to improve vehicle capacity of Franklin Boulevard. Currently, Franklin Boulevard has the following characteristics:

- ✓ **Myers Road to Dundas Street**
 - AADT = 9,000 to 18,000 vehicles
 - 2-lane cross-section
- ✓ **Dundas Street to Highway 401**
 - AADT = 20,000 to 41,000 vehicles
 - 4-lane cross-section

Townline Road and Shellard Road

Shellard Road (Shellard Sideroad, Township Road 17) extends from Morrison Road (Township Road 3E) to Gore Road in the Township of North Dumfries. About 750 metres westerly along Gore Road, Townline Road begins/ends. Townline Road continues northerly across Highway 401. The corridor has a 2-lane cross-section until the intersection of Townline Road and Saginaw Parkway, where a 4-lane cross-section begins and continues north of Highway 401 (to Jamieson Parkway).

Peak volumes occur on Townline Road near Highway 401 with an AADT of approximately 24,000 vehicles.

King Street/Coronation Boulevard/Dundas Street (Highway 8)

This corridor extends from the southeast corner of Cambridge to the northwest. With the exception of a short stretch of 2-lane and 3-lane cross-section (with auxiliary/turning lanes) between Main Street and Beverly Street. This corridor has a 4-lane cross-section from Branchton Road to Bishop Street.

Conestoga Boulevard/Elgin Street/Cheese Factory Road

This corridor consists of City of Cambridge roads. Two major gaps in this corridor exist: one at Can-Amera Parkway, and the other at the CP Rail crossing just south of Samuelson Street. The entire corridor has a 2-lane cross-section. It is currently not an existing or planned arterial north-south corridor.

EXISTING TRAFFIC VOLUMES AND LEVELS OF SERVICE

The two primary corridors are Hespeler Road and Franklin Boulevard. Each of these carries in excess of 40,000 vehicles per day. Volume in these two corridors is concentrated near Can-Amera Parkway and Highway 401. Townline Road near Highway 401 carries over 24,000 vehicles a day. Coronation Boulevard near Concession Road carries 27,000 vehicles a day.

In traffic analysis, volume represents the number of vehicles in a corridor and capacity is the theoretical maximum number of vehicles that can travel on a given facility. The volume to capacity (v/c) ratio represents how full a road or movement through an intersection is.

A v/c between 0.00 and 0.49 means that vehicles use less than half the capacity of the road. This is generally associated with good operating conditions. As the v/c approaches 1.00 traffic conditions worsen, and at a v/c equal to 1.00 the theoretical maximum number of vehicles is reached and operations are generally very poor. A v/c of greater than 1.00 indicates that more vehicles are expected than it is possible to serve, and is associated with extremely poor operations and extended traffic delays. When this happens, a road is often said to be failing.

The Hespeler Road and Franklin Boulevard corridors both have v/c ratios over 1.0, which is consistent with experiencing operational problems.

The Elgin Street corridor shows localized v/c ratios over 1.0, and the Dundas Street corridor also has some locations between Concession Road and Elgin Street with v/c ratios higher than 1.0. Townline Road generally operates without extended traffic delays.

PUBLIC TRANSIT

Figure 9 from the Region’s *Transportation Report (Appendix F)* shows the Grand River Transit routes currently operating within the Study Area. Routes serve existing developments, but no service in the outlying, undeveloped areas. The main transit routes serving a similar demand

pattern to the East Boundary Road are Routes 53 and 54, which operate between Main Street and Bishop Street mostly along Franklin Boulevard and Main Street and Myers Road respectively. However, due to the frequency of service, ridership, etc. transit routes alone cannot accommodate significant enough demand that would remove the need for corridor improvements.

The other significant current transit service providing long-distance north-south travel in Cambridge are iXpress Routes 200 (ION) and 203 connecting Conestoga Mall (Waterloo) and the Ainslie Street Terminal (Cambridge), as well as Conestoga College (Kitchener) and the Cambridge Centre respectively. While significant resources have been invested in this service and efforts are being made to attract new users, this service will take time to reach maturity; regardless, both routes are far away from the proposed East Boundary Road. A separate Environmental Assessment is being undertaken for Stage 2 ION/LRT service between Kitchener and Cambridge, and will also take some time to be implemented and reach maturity.

Existing public transit has little effect on the amount of traffic travelling north/south parallel to the proposed corridor.

COMMERCIAL VEHICLE TRAFFIC

The three main north/south Regional road corridors carry significant numbers of commercial vehicles (i.e. Hespeler Road/Water Street, Franklin Boulevard, and Dundas Street). On Hespeler Road, with AADT of approximately 40,000, the 5% heavy truck percentage equates to about 2,000 trucks daily. For Franklin Boulevard with the same AADT, the roughly 7% of heavy truck percentage equates to almost 3,000 trucks daily. For Dundas Street, with roughly 5% heavy truck percentage and AADT of over 25,000, equates to more than 1,200 trucks daily. These truck volumes represent a significant value to the local economy, and delays in these corridors carry a real economic cost/burden.

RAIL TRAFFIC

The Canadian Pacific (CP) railway running generally parallel to Samuelson Street and Clyde Road carries freight rail traffic, with passenger service discontinued some time ago. Crossings of Regional roads within the Cambridge City Limits are generally grade separated, such as at Hespeler Road, Dundas Street, Beverly Street, and Franklin Boulevard, while crossings of Cambridge local roads are generally at-grade, such as Bond Street and Dobbie Drive. Clyde Road, Shellard Road, and Gore Road crossings are also at-grade.

The Region and the City of Cambridge are collaborating on a business case and feasibility study for the extension of GO Train service along the Milton Line to Cambridge. If this initiative is successful, trains would use this line and would increase the number of trains in the morning and afternoon peak periods, which could also impact congestion on Cambridge roads where crossings are not grade separated.

2.4.3 Summary of Transportation Studies/Policies

Cambridge Area Transportation Study (CATS)

CATS studied overall transportation needs in Cambridge. Among other findings, the study identified traffic capacity deficiencies in the downtown Galt area of Cambridge, conflicts with heavy truck traffic, and north-south capacity deficiency within the commercial and industrial corridors south of Highway 401. The study revised the ring road concept and the new plan included an arterial corridor around the east, west, and south sides of the City of Cambridge, recommending the construction of the South Boundary Road and widening/realignment of Shellard Road to connect with a widened Townline Road. These routes would be along an alignment identified as an alternative for the East Boundary Road.

Regional Transportation Master Plan (RTMP)

While the RTMP has not always specifically identified heavy truck traffic concerns in the downtown Galt area of Cambridge, the findings with respect to north-south and east-west capacity deficiencies in Cambridge were consistent with CATS. The recommendations were also very similar: construct an arterial road alignment following the South Boundary Road between Water Street and Dundas Street, as well as an East Side Arterial along a widened Shellard Side Road to a widened Townline Road.

Cambridge Area Route Selection Study (CARSS)

The Region initiated a Class EA Study in the City of Cambridge in 2000, called the Cambridge Area Route Selection Study (CARSS). Corridors considered during this study included:

- ✓ East Side Arterial Corridor near Townline Road and Shellard Road;
- ✓ West Side Arterial Corridor extending west from Highway 24 at the southerly edge of Cambridge across the Grand River and north to Highway 401 near Highway 8;
- ✓ East-West Arterial Corridor extending from Townline Road and Highway 401 west through the City of Cambridge and across the Grand River to the West Side Arterial (now formed in part by Can-Amara Parkway); and
- ✓ South Boundary Road extending from Water Street (Highway 24) through to Dundas Street (Highway 8).

Detailed Transportation Network Review (DTNR)

The DTNR recommendations included the deletion of the West Side Arterial and any new bridge crossings of the Grand River from the Regional Official Policies Plan. The study also endorsed a list of transportation network improvements including the East Boundary Road to relieve traffic congestion on Hespeler Road and Franklin Boulevard.

Regional Transportation Master Plan (2018 Update – Moving Forward)

The 2018 update to the RTMP confirmed PM peak hour north-south capacity deficiencies along Hespeler Road and Franklin Boulevard in multiple sections, and also identified daily capacity

deficiencies along Hespeler Road. In addition to significant investments in public transit and the Franklin Boulevard improvements (roundabout corridor) to increase operating efficiency, construction of the South Boundary Road and East Boundary Road are also recommended. A number of infrastructure improvements for north-south travel within Cambridge have been identified, and include:

- ✓ Widening of Townline Road in the 10 year horizon;
- ✓ Increasing capacity along Franklin Boulevard in the 0-5 year horizon; and
- ✓ Identifying the need for a new East Boundary Road beyond 20 years.

Regional Official Policies Plan (ROPP) and Regional Official Plan (ROP)

Schedule A of the ROP identifies a 50-metre allowance for a future East-South Arterial from Highway 24 to Can-Amara Parkway following the Shellard Road alignment. This East-South Arterial includes the South Boundary Road and the East Boundary Corridor. Map 9 of the ROPP and Map 5b of the ROP show this corridor graphically.

City of Cambridge Official Plan

The Cambridge Official Plan identifies the alignment of the East Boundary Road shown in the ROPP and ROP as a “future conceptual transportation Study Area” from the RTMP. This follows planning for this area identified in previous studies, such as the *Southeast Galt Community Plan* (1999), which is not recognized under the Official Plan.

County of Wellington Official Plan

The County of Wellington Official Plan identifies a proposed major roadway roughly aligning with the portion of the East Boundary Road shown to pass through the County in the ROPP in Schedule A7 (Puslinch). Wellington OP policies would govern such an alignment. Part 12 (Transportation) of the OP has a few policies relevant to this alignment:

- ✓ Section 12.1 (General) notes that the “County will co-operate with surrounding jurisdictions to develop a transportation system that recognizes the mobility of people within this area and their need for effective inter-regional transportation systems.” Similar language is also found within Section 2.5 (Our Neighbours).
- ✓ Section 12.5.2 (Major Roadways) provides general policies discussing the management of County roads, and would likely be the governing policies in the event that the East Boundary Road alignment passed through the County and became a County road for some of its length. These policies provide for access restrictions, also noting that an OP amendment would be required for a new major road.

Other constraints identified in the Wellington County Official Plan would also need to be investigated. Potential alignments passing through the Township of Puslinch would pass through some areas identified as Secondary Agricultural, Greenlands, and Core Greenlands. Section 4.3.2 (Secondary Agricultural Areas) denotes such lands as having agricultural capability and for which agriculture will continue to be the dominant use, but permitting other uses. Section 5.4 (Core

Greenlands) identifies such lands as including provincially significant wetlands, all other wetlands, habitats for endangered or threatened species, fish habitats and hazardous lands. Similar designations of a less severe nature are attached to the Greenlands areas covered by Section 5.5. These issues would have to be reviewed during any study of the alignment of the road.

Schedule B7 (Well Head Protection Areas) of the County OP shows that the alignment would pass through areas of the Paris and Galt Moraine Policy Area and Well Head Protection Area 3. While the policies in Section 4.9.7 do not preclude roadways within the Paris and Galt Moraine policy areas, the importance of natural environmental protection and agricultural land uses is clearly established. While there are a significant number of policies governing land uses in Well Head Protection Areas (WHPAs), there are no policies strictly governing roads. It should be noted that WHPA 3 is the lowest category of potential risk in the County OP, and protection of the WHPA would in any event need to be studied as part of the ongoing natural environmental inventories being undertaken by others over the course of this study.

With the East Boundary Road being identified as part of the Cambridge transportation network in several studies and planning documents over an extended period of time, the entire south part of Cambridge was planned and approved with an East Boundary Road assumed as a transportation improvement in the area for the future.

Additional details regarding existing and projected traffic conditions are found in Section 3.0 Traffic Analysis, as well as **Appendix F**.

2.4.4 Overview of Other Transportation Studies

Highway 401 to Highway 24 By-Pass (MTO)

The Ministry of Transportation of Ontario (MTO) initiated an EA for Highway 24 between the City of Brantford and Highway 401. As one alternative, the MTO will consider a by-pass around the City of Cambridge. This would connect Highway 24 to Highway 401. This project is currently “on hold.” Communicating regularly with MTO has been part of the East Boundary Road process to satisfy consultation components of the process, as well as to avoid duplication of efforts.

South Boundary Road (Region of Waterloo)

The EA for the South Boundary Corridor and Franklin Boulevard Extension is complete. The Region of Waterloo began construction of the first phase in 2017. The South Boundary Road will connect Water Street South to the Franklin Boulevard Extension, and continuing to Dundas Street South in south Cambridge. The South Boundary Road connection at Dundas Street South is where the East Boundary Road will connect at its southerly limit.

Franklin Boulevard (Region of Waterloo)

The EA for Franklin Boulevard is complete. The Region of Waterloo started reconstructing Franklin Boulevard in 2015, between Pinebush Road and the South Boundary Road. These Franklin Boulevard improvements will increase traffic capacity through access control and roundabout installations.

Hespeler Road (Region of Waterloo)

The Rapid Transit EA identified Hespeler Road for improvements. This will improve transit service along the Hespeler Road corridor as part of implementing adapted bus rapid transit (aBRT) in 2015.

2.5 Utilities

Given the rural nature of the Study Area, utilities generally exist only on existing roads. The following sub-sections outline some of the existing and potential utilities that may be encountered within the Study Area or impacted by construction of the proposed East Boundary Road.

2.5.1 Local Hydro, Bell, Cable TV, and other Communications Networks

All existing roads within the Study Area have at least one of Hydro, Bell, Cable TV, or other communications network. This plant could consist of either overhead lines on poles or buried underground cables. In every case where the East Boundary Road would cross an existing road, there are overhead Hydro lines and poles. Bell and Cable TV are often also on these Hydro poles, but in some instances are on stand-alone Bell poles. There are also some buried communications lines that must be investigated prior to construction.

Since one of the primary purposes of the East Boundary Road is to provide access to future development, there will likely be a need for the East Boundary Road to carry new Hydro, Bell, Cable TV, and other communication lines. The existing and future Hydro and communication networks requirements would have to be confirmed during detailed design, in advance of construction.

2.5.2 Hydro One Networks

Hydro One Networks has a 230KV (high voltage) line within the Study Area, that provides inter-provincial distribution. In the south end of the Study Area, this high voltage tower line crosses Dundas Street South adjacent to the east side of Vanier Drive. It runs northerly crossing Main Street, continuing along the east side of the Region of Waterloo Waste Management Site, then westerly through the former landfill area near the north limit of the Waste Management Site. Any new roadway adjacent or crossing under this line will require review by Hydro One Networks, especially given that most Hydro One Network lines adjacent to roadways are only 115KV. Any road crossing under the Hydro One Networks lines must have a minimum 7m clearance from the road surface to the lowest elevation of the overhead lines.

Consultation with Hydro One during this study indicated their clear preference for a crossing of this corridor, as opposed to running within the corridor.

2.5.3 Natural Gas

Most of the existing roads within the Study Area have buried natural gas lines to service the community. Existing and future natural gas pipeline requirements would have to be investigated in more detail where the East Boundary Road intersects with existing roads to determine the need for relocations, upgrades, and future requirements; to be completed as part of the detailed design process.

2.5.4 **Municipal Services**

The existing roads within the City of Cambridge have buried municipal services such as watermain, sanitary sewers, and/or storm sewers. Many of the Township Roads in rural or non-built-up areas do not have any services, since properties are often serviced by private well water and (septic) sanitary systems, and are drained overland and conveyed by ditches. However, there is potential for existing or future underground municipal services on any existing road, which must be investigated in more detail during detailed design, prior to construction.

2.6 **Drainage**

The East Boundary Road Study Area is currently comprised of a mix of agricultural, waste management, and forested areas. Significant portions of affected properties include wetland and woodland features within the Moffatt and Mill Creek Wetland Complexes. Existing topographic conditions for the subject lands, range in elevation from approximately 284–319m above sea level (masl) with slopes ranging from flat (0%) to 11%.

The northern portion of the proposed East Boundary Road corridor lands is within the Mill Creek subwatershed, with the southern portion within the Moffatt Creek subwatershed.

The southern portion of the Study Area primarily drains to three (3) branches of Moffatt Creek. The main branch of Moffatt Creek accepts drainage from the other two branches and eventually crosses Moffatt Creek north of the proposed connection of the East Boundary Road and Dundas Street South (Highway 8). Much of Moffatt Creek is surrounded by wetlands that accept drainage prior to entering Moffatt Creek. This is especially true of the main branch of Moffatt Creek near the south central portion of the Study Area, known as the Moffatt Creek Wetland Complex.

The Region of Waterloo’s Waste Management Site has designed stormwater and purge well water outlets north of Main Street. These outletting conditions are monitored regularly by Region staff and the Ministry of the Environment, Conservation and Parks (MECP) to ensure water quality effluent from the Waste Management Site meets all MECP requirements. Stormwater runoff, as well as groundwater purge well flows, is directed to a central stormwater management pond on site, which provides quality and quantity control before the water is outletted (easterly) into a wetland feature draining towards Moffatt Creek. Consideration should be given to maintaining these flow characteristics in the design of the EBR to avoid any disruption to the Region’s Waste Management Site effluent monitoring program and its association with Moffatt Creek.

The north portion of the Study Area drains to Mill Creek. South of Mill Creek the area primarily drains to the Canadian Pacific (CP) Rail line before generally flowing north toward Mill Creek.

A Stormwater Management Technical Memo completed by MTE Consultants Inc. contains additional details on existing (and proposed) drainage conditions (**Appendix G**).

3.0 **TRAFFIC ANALYSIS**

3.1 **Purpose of the East Boundary Road Traffic Analysis**

Regional transportation studies and policies dating back to the 1960s have all identified a future need for an arterial road connection on the east side of Cambridge between the south portion of the City to Highway 401. Recent transportation demand modelling results confirmed that an arterial road on the east side of Cambridge is needed to alleviate forecasted north-south roadway capacity deficiencies along Hespeler Road and Franklin Boulevard, improve access to the Regional road network for residents of southeast Cambridge, and provide an alternative for goods movement to avoid traffic congestion in the downtown Galt area of Cambridge. Such a road could also accommodate alternative transportation, including dedicated walking and cycling facilities (active transportation), and public transit. The traffic analysis also forms an important component of the Problem Statement for this Class EA Study.

3.2 **Analysis of Various Network Alternatives**

3.2.1 **Background**

Traffic analysis was undertaken based on forecasted traffic volumes to the year 2031 to analyze various alternatives to accommodate traffic in southeast Cambridge. The analysis provides an approximate 20 year horizon based on current Region models, which are based on the existing 2011 data. The Regional Transportation Master Plan forecasts that Cambridge will have an additional 13,048 residents and additional 4,098 jobs by 2031.

The Transportation Network alternatives in sub-sections 3.2.2 through 3.2.7 inclusive were evaluated.

3.2.2 **Do Nothing**

The Class EA process explicitly requires consideration of a “Do Nothing” alternative, which represents the effect on the transportation network of choosing to not complete any network improvements. In practical terms, 2031 traffic conditions represented by “doing nothing” would, at minimum, result in delays to commuters, goods movement, emergency vehicles, etc. Delays to goods movement would have a negative impact on the economy in Cambridge, particularly the manufacturing base along Franklin Boulevard which depends on timely shipments of goods; as well as the larger economy which relies on timely movement of people.

3.2.3 **Non-Structural Improvements**

This alternative refers generally to using alternative modes to accommodate travel demands: e.g. public transit, cycling, and walking. The RTMP considered these improvements as part of the overall system planning process, and included significant growth in PM peak hour mode share to about 20% overall for Cambridge by 2031 for these modes. However, even with these improvements, the existing capacity deficiencies would not be addressed and would worsen significantly in the mature state. While non-structural improvements are a critical component of addressing long-term transportation needs in Cambridge, alone they are not sufficient to address all long-term needs.

3.2.4 Improvements to Franklin Boulevard

The approved design being implemented for Franklin Boulevard includes a centre median for access control, boulevard multi-use trails for active transportation on both sides, two travel lanes in each direction and two or three-lane roundabouts at most intersections between Pinebush Road and (the future) South Boundary Road. Improving Franklin Boulevard to increase its capacity further still would require widening of the roadway. To retain access control, including the centre median, widening of the road would have to be done to the outside of the roadway. The designated road allowance specified in the ROP for Franklin Boulevard is between 30 and 36 metres, and it is unlikely that a six-lane roadway with a centre median, boulevards and active transportation facilities on both sides could be accommodated within the existing road allowance. Additionally, larger roundabouts at the intersections would require more private property to be acquired beyond the road allowance specified in the ROP. The cost to widen the current design of Franklin Boulevard would cost significantly more than \$50 Million and a new Environmental Assessment study would need to be completed prior to such a widening. Consequently, widening improvements to Franklin Boulevard before 2031, and likely ever, are prohibitive from both social (impacts to existing property owners) and cost considerations.

3.2.5 Improvements to Water Street/Hespeler Road

Hespeler Road is already six lanes wide between Eagle Street/Pinebush Road and Can-Amara Parkway, south of which the road is four lanes wide to Ainslie Street. From Ainslie Street to (the future) South Boundary Road, Water Street is 2 lanes. In the traffic model two of these travel lanes are removed to account for Stage 2 ION. Most of the forecast capacity deficiencies in this corridor would occur in the four-lane section between Can-Amara Parkway and Ainslie Street. For some sections of this corridor, especially south of the Dundas/Coronation intersection (the Delta), adding additional lanes would require significant acquisitions of private property. While this would not necessarily render the alternative technically infeasible, the impacts to the social environment would be severe.

3.2.6 Improvements to Elgin Street Corridor

Cheese Factory Road, Elgin Street, and Conestoga Boulevard are City of Cambridge roads that are roughly parallel to Hespeler Road and Franklin Boulevard between the southern limit of Cambridge and Highway 401. As Cheese Factory Road continues into the Township of North Dumfries, this corridor could be viewed as being capable of providing a similar north-south corridor function as the East Boundary Road. However, this corridor would be unsuitable for the purpose of this Class EA, as it is discontinuous in two places: at Can-Amara Parkway and again at the CP Rail grade separation south of Samuelson Street. South of the Can-Amara Parkway and Conestoga Boulevard intersection, the corridor becomes a City trail before intersecting with Elgin Street at a T-intersection. Elgin Street continues west/south as a residential collector road and only becomes a more suitable arterial-type roadway south of Avenue Road. Converting Elgin Street through this area into a facility capable of accommodating regional traffic would impose severe disruption to this existing front-lotted residential area.

South of Samuelson Street, the corridor again becomes discontinuous where Elgin Street meets the CP Rail grade separation. The current structure is only wide enough to accommodate pedestrians

and cyclists, and the trail also crosses a creek immediately south of the railway. Further south, Elgin Street again becomes a residential collector road with private residences fronting the street. Accommodating regional traffic along this portion of the road would again impose severe disruption to an existing residential area, environmental disturbance to the creek, and entail significant expansion of the railway grade separation.

This corridor also ends at Pinebush Road just south of Highway 401. Were this corridor to begin accommodating inter-regional traffic, this traffic would have to turn onto Pinebush Road to join or cross the highway at the existing Hespeler Road, Franklin Boulevard, or Townline Road interchanges. This would add much more traffic to an already-busy Hespeler Road interchange, and also likely require widening of Pinebush Road to the east.

As a result, the Cheese Factory Road/Elgin Street/Conestoga Boulevard corridor would not be a suitable alternative.

3.2.7 Construct New East Boundary Road

Based on the unsuitability of widening or improving other north-south arterial corridors outside the Study Area, constructing a new East Boundary Road is more consistent with current Regional policies and would more effectively address the identified problem to address traffic in southeast Cambridge.

3.2.8 Summary

Section 9.0, Table 9.1 identifies potential impacts to the Transportation Environment as a result of the proposed East Boundary Road, as well as mitigating and/or monitoring measures to reduce net impacts.

4.0 EA PHASE 1: PROBLEM/OPPORTUNITY STATEMENT

Under Phase 1 of the Schedule “C” Class EA process a “Problem/Opportunity Statement” is prepared which identifies, in detail, the various opportunities to be addressed by the Class EA study. In essence, the Problem/Opportunity Statement outlines the need and justification for the overall project and establishes the general parameters, or scope, of the study.

Based on the traffic analysis and previously completed studies including the:

- *Cambridge Area Transportation Study (CATS),*
- *Cambridge Area Route Selection Study (CARSS),*
- *Detailed Transportation Network Review (DTNR), and*
- *Regional Transportation Master Plan (RTMP),*

which established the need and justification for the East Boundary Corridor, the Project Team developed the following problem/opportunity statement for the Class EA study:

Regional transportation studies dating back to the 1960s have all identified a future need for an arterial road connection on the east side of Cambridge between the south end of the City to Highway 401. This arterial road has commonly been referred to as the “East Boundary Road”. Recent transportation demand modelling results have confirmed that an arterial road on the east side of Cambridge will be needed to alleviate forecasted north-south roadway capacity deficiencies on Hespeler Road and Franklin Boulevard, as well as improve access to the Regional road network for residents of the Southeast Galt Community area, and provide an alternative for goods movements to avoid traffic congestion in downtown Cambridge.

A route for an “East Boundary Road” needs to be confirmed to facilitate any proposed developments in the area and to protect the land for this future roadway. With the recent approval of the South Boundary Road between Highway 24 and Dundas Street south of Myers Road and upgrades completed to Townline Road south of Highway 401, a route between Dundas Street in the south to Townline Road in the north must be identified for this Regional Road.

5.0 EA PHASE 2A: DEVELOPMENT & EVALUATION OF ALTERNATIVE SOLUTIONS

Under Phase 2 of the Class EA process, all reasonable solutions to the problem (i.e. planning alternatives) are identified and described, including the “Do Nothing” alternative. Planning alternatives are alternative solutions to the problem or opportunity in the transportation network. Planning alternatives are identified by taking into consideration factors such as the existing environment, as well as public and agency input and establishing a preferred solution. The Environmental Assessment Act (EAA) requires that all reasonable planning alternatives to the undertaking be considered during the decision making process.

5.1 Alternative Solutions Identified in Previous Studies

As identified in previous sections of this report, the need and justification for the South Boundary Corridor and the extension of Franklin Boulevard were established in previous studies completed for or by the Region of Waterloo and City of Cambridge. In addition to the network alternatives outlined in Section 3.0 of this report, previous studies established the need and justification of an East Boundary Road and also looked at alternative methods of addressing the transportation demands such as transit, cycling and walking. Because these studies considered alternative methods of addressing the transportation demands, and consulted with stakeholders, the requirements of this phase of the East Boundary Corridor Class EA project can be considered as being previously fulfilled.

6.0 EA PHASE 2B: DEVELOPMENT & EVALUATION OF ALTERNATIVE CORRIDOR ALIGNMENTS

In order to address the Study Problem/Opportunity Statement in Section 4.0, under Phase 2B of the Class EA process, all reasonable solutions to the problem (i.e. corridor alignments) are identified and described, including the “Do Nothing” alternative. Once the Class EA Schedule is confirmed, general inventories of the natural, social, and economic environments are reviewed and potential environmental impacts are determined for each alternative. The net benefits and impacts of each planning alternative are then identified and the alternatives are evaluated resulting in a recommended solution (i.e. corridor alignment). The recommended solution is then presented to the public and reviewing agencies to solicit input into the selection of the recommended solution.

The Project Team looked at a number of constraints and opportunities in developing Preliminary Alignment Alternatives. Some of the constraints and opportunities include: Mill Creek, Moffat Creek, existing and proposed roadways, existing and proposed development, hydro corridor, heritage and archeological features, railway, wetland, and other natural environmental factors. The following sections include a description of the Preliminary Alignment Alternatives that were developed by the Project Team.

6.1 Preliminary Alternative Alignments for the East Boundary Road Corridor

Initially, five main alignment options were developed for the East Boundary Road Corridor; including the Do Nothing alternative. Some of these options were borne out of previous studies and others were developed as part of this study. The initial East Boundary Road Corridor alignment options presented at Public Consultation Centre (PCC) No. 1 are briefly described later in this sub-section, following **Figure 6.1**.

PCC No. 1 was held on April 3, 2014. Additional PCC No. 1 details and information are contained in **Appendix H2**.

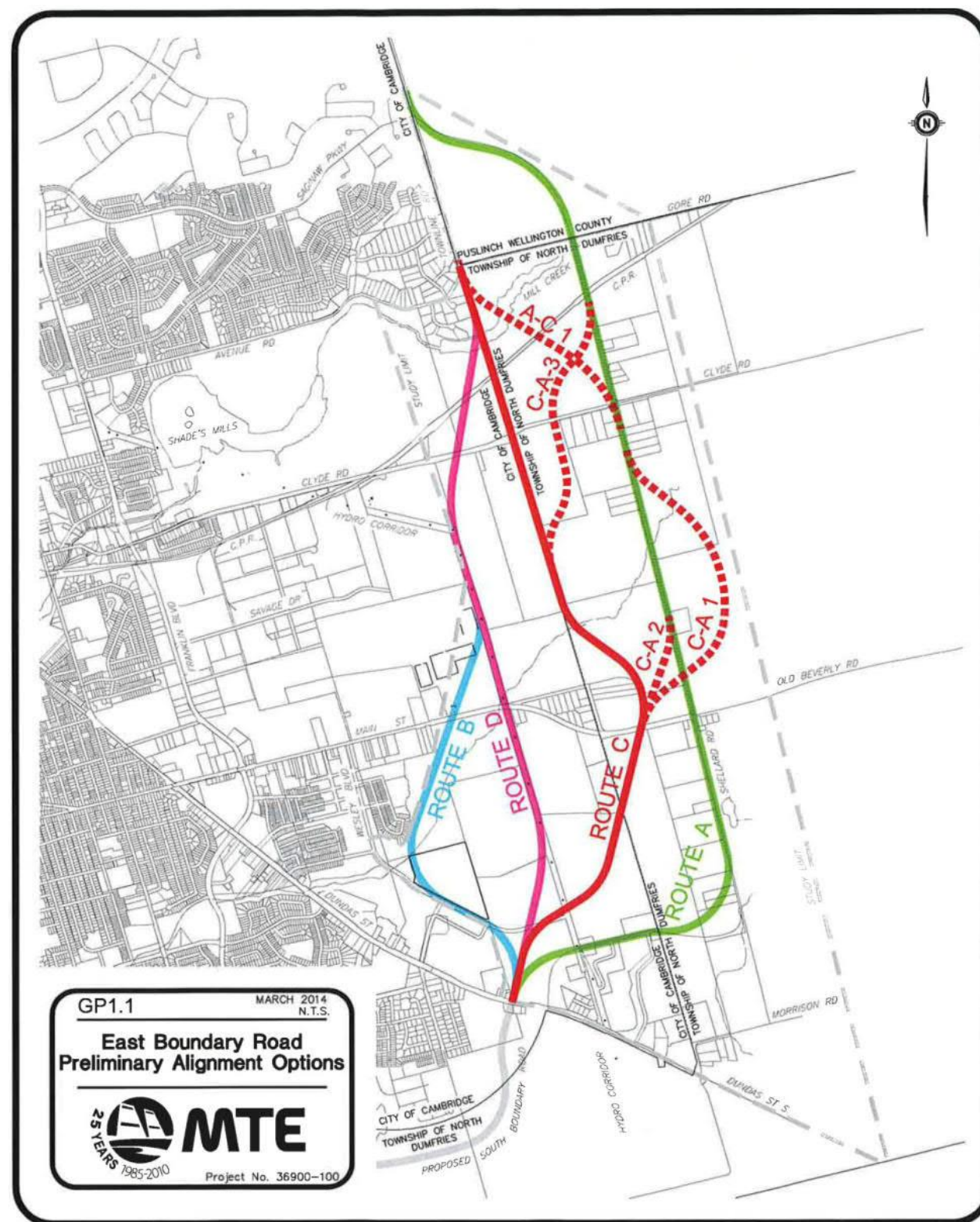


Figure 6.1 - East Boundary Road Preliminary Alignment Alternatives for PCC No. 1

6.1.1 “Do Nothing”

As part of any Class EA process, there is always a consideration of the “Do Nothing” alternative to assess what would happen if no action is taken to address the project concerns. This assessment provides a baseline against which the other project alternatives can be measured. Although previous studies undertaken have identified the need for a new East Boundary Road, the Do Nothing alternative continued to be considered for comparison purposes.

6.1.2 Route A – “Eastern Alignment”

Route A follows the route for an East Boundary Road illustrated in the Region of Waterloo, City of Cambridge, and Wellington County Official Plans. It ties into the current proposed location of the South Boundary Road at Dundas Street South (Highway 8), goes easterly utilizing a portion of Ripplewood Road and ties into Shellard Road. It then travels northerly on Shellard Road and through Puslinch Township at the intersection of Gore Road, tying into Townline Road at/near Saginaw Parkway. This route would utilize and expand upon existing crossings of Moffatt Creek, Mill Creek, and the CPR tracks.

6.1.3 Route B – “Western Alignment”

Route B is a western alignment that ties into the South Boundary Road at Dundas Street South (Highway 8) and follows a proposed City collector road (Wesley Boulevard). It then follows the eastern edge of the Region of Waterloo Waste Management Site, utilizes a portion of the Hydro One Corridor, and travels easterly tying into Townline Road at the Cambridge/North Dumfries Boundary. This route considered replacement of a pre-approved crossing of Moffat Creek near the proposed Wesley Boulevard and will require a new crossing of Mill Creek near a dammed portion of the creek in proximity to rear lots of existing Grandy Lane residences. It will also require a new crossing of the CPR tracks. This alignment may have impacts on a proposed City of Cambridge community campus, as well as other existing and proposed adjacent developments. This alternative alignment bypasses a significant portion of the Moffatt Creek Wetland Complex, but crosses Mill Creek at one of its widest points.

6.1.4 Route C – “Central Alignment”

Route C ties into the South Boundary Road at Dundas Street South (Highway 8) then travels northeasterly to eventually follow the Cambridge-North Dumfries municipal boundary, tying into Townline Road similar to Route B. This route would require a new crossing of Moffat Creek. As with Route B, it requires a new crossing of Mill Creek at a dammed portion of the creek in proximity to rear lots of existing Grandy Lane residences and a new crossing of the CPR tracks.

6.1.5 Route D – “Hydro One Corridor”

Route D ties into the South Boundary Road at Dundas Street South (Highway 8) then travels northeasterly to (eventually) follow the Hydro One Corridor until approximately Clyde Road where it ties into Route C near the Mill Creek crossing and, finally, Townline Road. The northern portion of this alignment is shared with Route B. This route will require a new crossing of Moffat Creek. As with Routes B and C, it requires a new crossing of Mill Creek at a dammed portion of the creek in proximity to rear lots of existing Grandy Lane residences and a new crossing of the CPR tracks.

6.1.6 “Hybrid” Alignment Concepts

A number of other short alignments connecting Route A and Route C were also considered. A short alignment concept for Route A crossing Moffat Creek further east than Shellard Road was also considered.

6.1.7 Constraints Associated with the Initial Alternatives

6.1.7.1 Canadian Pacific (CP) Rail Crossing

All alternative alignments must cross the existing CP Rail Line north of Clyde Road. Route A would use the existing Shellard Road (at-grade) crossing location, but alternative Routes B, C, and D require a new rail crossing location. Each potential new crossing was examined for either an “at-grade” (level) or “grade separation” (bridge) crossing.

6.1.7.2 Intersection Control

Roundabout intersection, as well as traffic signal control (signalized), were also considered. Roundabouts are characterized by the absence of traffic signals and a circulating roadway providing the ability for continual traffic flow through the intersection, as well as providing an anticipated reduction in severe collisions.

6.2 Evaluation Criteria

The Project Team developed criteria for evaluating various alternatives alignment concepts, as summarized in **Table 6.1**. The Evaluation Criteria were presented at each Public Consultation Centre. Each Alignment was assessed against this set of Evaluation Criteria to determine which alignment, singly or in combination with other alignments, best addresses the need for an East Boundary Road and the surrounding transportation network.

Table 6.1: Evaluation Criteria

Evaluation Criteria for East Boundary Road Class EA Study
Study Element
Natural Environment How does the alternative affect existing vegetation, water quality, source (ground) water resources, wildlife and aquatic habitat, wetlands, terrestrial resources, woodlands, species at risk, surface drainage and existing floodplains?
Social Environment Community Impacts – What impacts will the alternative have on the local community i.e. noise, property requirements, etc.? Access – How does the alternative impact access to existing residences, businesses and industries? Development/Property – Will the alternative fragment land and/or limit development opportunities?
Heritage/Archaeological/Cultural Environment What are the potential impacts on the heritage significance of heritage structures or landscapes and the potential disturbance of archaeological resources?
Traffic Capacity, Operations and Safety How does the alternative serve the expected vehicular, transit, pedestrian and cycling traffic needs? Does the alternative efficiently and safely handle the forecasted traffic from existing and future development properties?
Costs How does the alternative compare with anticipated capital costs, property costs and utility relocation costs?

The results of the evaluation of initial alternative alignments can be found in Section 6.3, including discussion of how the Initial Alternative Alignment concepts were adjusted and developed.

6.3 Response to Public and Agency Comments regarding Alternative Alignments Presented at PCC No. 1

Public and Agency feedback for all Public Consultation Centres is documented in **Appendix H5**, as well as responses to each comment. In summary, at PCC No. 1 support for each of the preliminary alternatives was received, with no clearly preferred alternative. The most common themes of public feedback, based on number or frequency of comments were:

- Minimizing natural environment and cultural heritage impacts;
- Minimizing impact to existing development; and

- Timely approval of a corridor that will service expected users.

In addition, the Project Team reviewed various inventories of existing features available at that time and identified constraints in the context of the identified route alignments. The Project Team evaluated the initial route alignments based on that information and modified them, as noted below for presentation at PCC No. 2.

6.3.1 “Screened Out” Alternatives

Do Nothing – Do Nothing is a required Design Alternative under the Class EA process. However, the Do Nothing alternative does not address current and forecasted traffic needs, as reflected in the study problem/opportunity statement. The Do Nothing alternative was also removed as a viable alternative.

Preliminary Route A (North of Gore Road) – Preliminary Route Alignment A passes through the Township of Puslinch in the County of Wellington (outside the Regional Municipality of Waterloo) north of Gore Road. Numerous natural environment constraints were located within this section of Route A making it unfavourable as a route in terms of impacts to the Natural Environment. In addition, the East Boundary Road is a Region of Waterloo road to address traffic primarily within the City of Cambridge. Building a Region road beyond the Region of Waterloo boundaries would present significant jurisdictional issues. Based on these factors, this portion of Route A was removed from the list of viable alternatives for the East Boundary Road.

Preliminary Route D – Route D, which utilizes the existing Hydro One Corridor, was screened out for further consideration at that time. Due to maintenance requirements on their high voltage line and the future ability to upgrade, Hydro One Networks Inc. (HONI) advised they could not properly provide required maintenance to their overhead lines and towers with an arterial roadway within their corridor. Even if the road was moved adjacent to, but outside the existing Hydro One Corridor, preliminary Route D passes through the Moffat Creek Wetland Complex at one of its widest and most sensitive areas, and for the greatest length of all alternatives. Due to the issues associated with a large portion of the roadway along or adjacent to the HONI Corridor and the significant impacts to the Moffat Creek Wetland Complex, the Project Team decided to remove alternative alignment Route D from further consideration at that time.

6.3.2 Revisions to Preliminary Route Alignments presented at PCC No. 1

In addition to routes or portions of routes that were “screened out”, initial Routes A, B, and C were revised by the Project Team in order to: address agency and public comments; reduce impacts to significant natural environment features and heritage properties; address the size of remnant properties; and increase curve radii to improve traffic safety and provide additional flexibility for adjustments during detailed design. The Project Team revised East Boundary Road Corridor alignment alternatives presented at Public Consultation Centre (PCC) No. 2 as briefly described later in this sub-section, following **Figure 6.2**.

PCC No. 2 was held on December 9, 2015. Additional PCC No. 2 details and information are contained in **Appendix H3**.

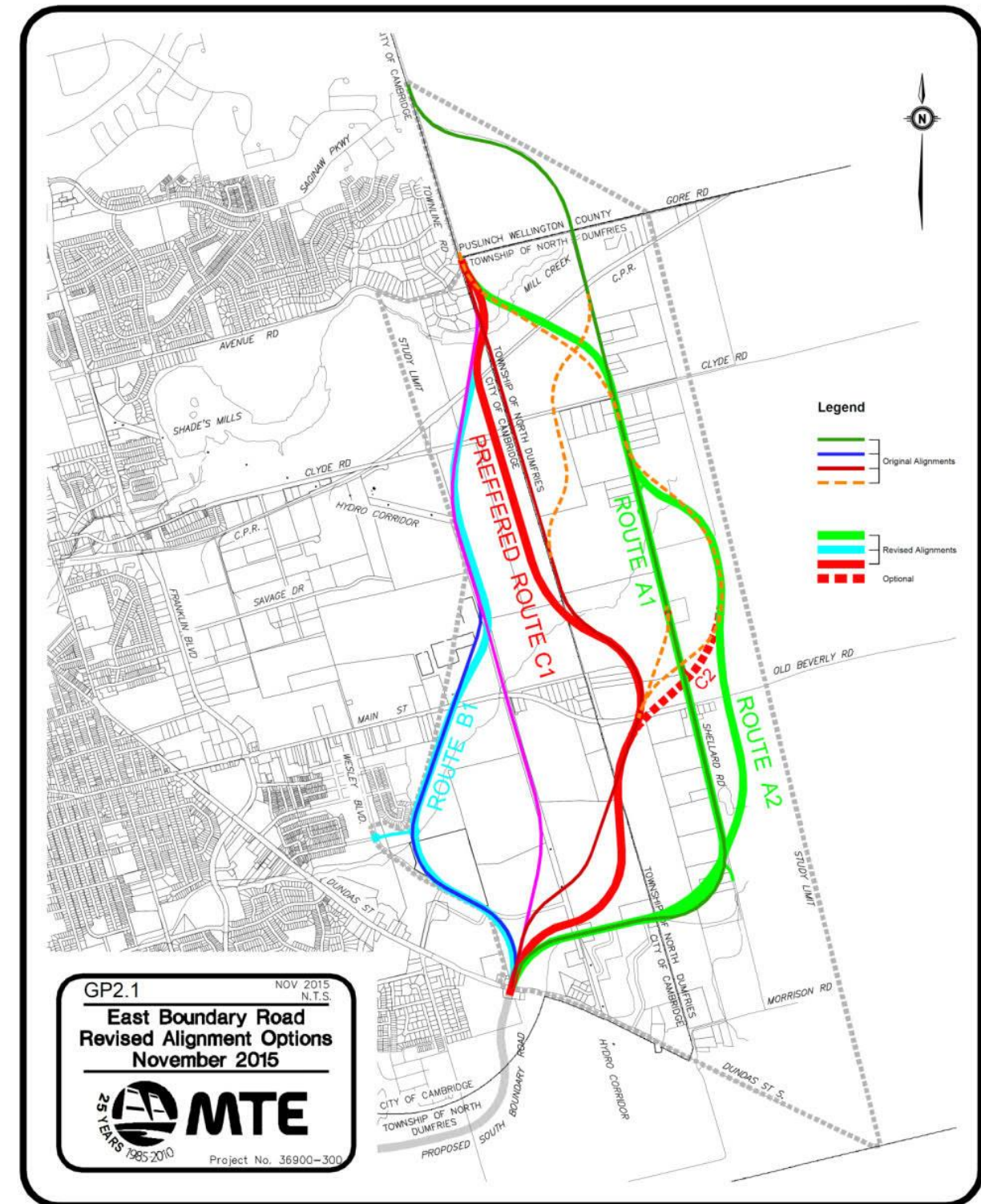


Figure 6.2 - East Boundary Road Revised Alignment Alternatives for PCC No. 2

Route A1 – Route A1 is very similar to the initial Route A. Revisions applied to Route A1 include:

- Screened out portion in Puslinch Township north of Clyde Rd. is no longer included;
- Curve radii increased to 450m; and
- Just north of Clyde Road, Route A1 heads northwest to tie into Townline Road at the Gore Road/Avenue Road intersection.

Route A2 – Route A2 is similar to revised Route A1 at the south and north ends, but the middle portion is further east of Shellard Road. Revisions applied to Route A2 include:

- Screened out portion in Puslinch Township north of Clyde Rd. is no longer included;
- Curve radii increased to 450m;
- Route A2 crosses Shellard Road in the south end and is located east of Shellard Road until south of Clyde Road where it ties into the same alignment as Route A1;
- Route A2 follows Route A1 alignment on Shellard Road from south of Clyde Road to just north of Clyde Road, where it heads to the northwest to tie into Townline Road at the Gore Road near the rear lots of Grandy Lane; and
- There may be an opportunity to close Shellard Road within the Moffat Creek Wetland Complex, with access to Shellard Road for residents to be via Old Beverly Road in the south or the new East Boundary Road (A2) in the north.

Route B1 – Very similar to initial Route B. Revisions applied to Route B1 include:

- Curve radii increased to 450m;
- Near the Region of Waterloo Waste Management Site, Route B1 has been moved slightly further east to reduce impacts to the existing Waste Management composting area and storm drainage features;
- In the middle portion of the alignment, Route B1 Has been moved eastward such that it is now adjacent to the Hydro One Corridor to avoid impacts to the physical aspects and maintenance activities for the Hydro One Corridor; and
- Near the CP Rail tracks north of Clyde Road, Route B1 follows Route C1 alignment and ties into Townline Road at the Gore Road/Avenue Road intersection.

Route C1 – Similar to initial Route C. Revisions applied to Route C1 include:

- Curve radii increased to 450m;
- Alignment moved eastward in the south end toward Ripplewood Drive, but avoids impacts to identified wetlands and reduces impacts to the Auto Recycler at its southeast end;
- Crosses the Moffat Creek Wetland Complex slightly further west than Preliminary Route C to further minimize impacts to the natural environment, then heads north approximately 120 metres west of the Cambridge/North Dumfries boundary;
- Ties into Townline Road at the Gore Road/Avenue Road intersection; and
- There may be an opportunity to close Shellard Road within the Moffat Creek Wetland Complex, with access to Shellard Road for residents to be via Old Beverly Road in the south or Clyde Road in the north.

Route C2 – Similar to Route Alignment C1 south of Clyde Road, then heads eastward to tie into Route Alignment A2 east of Shellard Road. Revisions applied to Route C2 include:

- Curve radii increased to 450m; and
- There may be an opportunity to close Shellard Road within the Moffat Creek Wetland Complex, with access to Shellard Road for residents to be via Old Beverly Road in the south or the new East Boundary Road (A2) in the north.

6.3.3 Project Team Evaluation of the Revised Alignment Alternative Concepts

The Revised Alignment Alternative Concepts A1, A2, B1, C1, and C2 were presented at Public Consultation Centre No. 2. Based on information available at that time, the various alternative alignment concepts were assessed by the Project Team against the Evaluation Criteria to determine which alignment was “preferred” and considered to best address the need for an East Boundary Road and the surrounding transportation network. The general Evaluation Criteria utilized are those summarized in **Section 6.2, Table 6.1:**

- 1) Natural Environment**
- 2) Social Environment**
- 3) Heritage/Archaeological/Cultural Environment**
- 4) Traffic Capacity, Operations and Safety**
- 5) Costs**

The Project Team identified **Route C1** to be presented as the Preferred Alternative Alignment at PCC No. 2. Route C1 was considered “Preferred”, compared to all the other routes carried forward based on its overall impacts across all of the Evaluation Criteria. The alignments are listed in order of least impacts to most impacts under each criteria. Although Route B1 was listed first in many of the categories, Route C1 was second in 3 out of 4 categories. In addition, Route B1 fared relatively poorly in the Social Environment category based on stakeholder feedback, which brought its overall evaluation below Route C1.

A summary of the Project Team evaluation, which resulted in Route C1 being identified as the Preferred Alternative Alignment at that point in the project, is provided in **Table 6.2**. The alignments that have been determined to have greater impacts, such that the alignment with the most impacts, is listed last.

Table 6.2: Evaluation Summary of Revised Route Alternatives

Evaluation Summary of Route Alternative for Public Consultation Centre No. 2

Study Element

1) Natural Environment

Route B1

- Crosses the Moffat Creek Wetland Complex at one of its narrowest areas in the eastern portion of the Study Area.
- A new crossing of Moffat Creek is required but in an area where a new crossing has been approved for other local roads.
- Approximately 400m of road crosses existing wetland areas

Route C1

- Crosses the Moffat Creek Wetland Complex at in the middle portion of the Study Area avoiding some natural environment features, but includes a new crossing of Moffat Creek.
- There is an opportunity to close Shellard Road and “naturalize” the Moffat Creek Wetland Complex along Shellard Road.
- Approximately 300m of road crosses existing wetland areas

Route A2

- Crosses the Moffat Creek Wetland Complex at one of its narrowest areas east of Shellard Road with a new crossing of Moffat Creek;
- There is an opportunity to close Shellard Road and “naturalize” the Moffat Creek Wetland Complex along Shellard Road;
- Approximately 550m of road crosses existing wetland areas

Route A1

- Crosses the Moffat Creek Wetland Complex at one of its widest points, but would utilize existing Shellard Road and its existing crossing location;
- Approximately 770m of road crosses existing wetland areas.

2) Social Environment

Route C1

- Requires purchase of new right-of-way from approx. 14 existing properties;
- Minor impacts to existing residential streets and access;
- Noise studies will be required for existing residential properties near tie-in location at Townline Road and Gore Road;
- Acceptable but less preferred than A1 or A2 by local School Boards, due to fewer impacts (than B1) on existing and proposed locations of schools.

Route A2

- Requires purchase of new right-of-way from approx. 29 existing properties (incl. 2 full buyouts and widenings from approx. 9 properties);
- Increased traffic on portions of Shellard Road impacts access to private properties and traffic operations;
- Preferred by local School Boards - does not impact existing and proposed

Evaluation Summary of Route Alternative for Public Consultation Centre No. 2

Study Element

locations for schools.

Route A1

- Requires purchase of new right-of-way from approx. 40 existing properties (incl. 1 full buyout and widenings from approx. 36 properties);
- Increased traffic on Shellard Road impacts access to private properties and traffic operations;
- Preferred by local School Boards - does not impact existing and proposed locations for schools.

Route B1

- Requires purchase of new right-of-way from approx. 12 existing properties and negotiations with Hydro One regarding roadway adjacent to their Corridor.
- Increased traffic on portions of Wesley Boulevard which is surrounded by residential and Community Complex Lands will impact the use of these properties.
- City of Cambridge has indicated that implementation of Route B1 will result in at least \$7M of additional costs to revise existing and proposed planning and land use in the area of Wesley Boulevard (this \$7M cost is included in the “costs” study element).
- Noise studies will be required for existing residential properties near the tie-in location at Townline Road and Gore Road.
- Least preferred by local School Boards as it will significantly impact existing locations and proposed planning for school.

3) Heritage/Archaeological/Cultural Environment

Route B1

- Requires approx. 3500m of additional Archeological surveys;
- 1 listed or “identified heritage properties potentially impacted.

Route A1

- Requires approx. 4950m of additional Archeological surveys;
- 2 listed or “identified heritage properties potentially impacted.

Route C1

- Requires approx. 5250m of additional Archeological surveys;
- 2 listed or “identified heritage properties potentially impacted.

Route A2

- Requires approx. 5400m of additional Archeological surveys;
- 5 listed or “identified heritage properties potentially impacted.

Table 6:2: Evaluation Summary of Revised Route Alternatives - continued

Evaluation Summary of Route Alternative for Public Consultation Centre No. 2

Study Element

4) Traffic Capacity, Operations and Safety

Route B1

- Predicted to attract the most amount of traffic (approx. 8500 vehicles/day);
- Is the shortest route (5120m);
- Closest to existing and planned developments.
- Existing and proposed residential driveways on Wesley Boulevard will impact operations and safety in the southern section;
- Will result in some “skewed” intersections with existing streets

Route C1

- Predicted to attract the 2nd most amount of traffic (approx. 7150 vehicles/day);
- Is the 2nd shortest route (5300m);
- 2nd closest to existing and planned developments.

Route A1

- Predicted to attract a reduced amount of traffic (approx. 5700 vehicles/day);
- Is 2nd longest route (6125m);
- 2nd furthest away from existing and planned developments;
- Several existing driveways on Shellard Road will somewhat impact operations and safety.

Route A2

- Predicted to attract a reduced amount of traffic (less than 5700 vehicles/day);
- Is the longest route (6300m);
- Furthest away from existing and planned developments;
- Some existing driveways on Shellard Road (north section) will somewhat impact operations and safety;
- Will result in some “skewed” intersections with existing streets.

5) Costs

Route B1

- Shortest route and has the lowest estimated capital cost of \$49M;
- Although B1 utilizes portions of existing or proposed Wesley Boulevard right-of-way, property is still required for wider road;
- Approximately 400m of road crosses wetland areas that will require peat removal and/or strengthened road base.

Route C1

- 2nd shortest route and has the 2nd lowest estimated capital cost of \$49.5M;
- Approximately 300m of road crosses wetland areas that will require peat removal and/or strengthened road base.

Route A1

- 2nd longest route and has the highest estimated capital cost of \$55.5M;
- Although A1 utilizes existing Shellard Rd. and Ripplewood right-of-way, property

Evaluation Summary of Route Alternative for Public Consultation Centre No. 2

Study Element

still required for wider road;

- Approximately 770m of road crosses wetland areas that will require peat removal and/or strengthened road base

Route A2

- The longest route and has the highest estimated capital cost of \$55M;
- Although A2 utilizes less length of existing Shellard Rd. and Ripplewood right-of-way than A1, property still required for wider road;
- Approximately 550m of road crosses wetland areas that will require peat removal and/or strengthened road base.

6.4 Response to Public and Agency Comments regarding the Preferred Alternative Alignment Presented at PCC No. 2

Public and agency feedback received as a result of PCC No. 2, can be found in **Appendix H5**. PCC No. 2 identified Route C1 as the Preferred Alternative based on information available at that time. The Project Team reviewed public and agency input following PCC No. 2. The most common themes, based on number or frequency, of comments were:

- Minimizing natural environment impacts;
- Minimizing impact to both existing and planned development; and
- Timely approval of a cost effective corridor that will service expected users.

In addition, through discussion with Ministry of Natural Resources and Forestry (MNRF) staff following PCC No. 2 through April and May 2016, significant natural environment challenges associated with Route C1 were identified. Due to the proposed long, bisecting crossings of highly constrained (e.g. high quality) natural environment features (mainly related to the Moffatt Creek Wetland Complex), the challenges included:

- the need to conduct a minimum of four (4) seasons of additional habitat and wildlife study; and
- the potential need to obtain an Overall Benefit Permit, whereby establishing an Overall Benefit to wildlife and habitat is an uncertain process.

Given the significant natural environment challenges with Route C1 identified by the MNRF, GRCA, Region of Waterloo Ecological and Environmental Advisory Committee (EEAC), and City of Cambridge Environmental Advisory Committee (CEAC), the Project Team reconsidered Route B1, which had rated comparatively well to Route C1. Extensive consultation with review agencies (e.g. MNRF, GRCA), key stakeholders (e.g. EEAC, City of Cambridge, School Boards), and the Project Team followed until November 2017 to address and mitigate the various challenges raised.

Due to Social Environment challenges previously identified with Route B1, a Route B4 sub-alternative was developed by the Project Team. Route B4 is similar to B1 however it passes along the eastern, versus western, boundary of an existing City of Cambridge parcel “reconnecting” with B1 both south toward Dundas Street South (Highway 8) and north toward Main Street.

7.0 EA PHASE 3: DEVELOPMENT & EVALUATION OF ALTERNATIVE DESIGN CONCEPTS FOR THE RECOMMENDED SOLUTION

7.1 Preferred Design Alternative Alignment Presented at PCC No. 3

The Project Team developed a B4 sub-alternative, similar to B1 but passing along the eastern boundary of an existing City of Cambridge parcel and “reconnecting” with B1 north and south of the City of Cambridge parcel. This B4 alignment satisfactorily mitigated previously identified Social Environment challenges, provides a greater separation between a previously approved GRCA crossing of Moffatt Creek at Wesley Boulevard and the additional crossing required for the East Boundary Road, and avoids the natural environment impacts and concerns associated with Route C1. The differences between Routes B1 and B4 are illustrated on **Figure 7.1** in orange and blue respectively.

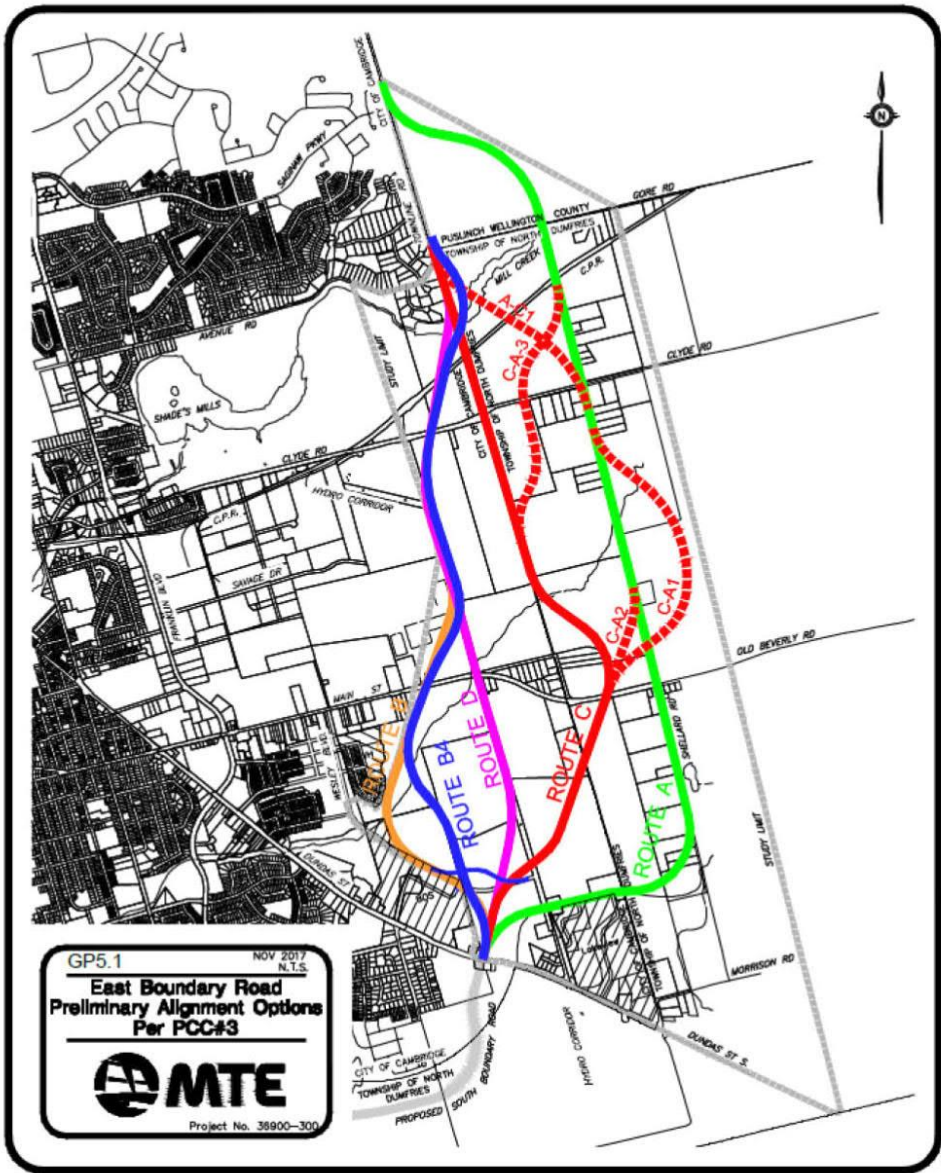


Figure 7.1 - Project Team Preferred Alignment Alternative (Route B4) for PCC No. 3

Alignment B4 is strongly preferred to any Route C alternative from a natural environment standpoint, based on approval agency and stakeholder feedback, and rates equal or better in the four (4) other Evaluation Criteria: Social Environment; Heritage, Archaeological, and Cultural; Traffic Capacity, Operations, and Safety; and Cost. The Project Team evaluation is summarized in **Table 7.1**.

Route B4 was identified as the (Project Team) Preferred Alternative Alignment at Public Consultation Centre (PCC) No. 3.

PCC No. 3 was held February 1, 2018. Additional PCC No. 3 details and information are included in **Appendix H4**.

Table 7.1 - Evaluation Matrix PCC No. 3



EAST BOUNDARY ROAD - PCC #3
ALTERNATIVE EVALUATION MATRIX



CRITERIA	DESCRIPTION	DO NOTHING	PROPOSED ROUTE A1 / A2	PROPOSED ROUTE B1 / B4	PROPOSED ROUTE C1
OVERALL EVALUATION RANKING	General Description of Route	No new road constructed within study area, but may require improvements to other existing roads, intersections etc., to accommodate future traffic. Screened out (does not address Problem/Opportunity Statement).	Follows route illustrated in Region of Waterloo and Wellington County Official Plan, but doesn't continue through Puslinch/Wellington County, and diverts east of Shellard Road. 	Western route originally utilizing Wesley Blvd (B1), adjacent to East of Wesley Blvd, eastern edge of landfill, and just East of Hydro One Corridor. Route B4 PREFERRED	Route through "centre" of Study Area, crossing Moffat Creek at narrowest point then ties into Townline Rd west of Cambridge/North Dumfries Boundary.

LEGEND	Poor	Fair	Good
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Table 7.1 - Evaluation Matrix PCC No. 3 - continued



EAST BOUNDARY ROAD - PCC # 3 ALTERNATIVE EVALUATION MATRIX



CRITERIA	DESCRIPTION	DO NOTHING	PROPOSED ROUTE A1 / A2	PROPOSED ROUTE B1 / B4	PROPOSED ROUTE C1
Natural Environment	General Description of Route	No new road constructed within study area, but may require improvements to other existing roads, intersections etc., to accommodate future traffic.	Follows route illustrated in Region of Waterloo and Wellington County Official Plan, but no longer continues through Puslinch/Wellington County, and diverts east of Shellard Road 	Western route originally utilizing Wesley Blvd (B1), adjacent to eastern edge of landfill, and just East of Hydro One Corridor 	Route through "centre" of Study Area, crossing Moffat Creek at narrowest point then ties into Townline Rd west of Cambridge/North Dumfries Boundary
	How does the alternative affect existing vegetation, water quality, wildlife and aquatic habitat, wetlands, ANSI's, terrestrial resources, woodlands, species at risk, groundwater resources, surface drainage and the floodplain?	- No roads (or bridges) constructed so no new impacts to vegetation, wildlife or wildlife habitat within study area; - Potential improvements to other roads may impact the natural environment in localized areas outside the study area.	- New crossing of Moffat Creek required but in narrowest portion of Wetland Complex; - Potential to close Shellard Rd through Moffat Creek Wetland Complex and convert to trail as compensation for new Moffat Creek crossing; - New bridge required over Mill Creek Dam/Pond; - Longest Route – most air emissions; - Approx. 700m of road runs through woodlands; - Avoids Salamander ponds; - Some Bobolink and Eastern Meadowlark habitat affected, as well as Eastern Wood Peewee and Wood Thrush; - Greatest amount of evaluated, unevaluated and GRCA wetlands directly impacted by alignment. (38,850 s.m)	- Route B4 no longer utilizes Wesley Boulevard and crosses Moffat Creek in an area acceptable to approving agencies, and provides greater separation from approved Wesley Boulevard Moffat Creek crossing; - New bridge required over Mill Creek Dam/Pond; - Shortest Route – least air emissions; "Skirts" east edge of existing Landfill; - Approx. 900m of road runs through woodlands; - No nearby salamander ponds; - Route skirts Bobolink and Eastern Wood thrush habitat; - Smallest amount of evaluated, unevaluated and GRCA wetlands directly impacted by alignment (26,250 s.m.); - MNRF have indicated that impacts to peripheral/fringe of habitat and wetlands etc. are significantly less than bisecting wetlands/habitat.	- New crossing of Moffat Creek required in area not favored by approving agencies due to impacts on wetland and habitat; - As compensation for new Moffat Creek Crossing, potential to close Shellard Road through Moffat Creek Wetland Complex and convert to trail; - New bridge required over Mill Creek Dam/Pond; - Second shortest route – second least air emissions; - Approx. 1350m of road runs through woodlands; - Route has been moved away from salamander ponds; - Some Bobolink, and Eastern Meadowlark habitat affected, as well as Eastern Wood Peewee and Wood Thrush; - Second most amount of evaluated, unevaluated and GRCA wetlands directly impacted by alignment (35,350 s.m.); - Significant additional monitoring will be required as a result of bisecting Moffat Creek Wetland and surrounding areas. This adds additional time, costs and uncertainty associated with agency approvals; - Due to anticipated significant impacts to wetland and surrounding habitat, MNRF will likely require an Overall Benefit Permit which adds significant time, cost and uncertainty due to requirements of permit;

LEGEND	Poor	Fair	Good
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Table 7.1 - Evaluation Matrix PCC No. 3 - continued



EAST BOUNDARY ROAD - PCC # 3 ALTERNATIVE EVALUATION MATRIX



CRITERIA	DESCRIPTION	DO NOTHING	PROPOSED ROUTE A1 / A2	PROPOSED ROUTE B1 / B4	PROPOSED ROUTE C1
Social Environment	General Description of Route	No new road constructed within study area, but may require improvements to other existing roads, intersections etc., to accommodate future traffic.	Follows route illustrated in Region of Waterloo and Wellington County Official Plan, but no longer continues through Puslinch/Wellington County, and diverts east of Shellard Road 	Western route originally utilizing Wesley Blvd (B1), adjacent to eastern edge of landfill, and just East of Hydro One Corridor 	Route through "centre" of Study Area, crossing Moffat Creek at narrowest point then ties into Townline Rd west of Cambridge/North Dumfries Boundary
	What Impacts will the alternative have on the local community (e.g. noise, property requirements, etc.)? How does the alternative impact access to existing residences, businesses and industries? Will the alternative fragment land and/or limit development?	- No roads constructed resulting in no new impacts on noise, property requirements, access to existing residences and businesses, nor will there be any land fragmentation or limit development within the study area; - Potential improvements to other roads may result in additional noise, property requirements, and revised accesses to existing residences and businesses; - No new roads in study area will limit development potential within the study area.	- Bisects two residential properties near connection to Shellard Rd in south; - Utilizes existing Ripplewood Rd. and Shellard Road; - Potential Closure of Shellard Road will result in less direct access for residents, but reduce traffic on Shellard Road; - New right of way required on approx. 29 properties, including at least two buyouts; - Constructing new road on existing Shellard Rd. alignment may require temporary closures during construction; - Noise Studies required for Scottfarm Walk; - Preferred by School Boards as planning for existing and future school locations have been based on an "eastern" alignment per Official Plan.	- Adjacent to existing and proposed subdivisions with direct access. - Not utilizing Wesley Boulevard (B1) eliminates impacts on proposed servicing. Alignment B4 skirting the eastern side of the community complex / school site eliminates need to consider relocation of schools, etc; - Requires property from RMOW landfill potentially affecting operation; - New right of way required on approx. 12 properties; - Noise Studies required for properties in Laurelview/Hammersley, Main St., Scottfarm Walk, Grandy Ln, Deer Path, Stone Brook and Cedarpath; - Acceptable to School Boards.	- New right of way required on approx. 14 properties, including one potential buyout; - Noise Studies required for properties off of Main St., Scottfarm Walk, Grandy Lane, Deer Path Ct., Stone Brook Rd., and Cedarpath Ct; - Splits up at least 10 farm fields; - Some adjustments will have to be made to School Boards current planning for school locations and territories as it is further west than "eastern" Official Plan Alignment for which they based their planning.

LEGEND	Poor	Fair	Good
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Table 7.1 - Evaluation Matrix PCC No. 3 – continued



EAST BOUNDARY ROAD - PCC # 3
ALTERNATIVE EVALUATION MATRIX



CRITERIA	DESCRIPTION	DO NOTHING	PROPOSED ROUTE A1 / A2	PROPOSED ROUTE B1 / B4	PROPOSED ROUTE C1
Heritage/ Archaeological/ Cultural Impacts	General Description of Route	No new road constructed within study area, but may require improvements to other existing roads, intersections etc., to accommodate future traffic.	Follows route illustrated in Region of Waterloo and Wellington County Official Plan, but no longer continues through Puslinch/Wellington County, and diverts east of Shellard Road	Western route originally utilizing Wesley Blvd (B1), adjacent to eastern edge of landfill, and just East of Hydro One Corridor	Route through “centre” of Study Area, crossing Moffat Creek at narrowest point then ties into Townline Rd west of Cambridge/North Dumfries Boundary
	What are the potential impacts upon the heritage significance of the heritage structures or landscapes and the potential disturbance of archaeological resources?	- No new roads constructed so no new impacts to the heritage significance of heritage structures or landscapes, or disturbance of archaeological resources within the study area; - Potential improvements to existing roads may have potential to disturb heritage structures or landscapes archaeological resources outside the study area.	- Approx. 3900m of proposed road where Stage 2 Archaeological Pedestrian Survey recommended; - Approx. 1500m of proposed road where Stage 2 Archaeological Test Pit Survey recommended; 5 Listed or “Identified” properties potentially impacted.	- Approx. 1700m of proposed road where Stage 2 Archaeological Pedestrian Survey recommended; - Approx. 1800m of proposed road where Stage 2 Archaeological Test Pit Survey recommended; 1 Listed or “Identified” property potentially impacted.	- Approx. 1950m of proposed road where Stage 2 Archaeological Pedestrian Survey recommended; - Approx. 3300m of proposed road where Stage 2 Archaeological Test Pit Survey recommended; 3 Listed or “Identified buildings potentially impacted.

LEGEND	 Poor	 Fair	 Good
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Table 7.1 - Evaluation Matrix PCC No. 3 - continued



EAST BOUNDARY ROAD - PCC # 3
ALTERNATIVE EVALUATION MATRIX



CRITERIA	DESCRIPTION	DO NOTHING	PROPOSED ROUTE A1 / A2	PROPOSED ROUTE B1 / B4	PROPOSED ROUTE C1
Traffic Capacity, Operations and Safety	General Description of Route	No new road constructed within study area, but may require improvements to other existing roads, intersections etc., to accommodate future traffic.	Follows route illustrated in Region of Waterloo and Wellington County Official Plan, but no longer continues through Puslinch/Wellington County, and diverts east of Shellard Road 	Western route originally utilizing Wesley Blvd (B1), or adjacent to eastern edge of landfill, and just East of Hydro One Corridor 	Route through "centre" of Study Area, crossing Moffat Creek at narrowest point then ties into Townline Rd west of Cambridge/North Dumfries Boundary 
	How does the alternative serve the expected vehicular, transit, pedestrian and cycling traffic needs? Does the alternative efficiently and safely handle the forecasted traffic from existing/future developments and properties?	- Significant improvements to existing roads will be required (widening, intersection improvements etc.) to meet the expected vehicular, transit, pedestrian and cycling traffic needs; - May result in congestion on existing roads with limited room for widening; - Does not provide the best opportunities for future development within the study area.	- Will address required capacity, and include sidewalks, cycling and transit facilities as required; - Forecasted (2031) traffic is 5,712 – lowest of all alternatives; - Longest total length (6300m) which is least conducive to attracting Active Transportation and Public Transit users; - Furthest away from existing and planned developments with little access to existing and proposed developable areas; - Some existing private driveways on Shellard Road will impact traffic flow and safety; - Crosses all major intersections at 90 degrees, but connects to Shellard Rd on a skew (2 locations) requiring revised intersections; - Can be designed to meet Engineering Standards.	- Will address required capacity, and include sidewalks, cycling and transit facilities as required; - Forecasted (2031) traffic is 8,520 – Highest of all considered alternatives; - Shortest total length (5120m) which is most conducive to attracting Active Transportation and Public Transit users; - Closest to existing and planned developments with best access to existing and proposed developable areas; - Approximately 700m length of road adjacent to the Hydro One Corridor; - Crosses Main Street and Clyde Rd. on a skew; - Can be designed to meet Engineering Standards.	- Will address required capacity, and include sidewalks, cycling and transit facilities as required; - Forecasted (2031) traffic is 7,131 – Second highest of all considered alternatives; - Second shortest route length (5300m) which is second most attractive for Active Transportation and Public Transit; - Somewhat further away from existing and planned developments than Route B1/B4; - Crosses Main Street at right angles, and Clyde Rd. on a skew; - Can be designed to meet Engineering Standards;

LEGEND

 Poor

 Fair



 Good

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Table 7.1 - Evaluation Matrix PCC No. 3 - continued



EAST BOUNDARY ROAD - PCC # 3 ALTERNATIVE EVALUATION MATRIX



CRITERIA	DESCRIPTION	DO NOTHING	PROPOSED ROUTE A1 / A2	PROPOSED ROUTE B1 / B4	PROPOSED ROUTE C1
Cost	General Description of Route	No new road constructed within study area, but may require improvements to other existing roads, intersections etc., to accommodate future traffic.	Follows route illustrated in Region of Waterloo and Wellington County Official Plan, but no longer continues through Puslinch/Wellington County, and diverts east of Shellard Road 	Western route originally utilizing Wesley Blvd (B1), adjacent to eastern edge of landfill, and just East of Hydro One Corridor 	Route through "centre" of Study Area, crossing Moffat Creek at narrowest point then ties into Townline Rd west of Cambridge/North Dumfries Boundary
	How do the alternatives compare with respect to anticipated costs: - Capital Costs - Property Costs - Utility Relocation Costs	- Less new road capital costs than building a new road, but will be significant capital costs for widening or increasing the capacity of existing roads; - No property required for a new road within the study area, but widening of existing roads will impact the use and area of existing properties along existing roads; - No utility costs for a new road, but there will be significant utility relocation costs for widening of existing roads or intersection improvements.	- Estimated Construction/Capital Cost \$65,200,000 (Highest Cost); - Habitat compensation/mitigation costs unknown due to Agency comments focusing on Preferred Alignment; - Approx. 6300 m of new road including rebuilding approx. 500m of Ripplewood Rd and 700m of Shellard Rd; - Requires new crossing of Moffat Creek (culvert/bridge); - Requires new crossing of Mill Creek (bridge) at wide section of creek; - Utilities on approx. 3900m of existing roads to be relocated; - Crosses/intersects with existing roads at 7 locations; - New at-grade or grade separated (bridge) crossing of CPR tracks required; - Crosses existing CPR tracks on an approx. 70 degree skew; 550m of road crosses existing wetland areas that may require peat removal and/or strengthened granular road base.	- Estimated Construction/Capital Cost \$58,800,000 (Lowest Cost) ; - Less Habitat compensation/mitigation costs than C1 due to peripheral impacts; - Approx. 5120 m of new road; - Requires new crossing of Moffat Creek (culvert/bridge) ; - Requires new crossing of Mill Creek (bridge) at slightly narrower section of creek; - Crosses/intersects with existing roads at 5 locations including new intersection with Wesley Boulevard; - New at-grade or grade separated (bridge) crossing of CPR tracks required; - Crosses existing CPR tracks on an approx. 40 degree skew; 400m of road crosses existing wetland areas that may require peat removal and/or strengthened granular road base.	- Estimated Construction/Capital Cost \$62,800,000 (not including environmental mitigation measures) - Significant Habitat compensation/mitigation estimated costs of \$1,000,000 to \$2,000,000 to address Agency Approvals (Total Costs of \$63,800,000 - \$64,800,000); - Approx. 5300 m of new road; - Requires new crossing of Moffat Creek (culvert/bridge) at new location; - Requires new crossing of Mill Creek (bridge) at slightly narrower section of creek; - Crosses/intersects with existing roads at 5 locations; - New at-grade or grade separated (bridge) crossing of CPR tracks required; - Crosses existing CPR tracks on an approx. 60 degree skew; 300m of road crosses existing wetland areas that may require peat removal and/or strengthened granular road base.

LEGEND

Poor

Fair

Good

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Environmental Study Report
East Boundary Road

- 41 -

May 2019
MTE Project: 36900-300
Region Project: 07299

In summary, Route B4 was selected as the Preferred Alternative Alignment because it:

- Is the least impactful of the alternatives considered on the natural environment;
- Has impacts to proposed or existing development with acceptable mitigation measures discussed and agreed upon with key stakeholders;
- Is the least impactful of the alternatives considered on listed/identified heritage features (1);
- Is the most direct route and will attract the most users both vehicular, including transit, and active transportation (pedestrians and cyclists); and
- Has the lowest estimated capital cost (i.e. cost to construct).

7.2 Public and Agency Comments regarding the Preferred Alternative Alignment Presented at PCC No. 3

The Project Team reviewed public and agency input following PCC No. 3. Public comments were generally supportive of Route B4. Some concerns were expressed regarding property impacts, including traffic noise, as well as impacts to the natural environment. The most common themes, based on number or frequency, of comments were, once again:

- Minimizing natural environment impacts;
- Minimizing impact to both existing and planned development; and
- Timely approval of a cost effective corridor that will service expected users.

The nature of comments remained consistent throughout this study. Public and agency comments received regarding the Preferred Alternative B4 are addressed as follows:

- **Minimizing Natural Environment Impacts:**
 - Following receipt of comments from the Ministry of Natural Resources and Forestry (MNRF) following PCC No. 2, Route B4 has significantly less natural environment impact than Route C1 due to the nature of that impact. Route B4 has a peripheral (‘fringe’) impact versus a bisecting (‘severing’) impact from the other alternatives. Due to the nature of the natural environment impact of Route C1, additional permitting, including time, expense, and uncertainty, would be required.
 - Similar bisecting impacts are expected with widening Shellard Road (Route A1) from the existing 2-lane, rural road to a 4-lane, urban collector road through a highly-constrained natural environment area.
 - Every effort will be made to mitigate natural environment impacts through the detailed design process in order to obtain required agency approvals prior to construction.
 - From a Natural Environment standpoint, MNRF, GRCA, and EEAC comments indicate a preference for a Route B alternative rather than Route A and/or C alternatives.

- **Minimizing Impact to Both Existing and Planned Development**

Noise Issues:

- The primary property impact concern of existing residents in proximity to Route B4 is traffic noise and/or the proximity of the proposed East Boundary Road to their residences. As the project progresses to detailed design the Region’s Noise Policy will apply and a Noise Assessment will be undertaken at that stage to determine if there will be a need for further noise mitigation.

Property Impacts:

- An additional concern specific to those residents in proximity to the proposed East Boundary Road/Townline Road/Avenue Road/Gore Road intersection, is property impact. While it is the intent of the planning and design process to minimize the need to acquire property, the proposed East Boundary Road would require the acquisition of private property at several locations; however, the precise locations and amounts of land to be acquired will not be fully known until the detailed design stage. Once property needs have been further defined, the affected property owners will be contacted by Regional Real Estate staff to discuss the necessary property acquisitions and related issues. It is the Region’s standard practice to negotiate agreements of purchase and sale with the affected property owners, based on an independent appraisal of the land’s fair market value. If agreements cannot be reached in time to meet the project schedule, the Region will acquire the needed lands through expropriation.
- With respect to planned development, mitigating measures continue to be discussed in consultation with those property owners with pending development applications.

- **Timely Approval of a Cost Effective Corridor that will Service Expected Users**

- Following approval of the Class EA, the corridor will be protected for future construction of the East Boundary Road and development outside this corridor can be considered. Funding for the design and construction phases of the East Boundary Road will be subject to future Council approval of the Region’s Transportation Capital Program.

7.3 Region of Waterloo Planning and Works Committee and Council Approvals

On May 29, 2018 Region of Waterloo Staff Report No. TES-DCS-18-11 (**Appendix I**) recommending Alternative Alignment B4 (and other key design elements) for approval, was presented to the Region’s Planning and Works Committee. Following Planning and Works Committee approval, Region of Waterloo Council approval was granted on June 6, 2018 as follows:

“That the Regional Municipality of Waterloo take the following actions with respect to the Class Environmental Assessment for the East Boundary Road Corridor Study, in the City of Cambridge and Township of North Dumfries:

- a) Approve the Recommended Design Alternative for the proposed construction of an East Boundary Road from Dundas Street South (Highway 8) to Avenue Road/Gore Road as described in Report TES-DCS-18-11, dated May 29, 2018; and
- b) Direct staff to file the Notice of Completion with the Ministry of Environment and climate Change (MOECC) for this Class Environmental Assessment study and place the Environmental Study Report on the public record for a review period of 30 days.”

A copy of the Report to Planning and Works Committee (TES-DCS-18-11), as well as Committee and Council Meeting Minutes can be found in **Appendix I**.

8.0 DESCRIPTION OF THE RECOMMENDED DESIGN

8.1 Design Elements of the Recommended (Ultimate) Road Design Alternative

In addition to a Recommended Alternative Alignment, the Project Team also developed a Recommended Design for (Road) Cross-Section, Corridor Access Control, Intersection (Traffic) Control, and other design elements.

8.1.1 Road Cross-Section and Design Criteria

In accordance with the Context Sensitive Regional Transportation Corridor Design Guidelines Roadway Classification and key operational criteria, the East Boundary Road identifies as a “Community Connector”. Community Connectors focus on moving vehicles and can be considered for transit corridors. Community Connectors connect communities within the Region and incorporate a high degree of access control. Designing the East Boundary Road to support active transportation modes including walking and cycling is a fundamental character of this road classification and aligns with Regional Transportation Master Plan objectives.

Key elements of the recommended cross-section include:

- A forty (40) metre wide right-of-way;
- Four (4) lanes of through traffic;
- A three (3) metre wide multi-use trail (MUT) along each side of the road;
- Raised median;
- Street lighting;
- Curb and gutter;
- Storm sewers and stormwater management facilities, as required;
- Flexibility for median and boulevard features; and
- Flexibility for staged construction.

The proposed typical cross-section for the East Boundary Road is illustrated in **Figure 8.1**. The 30% (preliminary) design of Recommended Alternative Alignment B4 is based on design criteria listed in **Table 8.1, following Figure 8.1**.

The proposed 40m-50m right-of-way (ROW) cross section incorporated into the 30% design includes the following:

- ✓ 3.35m wide “inside” traffic lanes;
- ✓ 3.65m wide “curb” traffic lanes;
- ✓ 5.0m wide raised centre median – if turn lanes are required for standard intersections with turn lanes, they can be “cut” into this median;
- ✓ 6.0m wide Boulevard (between curb and sidewalk) would permit future widening of East Boundary Road, if needed; and
- ✓ 3.0m - 4.0m wide Multi-Use Trail on both sides of the road.

30% Preliminary Design Drawings for the Recommended Design Alternative B4 are contained in **Appendix J**. The design criteria have generally been applied to the 30% design. It is noted that the right-of-way (ROW) or road allowance width of 40m is considered a minimum and may need to be expanded in areas where slopes in cut and fill areas and other items may necessitate a slightly wider ROW. These cut/fill areas are illustrated in the 30% design drawings by means of slope lines, and the extra areas are included in the preliminary property impact/requirement plans to be refined through detailed design.

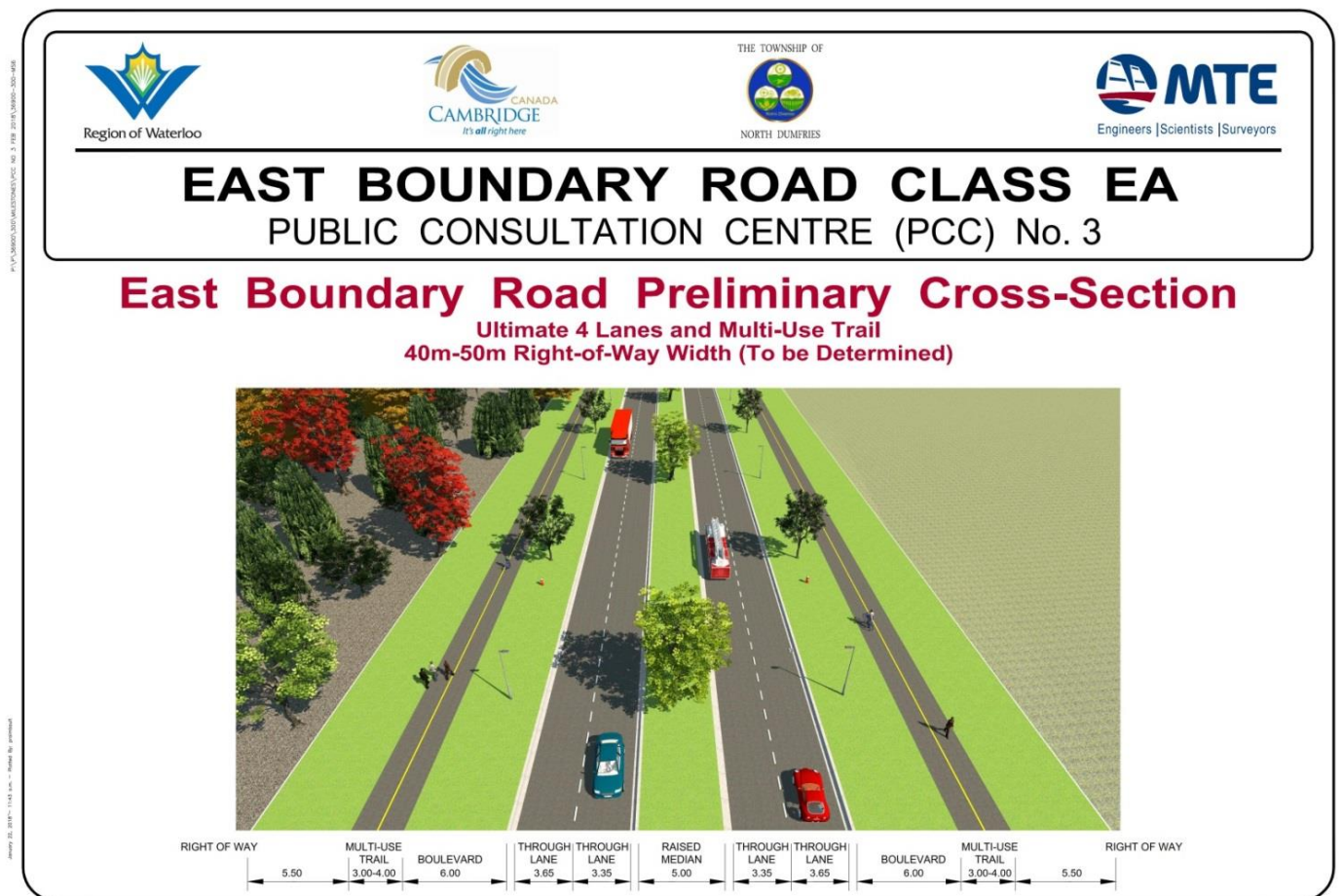


Figure 8.1 - Typical East Boundary Road Cross-Section

8.1.4 Intersection (Traffic) Control

The implementation of roundabouts instead of traffic signals has been preliminarily identified as the Recommended Design Alternative due to expected traffic operations, i.e. decreasing serious and fatal injuries, as well as cost benefits.

As such, roundabouts are recommended at the intersections of the East Boundary Road and each of: Wesley Boulevard; Main Street; Clyde Road; and Avenue Road/Gore Road. This recommendation is supported by Intersection Control Studies (ICS) completed by CIMA+ in 2018, included with the Transportation Report in **Appendix F**.

The ICS compared future signalized intersections and multi-lane roundabouts. At Avenue Road/Gore Road it was assumed no lands would be acquired on the northeast corner, within Wellington County. This meant that both conceptual designs have an interim configuration that matches to a two-lane road to the north. It is expected the necessary lands may be acquired to widen the north leg in the future, subject to future study and need, and ultimate configurations with additional lanes are reported in the capacity and safety analyses.

A summary of the quantitative comparison of a roundabout versus a signalized intersection is provided in **Table 8.2** (where LOS is level of service).

Table 8.1: East Boundary Road 30% Design Criteria Table

<u>Criteria</u>	<u>Design Element</u>	<u>Notes</u>
Design Speed	80km/h	Community Connector
Posted Speed	60km/h	
Right of Way (ROW) width	40m	
Horizontal Alignment Radius	450m R	TAC 2017 Table 3.2.4. High Speed 80km/h 0.02 m/m Reverse
Reverse curves		To be checked at 60% design
Lane width - inside	3.35m	
Lane width - outside	3.65m	
Left – Right turn width	3.25m	
Center island median width	5.00m	Excluding curbs
Multi-use Trail width	3.00m	
Intersection radius	15m	
Cross fall	2%	
Super elevation	2% - 3.5%	TAC 2017 Table 3.2.5
Vertical alignment	5% max.	TAC 2017 chapter 3.3.2.2.
K sag	30	TAC 2017 Table 3.3.4
K crest	26	TAC 2017 Table 3.3.2

8.1.2 Corridor Access Control

Community Connectors are typically Access Control Prohibited, with no access to the Regional Road as defined in the Region Official Plan (ROP), Policy 5.A.24. Any future exemption to permit access would require approval from Regional Council through amendment to the Controlled Access By-law. Local road connections may be permitted subject to review. Wesley Boulevard and Avenue/Gore Road are two such local road connections, which are addressed further in the following sections.

8.1.3 Plan and Profile

The proposed plan and profile of the Recommended Design Alternative B4 is shown on the 30% Design Drawings contained in **Appendix J**. The 30% Design Drawings also illustrate a number of other details determined as part of the study.

Table 8.2: Intersection Control Study (ICS) Summary Evaluation

ICS SUMMARY EVALUATION

Intersection		Evaluation Criteria			
		LOS 2041 AM Peak Hour	LOS 2041 PM Peak Hour	Estimated Capital Cost (x \$1,000)	Estimated 20 Year Study Period Cost (x \$1,000)
Avenue Road / Gore Road	Signals	C	C	\$2,412	\$5,401
	Roundabout	A	B	\$2,915	\$5,097
Clyde Road	Signals	B	B	\$3,788	\$5,900
	Roundabout	A	A	\$4,270	\$6,043
Main Street	Signals	B	B	\$4,433	\$6,648
	Roundabout	A	B	\$5,215	\$7,779
Wesley Boulevard	Signals	C	D	\$3,709	\$5,492
	Roundabout	A	A	\$3,968	\$6,634

In general, the roundabout concepts (with the ultimate configuration at Avenue Road/Gore Road) are predicted to result in lower delays and queues during the 2041 peak hours than the signalized intersection concepts (with the ultimate configuration at Avenue Road/Gore Road). However, generally favourable future peak hour operations for motorists can be expected with either alternative at all four locations.

A number of qualitative criteria were also considered. In addition to peak hour traffic operations, they include: peak and off-peak vehicle noise; fuel consumption and emissions; aesthetics; public outreach; accessibility; pedestrian and cyclist security, comfort, and safety; speed control; access management; truck accommodation; and driver expectancy. Roundabouts have a number of advantages when considering these criteria. While collectively they should not be considered reason to overturn the results of the economic analysis, if the margin is close then they should be considered significant. This would make a roundabout preferred at Avenue Road/Gore Road, as well as at Clyde Road.

Historically, the Region may consider implementation of a roundabout if its 20-year study period cost is less than 1.5 times the cost of the signalized intersection alternative. This is the case at both Main Street and Wesley Boulevard (where a roundabout is 1.2 times the cost). The fact that four roundabouts are planned along South Boundary Road, and that there are two roundabouts preferred as part of this study for the East Boundary Road, there are advantages to constructing

roundabouts at Main Street and Wesley Boulevard intersections with the East Boundary Road to establish/maintain a roundabout corridor.

During detailed design, the need for a roundabout at these intersections will be re-examined based on current design criteria at that time.

8.1.5 Active Transportation Facilities

The proposed cross-section for the East Boundary Road illustrates a 3.0-4.0m off-road multi-use trail (MUT). The purpose of this MUT is to accommodate both pedestrians and cyclists. During detailed design, the Active Transportation facility type will be confirmed based on current standards.

In addition, provisions have been made to include a MUT under the Moffatt Creek Bridge to allow a trail connection as a grade-separated active transportation crossing of the East Boundary Road from future developed areas to the east and west side of the East Boundary Road. In addition, the Region has committed to review warrants for a Level 2 Pedestrian crossing on the East Boundary Road in the vicinity of potential vulnerable user facilities near Wesley Boulevard during detailed design.

8.1.6 Bridges

In order to satisfy applicable codes, guidelines, and regulations, and to mitigate impacts to the natural environment in the creek beds, bridge crossings are required at the East Boundary Road creek crossing locations at Moffatt Creek and Mill Creek.

The East Boundary Road also crosses the CP Rail line north of Clyde Road. An above-grade crossing (bridge overpass) is recommended at the CP Rail crossing location. An above-grade (i.e. road over rail) crossing rates better for traffic operations and safety than an at-grade crossing and is expected to have a higher capital cost; however due to reduced collisions, it is expected to have a comparable life cycle (total) cost to an at-grade crossing.

A below-grade (i.e. road under rail) crossing was pre-screened out in consideration of several of the evaluation criteria, including: natural environment; traffic capacity, operations, and safety; and cost.

Context sensitive detailed design of these bridges (e.g. for items such as bridge barriers/railings, sidewalk widths, etc.) will follow completion of the Class EA with required regulatory approvals to precede construction.

8.1.6.1 Moffatt Creek Bridge

The Moffatt Creek Bridge Preliminary General Arrangement Drawing is illustrated in **Figure 8.2, following Sub-Section 8.1.6.3.** The Preliminary (30%) Design consists of a single span, semi-integral abutment design with NU 1200 pre-stressed concrete girders and a 25.6m span. Some items to be confirmed as part of detailed design include:

- ✓ The East Boundary Road is super-elevated to approximately 3.2% at the Moffatt Creek Bridge. However the longitudinal profile on the bridge is less than 1%. A longitudinal profile

of at least 1% should be considered to ensure minor construction imperfections do not impede drainage off the bridge deck;

- ✓ Geotechnical information at the Moffatt Creek Bridge should include enough information to determine the suitability of a semi-integral abutment design. Although integral abutment designs are preferred, the geotechnical information and final pile lengths must confirm the type of abutment to be used;
- ✓ Suitability of reinforced concrete wingwalls should be reviewed. Consideration should be given to the impacts of potential settlement. RSS walls shall be discouraged to avoid conflicts with tie-backs to existing and future utilities;
- ✓ A “floating” concrete median has been included to provide some flexibility to stage traffic for future repaving and bridge rehabilitation. The suitability of a floating median should be reviewed, including evaluation of the floating medians shear bond with asphalt to ensure effective performance under loads; and
- ✓ The decorative barrier wall design has been designed to TL-4 standards, and should be reviewed in keeping with recommendations for future context sensitive design standards.

8.1.6.2 Mill Creek Bridge

The Mill Creek Bridge Preliminary General Arrangement Drawing is illustrated in **Figure 8.3, following sub-section 8.1.6.3.** The Preliminary (30%) Design consists of a three span semi-integral abutment design with NU1400 girders and a 90.0m span (2-27.5m spans and 1- 35m centre span). Some issues to be confirmed as part of detailed design include:

- ✓ Geotechnical information at the Mill Creek Bridge should include enough information to determine the suitability of a semi-integral abutment design. Although integral abutment designs are preferred, the geotechnical information and final pile lengths must confirm the type of abutment to be used;
- ✓ Suitability of reinforced concrete wingwalls should be reviewed. Consideration should be given to the impacts of potential settlement. RSS walls shall be discouraged to avoid conflicts with tie-backs to existing and future utilities;
- ✓ A “floating” concrete median has been included to provide some flexibility to stage traffic for future repaving and bridge rehabilitation. The suitability of a floating median should be reviewed, including evaluation of the floating medians shear bond with asphalt to ensure effective performance under loads; and
- ✓ The decorative barrier wall design has been designed to TL-4 standards, and should be reviewed in keeping with recommendations for future context sensitive design standards.

8.1.6.3 Canadian Pacific (CP) Rail Bridge

The CP Rail Bridge Preliminary General Arrangement Drawing is illustrated in **Figure 8.4, following this Sub-Section.** It is illustrated as a single span, semi-integral abutment design with NU900 girders and a 34.13m span. Some issues to be confirmed as part of detailed design include:

- ✓ Geotechnical information at the CP Rail Bridge should include enough information to determine the suitability of a semi-integral abutment design. Although integral abutment designs are preferred, the geotechnical information and final pile lengths must confirm the type of abutment to be used;
- ✓ Suitability of reinforced concrete wingwalls should be reviewed. Consideration should be given to the impacts of potential settlement. RSS walls shall be discouraged to avoid conflicts with tie-backs to existing and future utilities;
- ✓ A “floating” concrete median has been included to provide some flexibility to stage traffic for future repaving and bridge rehabilitation. The suitability of a floating median should be reviewed, including evaluation of the floating medians shear bond with asphalt to ensure effective performance under loads;
- ✓ The decorative barrier wall design has been designed to TL-4 standards, and should be reviewed as part of detail design in keeping with recommendations for future context sensitive design standards;
- ✓ The skew of approximately 53 degrees is necessitated by a number of factors including avoiding significant impacts to the natural environment and property impacts. A skew of less than 35 degrees is desired, and options to reduce the skew should be explored;
- ✓ The use of NU900 girders allows the top flanges of adjacent girders to “touch”, and minimizes the need for formwork over the rail; and
- ✓ “Overbuilding” of the deck results in “squaring” up the bridge, which reduces the girder lengths. Consideration should be given to an additional railing to protect the overbuilt area from exploring/errant pedestrians. Consideration should also be given to protecting the overbuilt areas from moisture accumulation and drainage.

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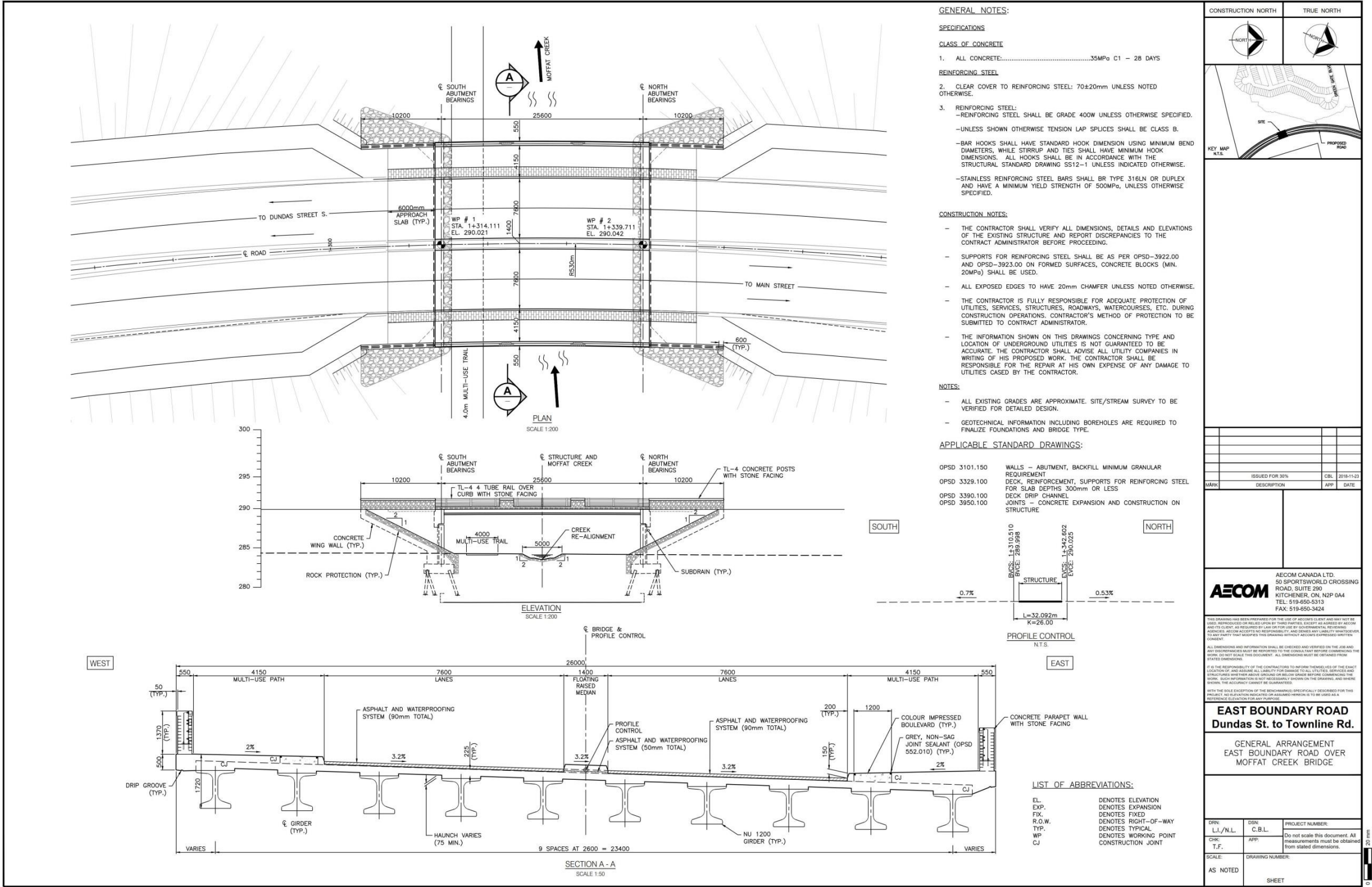


Figure 8.2 - Moffat Creek Bridge Preliminary General Arrangement Drawing

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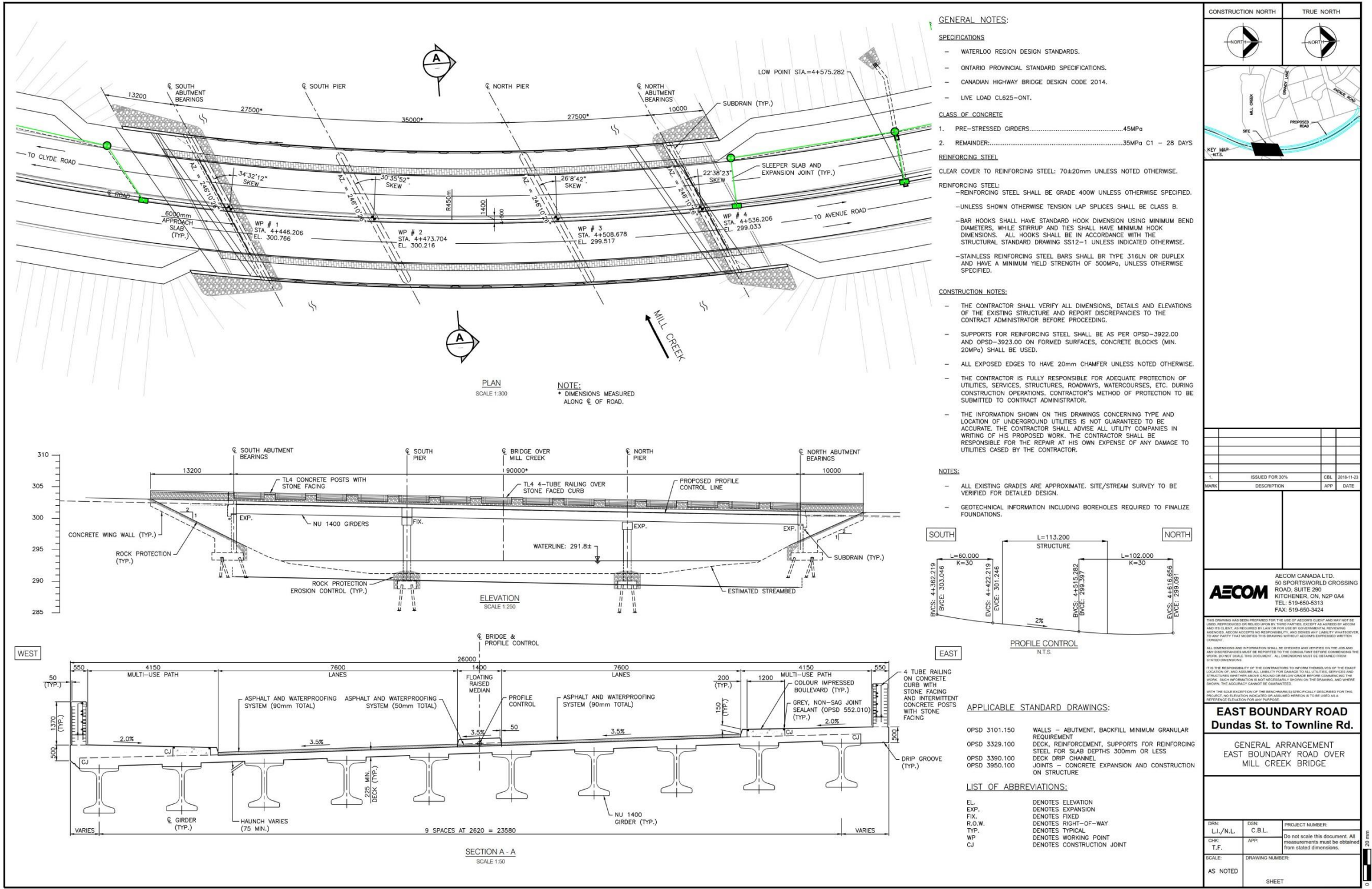
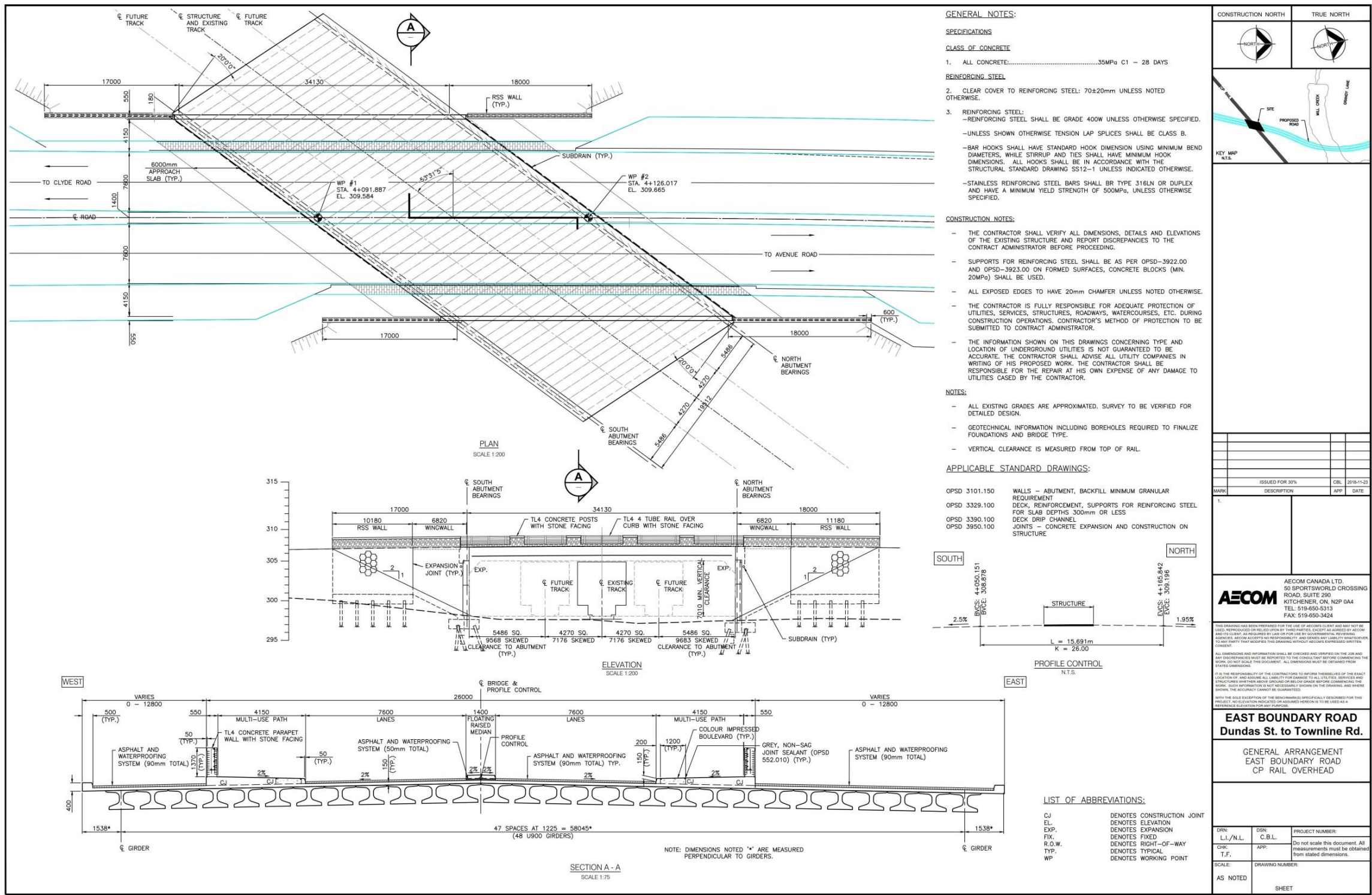


Figure 8.3 - Mill Creek Bridge Preliminary General Arrangement Drawing

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8.1.7 Stormwater Management (SWM)/Drainage

8.1.7.1 Storm Sewers

The 30% preliminary design includes curb and gutter along the edges of the roadway; as such, storm sewers are required to convey road drainage during rain and snow melt events. The 30% design drawings illustrate the location of a storm sewer, assuming a “Maintenance Hole/Catchbasin” system including the use of side inlet catchbasins per current Region standards. A 30% design storm drainage area plan and storm sewer design sheets are contained in **Appendix G**. The 30% Design Drawings in **Appendix J**, show that the storm sewers range in size from 300mm to 825mm diameter.

Each storm drainage area or catchment will be directed to a Stormwater Management (SWM) Pond or other SWM facility.

8.1.7.2 Stormwater Management (SWM) Facilities

There are five (5) quality/quantity control stormwater management (SWM) facilities, and one (1) dry pond quantity control SWM facility with an oil/grit separator (OGS), proposed to provide stormwater management as part of the East Boundary Road 30% (preliminary) design. The six (6) facilities will provide the project with appropriate levels of quality, quantity, erosion, and water balance controls, in the form of LID/conveyance or end-of-pipe measures, in order to meet the criteria set out for the East Boundary Road in accordance with sub-watershed studies for Moffat Creek and Mill Creek. **Appendix G** contains a Stormwater Management Technical Memorandum for the 30% design of the SWM facilities, including additional design information, completed by MTE.

The proposed SWM facilities are illustrated on **Figures 8.5, 8.6, and 8.7**. The SWM facilities are also included on the 30% (preliminary) design drawings in **Appendix J**.

The East Boundary Road was modeled for the 5yr and 100yr return period rainfall events (3hr Chicago distribution derived from the City of Cambridge Intensity-Duration-Frequency parameters) and the Regional storm event (48-hr, 285mm depth – Hurricane Hazel).

All facilities, with the exception of SWM Facility 5A, have been designed as wet pond/wetland hybrids with permanent pool depths of 1.5m and wetland depths of 0.3m. SWM Facility 5A was designed as a combination of an oil/grit separator (OGS), and detention basin. Wet facilities will incorporate a sediment forebay with a depth of 1.5m, which offer benefits of dilution and settling of sediment. All forebay designs will be explored in the detailed design stage based on classic particle settling and flow dispersion equations as presented in the *Stormwater Management Planning and Design Manual* (Ministry of Environment, 2003).

As part of the 30% road and bridge design, the road and bridge elevations and openings were reviewed to determine if there would be potential floodplain elevation impacts. Current modeling for both Mill Creek and Moffat Creek were provided by the Grand River Conservation Authority (GRCA). Floodplain elevations in the Mill Creek sub-watershed were obtained from the provided

model. Floodplain elevations in the Moffat Creek watershed were also generally obtained from the provided model. However, a revised model was created by MTE wherein some cross-sections were modified to represent the proposed East Boundary Road, the proposed bridge crossing, and culverts, to determine whether potential floodplain elevation impacts result from the preferred East Boundary Road alignment and crossing.

As part of this review it is proposed that the existing Moffat Creek channel be realigned through the proposed bridge opening. If Moffat Creek was not realigned, there would be a significant skew between the existing Moffat Creek channel and the proposed East Boundary Road alignment. A realignment of Moffat Creek closer to a 90 degree angle between Moffat Creek and East Boundary Road will result in:

- ✓ A significant reduction of the length of Moffat Creek covered by the proposed bridge, allowing for natural light and vegetation along Moffat Creek;
- ✓ A longer channel to provide opportunities for additional mitigation or compensation measures for vegetation and fish habitat; and
- ✓ A much shorter and simpler bridge design.

As part of detailed design and approval agency applications, it is recommended that the hydraulic modeling of the proposed bridge crossings be updated as part of detailed design to ensure no negative impacts to Regulatory flood elevations. It is further recommended that the proposed channel realignments be reviewed with the appropriate review agencies as no formal consultation has occurred to date.

8.1.7.3 Road design for the Protection of Groundwater and Surface Water

Assessing potential measures to minimize winter maintenance requirements and the use of road salt/de-icing materials during the planning/Class EA stage is required for a new Regional road project.

A Salt Management Road Design Assessment Form (**Appendix K**) was completed by the Region Project Manager with assistance from Region Water Services (Hydrogeology and Source Water) and Operations staff, as well as City of Cambridge Operations staff, in order to identify design elements, mitigating and/or monitoring features that can be incorporated into the project to minimize snow drifting, winter maintenance requirements, (including use of salt and de-icing materials), and associated impacts on area groundwater and surface water sources.

Section 9.0, Table 9.1 identifies potential impacts to the Natural Environment, including ground water and surface water, as a result of the proposed East Boundary Road, as well as mitigating and/or monitoring measures to reduce net impact.

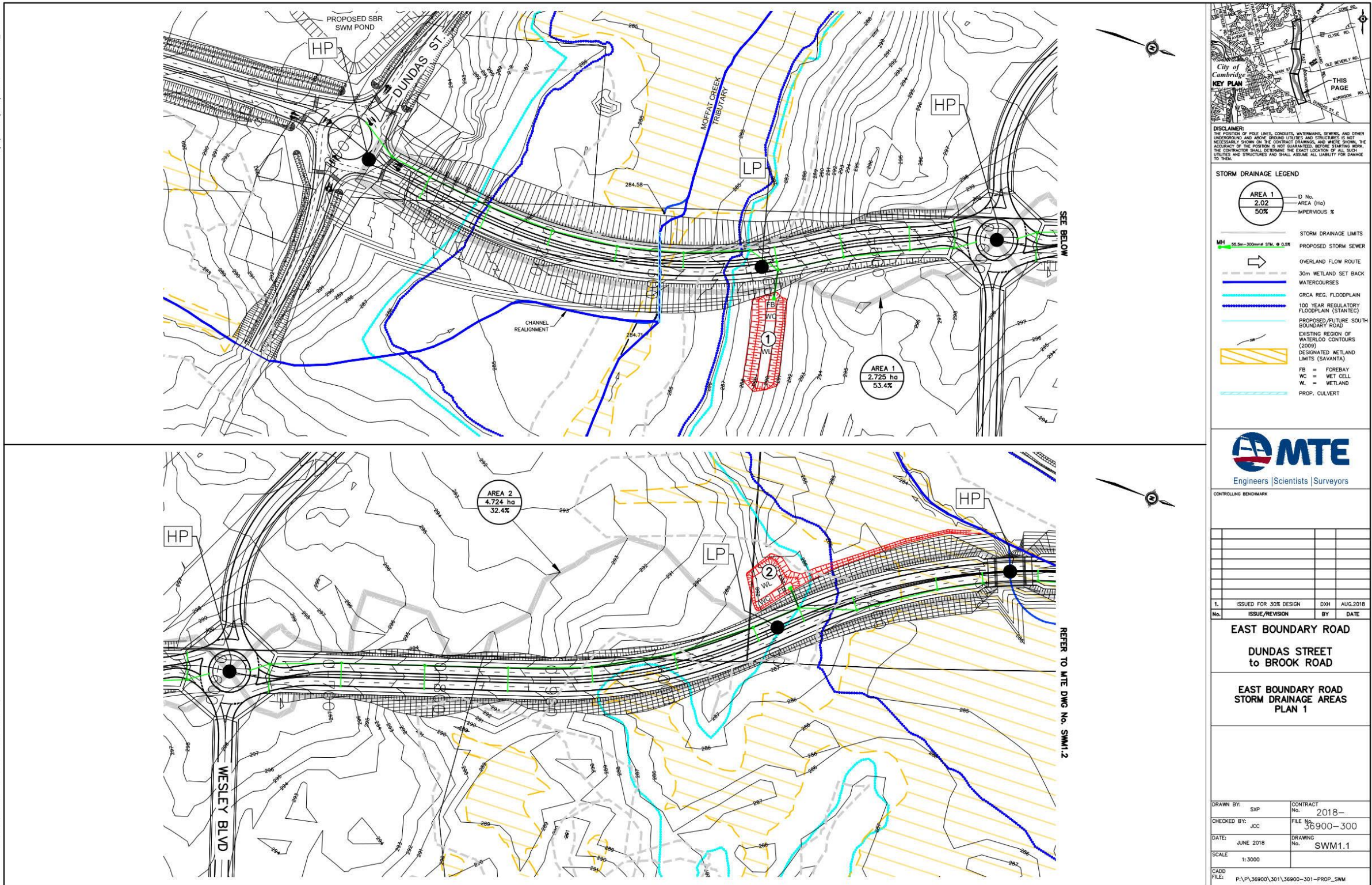


Figure 8.5 - Storm Drainage Area and Proposed SWM Facilities - Plan 1

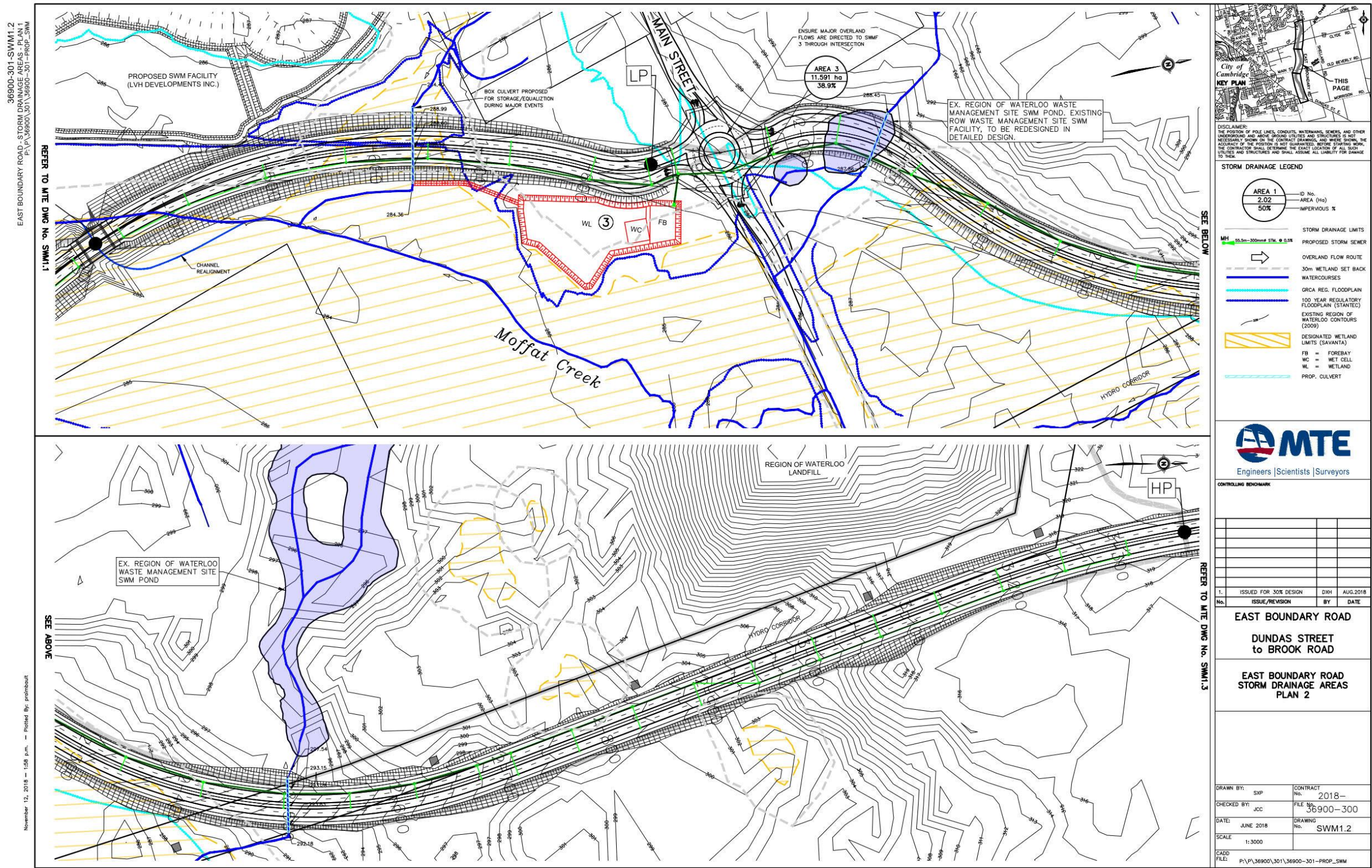


Figure 8.6 - Storm Drainage Area and Proposed SWM Facilities - Plan 2

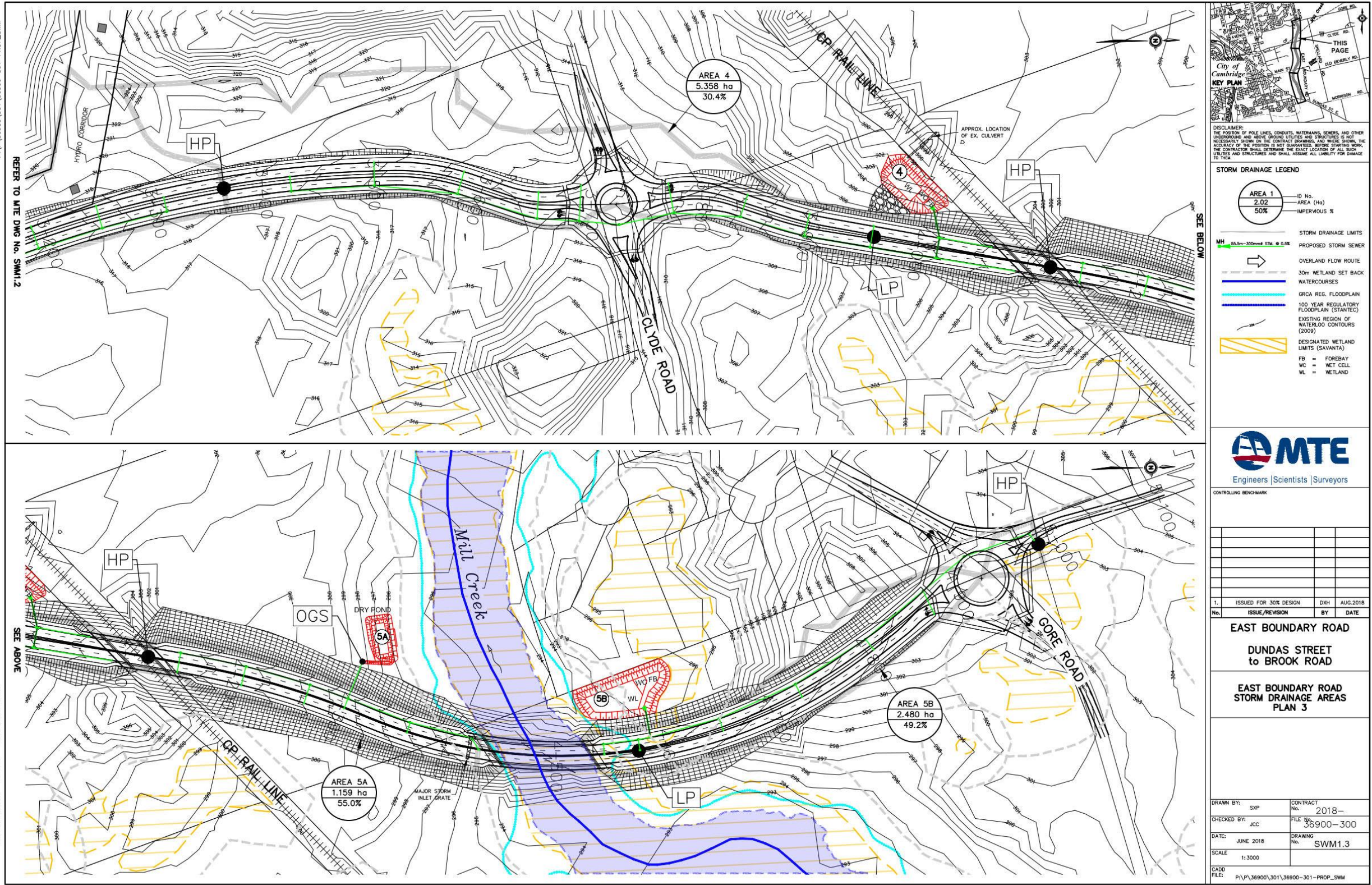


Figure 8.7 - Storm Drainage Area and Proposed SWM Facilities - Plan 3

During detailed design a planting and landscaping plan should be prepared that selects plant species and their location in and around the basins to stabilize banks, deter waterfowl from nesting within the area, and provide aesthetic and safety benefits. Incorporation of LID measures may also provide additional quality treatment of East Boundary Road stormwater runoff prior to reaching the proposed end-of-pipe SWM facilities.

8.1.8 Noise

MTE Consultants Inc. (MTE) prepared a Preliminary Noise Assessment Technical Memorandum **Appendix L**, based on the 30% Preliminary Design of the Recommended Design Alternative. The purpose of the Preliminary Noise Assessment is to provide technical information and analysis of Alternative Alignment B4, and provide recommendations for noise mitigation measures that may be required and/or implemented.

The noise assessment was completed using the requirements of the *Implementation Guidelines for Noise Policies* (Region of Waterloo, 1999), along with *NPC-300: Environmental Noise Guideline: Stationary and Transportation Sources – Approval and Planning* (MECP, 2013). *NPC-300* was adopted by the Region of Waterloo upon its release in August 2013. *Part B - Existing Development Impacted by Proposed Regional Road Undertakings* of the Region’s Noise Policy was used to determine potential noise impacts to existing residential developments in proximity to Recommended Alignment B4.

Traffic volume projections for the year 2041 were utilized to assess daytime projected noise levels for the outdoor living areas (OLA) at existing residential properties, and at potential properties (e.g. Moffatt Creek Estates Subdivision, 1395 Main Street East – Hammersley Lands) on the west side of the Proposed East Boundary Road between Moffatt Creek and Main Street. Per Policy, noise attenuation measures are required where:

- The projected noise level exceeds 65 dBA; or
- The projected noise level exceeds 60 dBA and the difference between the existing and projected noise levels is 5 dBA or more.

Since there is currently no East Boundary Road in existence, it was assumed the existing OLA noise level at the various properties is 55dBA. Therefore a 5 dBA difference would be realized where the projected noise level exceeds 60 dBA. The required noise control measures for outdoor living areas are summarized in **Table 8.3**:

Table 8.3: Required Noise Control Measures for Outdoor Living Areas (OLAs)

Daytime (07:00-23:00)	Exceeds Objective By	Noise Control Measures
60 dBA or less	0 dBA	No requirements or conditions
61+ dBA	1+ dBA	Noise Barriers to reduce projected noise levels to 60 dBA or less

The noise calculations for Recommended Alignment B4 are summarized in **Table 8.4**.

One (1) property within the Study Area, 980 Avenue Road, is projected to have an unattenuated daytime OLA noise level higher than 60 dBA. 1591 Dundas Street South falls within the South Boundary Road Study Area, so noise mitigation measures are not considered for that property in this study, but must be considered through South Boundary Road detailed design (and construction). Based on preliminary analysis, 980 Avenue Road appears to require noise attenuation when East Boundary Road is constructed. Part B of the Region’s Noise Policy indicates that noise attenuation will be designed to achieve a 5 dBA or more reduction in the Daytime OLA noise level and to reduce the projected noise level to 60 dBA or less. It is also noted that anticipated noise levels at potential OLAs in the Moffatt Creek Subdivision (Hammersley Lands) will not require noise attenuation measures based on preliminary analysis.

Regardless of projected noise calculations completed as part of the 30% Preliminary Design, when the East Boundary Road is undergoing detailed design, and prior to construction, additional noise modeling must be completed based on current traffic volume projections, etc. at that time.

Table 8.4: Outdoor Living Area (OLA) Noise Level Summary

OLA Noise Level Summary				
Outdoor Living Area (OLA)	Civic Address	DAY-TIME NOISE LEVELS		
		Calculated Outdoor Road Noise Level (dBA) ₂		
		Unattenuated (dBA)	Exceeds Required Noise Level By (dBA)	Attenuated (dBA)
OLA1 ₃	1591 Dundas St S	61.2	1.2	N/A
OLA2 ₃	1551 Dundas St S	55.4	N/A	N/A
OLA3 ₃	1551 Dundas St S	55.0	N/A	N/A
OLA4	32 Davies St	49.3	N/A	N/A
OLA5	20 Ripplewood Rd	42.9	N/A	N/A
OLA6	5 Ripplewood Rd	43.1	N/A	N/A
OLA7	1791 Dundas St S	48.8	N/A	N/A
OLA8	1261 Dundas St S	47.3	N/A	N/A
OLA9	~ ₁	50.8	N/A	N/A
OLA10	~ ₁	54.7	N/A	N/A
OLA11	~ ₁	52.4	N/A	N/A
OLA12	1235 Main St E	45.8	N/A	N/A
OLA13	1180 Main St E	44.8	N/A	N/A
OLA14	1355 Main St E	51.6	N/A	N/A
OLA15	1365 Main St E	52.2	N/A	N/A
OLA16	1375 Main St E	53.5	N/A	N/A
OLA17	1370 Main St E	51.5	N/A	N/A
OLA18	1440 Main St E	55.4	N/A	N/A
OLA19	1805 Main St E	46.4	N/A	N/A
OLA20	855 Clyde Rd	59.8	N/A	N/A
OLA21	935 Clyde Rd	55.3	N/A	N/A
OLA22	800 Clyde Rd	49.8	N/A	N/A
OLA23	N/A	48.8	N/A	N/A
OLA24	N/A	55.0	N/A	N/A
OLA25	50 Grandy Ln	53.2	N/A	N/A
OLA26	45 Grandy Ln	58.5	N/A	N/A
OLA27	25 Grandy Ln	49.3	N/A	N/A
OLA28	35 Grandy Ln	50.3	N/A	N/A
OLA29	25 Scottfarm Walk	54.3	N/A	N/A
OLA30	15 Grandy Ln	49.8	N/A	N/A
OLA31	20 Scottfarm Walk	51.2	N/A	N/A
OLA32	15 Scottfarm Walk	55.6	N/A	N/A
OLA33	980 Avenue Rd	61.4	1.4	58.0
OLA34	100 Deerpath Rd	54.8	N/A	N/A
OLA35	11 Deerpath Crt	56.0	N/A	N/A
OLA36	23 Deerpath Crt	59.2	N/A	N/A

Notes: 1. Points analyzed at potential OLAs within proposed Moffat Creek Estates Subdivision.
2. Unattenuated noise levels are calculated as free-field measurements. Attenuated results are calculated assuming the potential shielding effect from the surrounding buildings and barriers (where applicable), assuming full build-out.
3. OLAs are anticipated to be impacted moreso by the future development of South Boundary Road at Dundas Street, and noise mitigation measures are not assessed at these OLAs for the purpose of this preliminary Noise Assessment.

8.1.9 Utilities

Anticipated potential utility relocations include: hydro lines and poles; gas mains; and Rogers, Bell, and other communications networks where the East Boundary Road crosses existing streets. Coordination with all utilities will be required during detailed design to ensure protection of existing facilities, minimize utility relocations and disruptions to service, and installation of possible new utility plant.

8.1.10 Streetscaping

There is potential for aesthetic features such as boulevard trees, etc. along the East Boundary Road corridor. In addition to streetscaping, given the many existing natural wetlands and vegetation features, native plantings adjacent to these areas may be considered in conjunction with any approvals required from the various approval agencies. Where property and cross-sections permit, a vegetated buffer between the MUT and residential properties may be considered. In the centre medians low level vegetation and tree planting may also be considered. During detailed design, communications with Region of Waterloo Waste Management Site staff should consider planting buffers/screening.

Any required retaining walls, including wingwalls, etc. at the various bridges, may consider natural or decorative facades by use of form liners that reflect the area environment (i.e. context sensitive). In addition, parapet walls on the bridges may consider railings that provide a view of the surrounding landscape, whilst conforming with applicable requirements.

8.1.11 Property Requirements

Implementation of the recommended new road corridor design will require construction of road allowance and Stormwater Management Ponds on existing private property. This will require the acquisition of private property and potential to obtain easements for construction. 30% Preliminary Design property requirements are illustrated in **Figure 8.8**. Property Impact Plans for each individual property impacted, based on 30% Preliminary Design, are found in **Appendix M**. Remnant surplus lands should be considered for planting for potential habitat buffers/improvements.

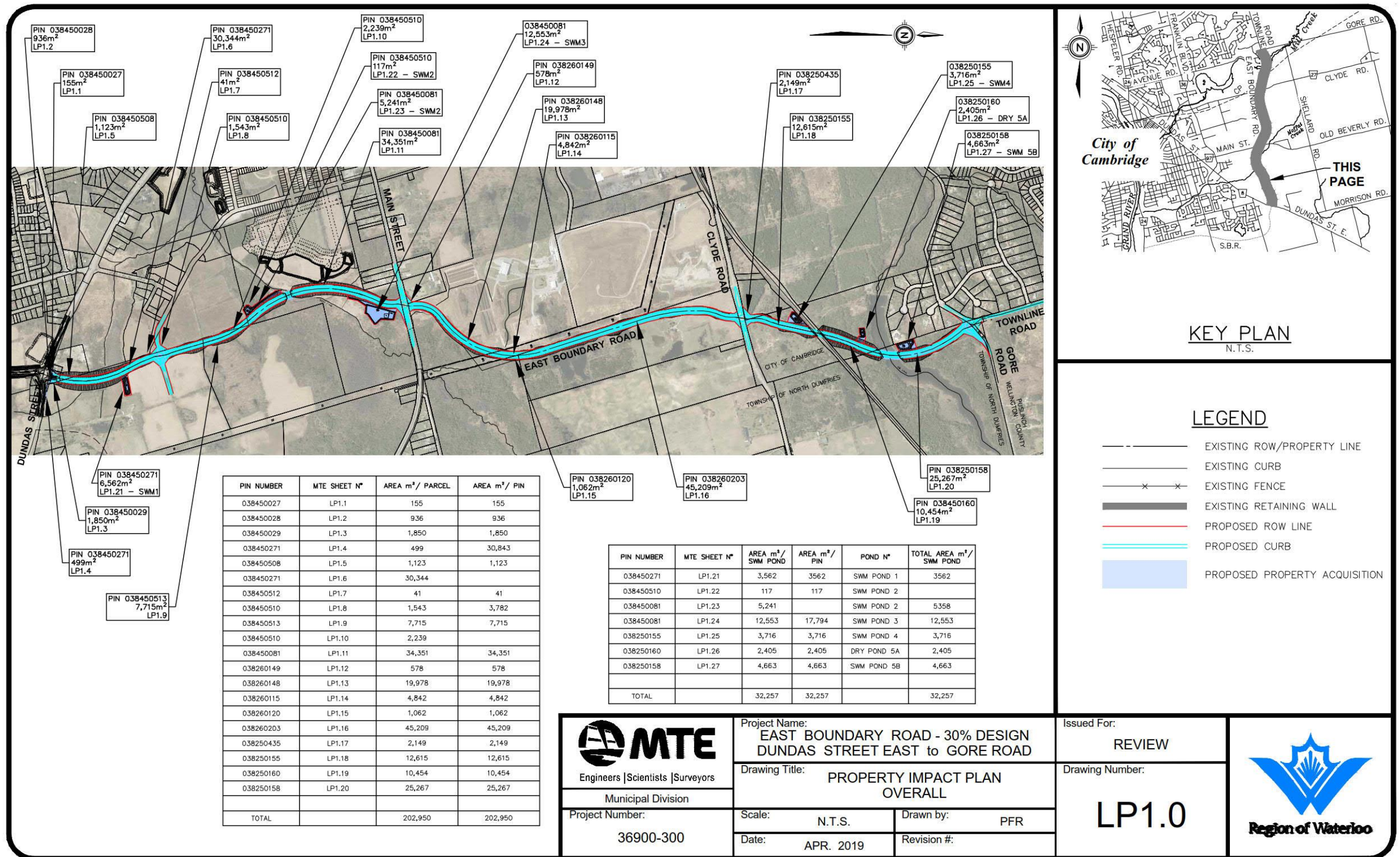


Figure 8.8 - Preliminary Design Property Impacts

8.1.12 Pavement

It is anticipated that the East Boundary Road will be constructed with asphalt pavement, subject to asphalt and granular road base thickness requirements to accommodate projected daily traffic numbers, and further recommendations of the Geotechnical Investigation to be completed during the detailed design stage.

8.1.13 Illumination (Street Lighting)

Roadway illumination will be provided in accordance with the Region's Illumination Policy. Through detailed design, photometric analysis should be completed and consider light pollution mitigation in the context of Region Policy, existing and proposed developments, the natural environment, etc.

8.1.14 Municipal Services (Sewers and Watermains)

Prior to construction, the presence of watermains and sewers on existing roads being crossed by the East Boundary Road must be investigated and confirmed. Dundas Street South (Highway 8), Main Street, Clyde Road, and Avenue/Gore Road are existing streets that may have some underground municipal services. Other potential new streets, such as Wesley Boulevard or other side streets, or municipal service allowances must also be investigated further to determine potential impacts such as relocations, or other servicing needs.

It is anticipated that either local or trunk watermains or sanitary sewers may need to be installed along the East Boundary Road to service existing and/or proposed residential areas. This issue must be thoroughly investigated with both the local (Cambridge) and upper tier (Region) municipal staff. In addition, there is the possibility that a supply watermain may be required by the Region to service existing, new, and/or proposed residential areas.

If watermains or sanitary sewers are required at any of the three bridges along the East Boundary Road, it is highly desirable to bury these pipes as opposed to supporting pipes on the bridges. Pipes hanging from bridge structures are subject to potential freezing, and are also susceptible to damage from floods, trains, and deterioration or damage to the bridge structure itself.

8.1.15 Construction Staging

Construction staging will be dependent on need and available funding. At the time of writing of this Environmental Study Report, funding in the amount of \$5.95M is included in 2022-2027 for the design, property acquisition, utility relocation, and construction of the East Boundary Road from Dundas Street to Wesley Boulevard in the 2019 Region Transportation Capital Program.

Given the length and total estimated cost of the East Boundary Road, it is unlikely that the entire road will be built within one construction contract and/or in one or two seasons. Staging the construction in sections can be achieved, as long as access is provided from both ends of the newly constructed road segment. In addition, given the cost and length of time required to construct the bridges, consideration could be given to constructing the bridges ahead of road construction.

9.0 POTENTIAL IMPACTS, PROPOSED MITIGATION MEASURES, AND MONITORING OF THE RECOMMENDED SOLUTION

A key feature of the Class Environmental Assessment planning process is the avoidance and/or mitigation of impacts on the local environment. Under the Ontario *Environmental Assessment Act*, the environment refers to the natural, social, economic, and cultural components that make up the area. **Table 9.1** identifies potential impacts that may result from the proposed East Boundary Road (during and following construction), mitigation/monitoring measures, and net impacts.

Table 9.1: Net Impacts and Mitigation

NO.	POTENTIAL IMPACT	MITIGATION MEASURES	NET IMPACT
1.0	Natural Environment		
1.1	Disruption to soils, surface water, and groundwater quantity and quality.	- As a minimum, and subject to all conditions of permits from Regulatory Agencies, the following temporary erosion and sedimentation control measures shall be implemented prior to construction to mitigate negative impacts on water quality and fish habitat within and beyond the limits of this Study Area: - The extent and duration that soils are exposed to the elements will be kept to a minimum. - Disturbed areas will be stabilized through seeding, sodding, mulching, or use of an erosion control blanket as soon as possible. - During construction, the existing creeks will be protected by silt fence barriers and straw bale check dams. - All erosion and sedimentation control measures will remain in place until soils have been re-stabilized. - The erosion and sedimentation control measures are to be inspected and monitored to ensure that damage to vegetation has been minimized. - Any substrata disturbed within the creek channel shall be replaced with like material to return the area back to its present condition. - All permits for construction within and/or nearby the Creeks shall be acquired during detailed design, prior to construction. Permits should include a Fill, Construction and Alteration to Waterways Permit (Grand River Conservation Authority), Authorization for Works or Undertakings Affecting Fish Habitat (Department of Fisheries and Oceans), and a Work Permit (Ministry of Natural Resources and Forestry). - During construction, contamination to soils caused by spills and leaks can be avoided by ensuring that fuel storage, refueling and maintenance of construction equipment are handled properly and not allowed in or adjacent to watercourses. Contingency plans shall be prepared prior to construction for the control and emergency cleanup of a spill should one occur. - Should construction activities encounter groundwater: - All water from dewatering operations shall be contained and discharged in a way that ensures that water quality objectives of the receiving storm or sanitary sewer systems are met. - Temporary drainage and pumping shall be provided as necessary to keep excavations and site free from water. Erosion and siltation controls will be implemented as necessary. - Water containing suspended materials will not be pumped into waterways, sewers, or drainage systems. - Sewer Use By-law for the disposal of effluent water containing solid and/or liquid contaminants will be complied with. - As part of Stormwater Management Design, the following should be considered/undertaken: - A monitoring program be completed to determine groundwater elevations and seasonal fluctuations to establish the water table in the vicinity of the SWM facilities. - Infiltration targets and SWM Pond elevations to be evaluated once detailed geotechnical, groundwater, and topographical information is available to analyze infiltration and facility depth viability. - Implementation of LID measures to be considered to reduce the size of the proposed end-of-pipe facilities. - Surface water inputs to the existing local wetlands/ESPAs to be considered in the post-development condition. - Hydraulic modeling of Moffat and Mill Creek for more frequent storm events (i.e. 2-yr & 5-yr return events) to be considered to ensure pond outlet functionality with respect to backwater effects.	- Alternative B4 was selected due to its reduced impact on natural environment areas, compared to the other alignments. - Route B4 Impacts are expected to be fringe/peripheral, as opposed to the bisecting/severing impacts of other alternatives, per MNRF correspondence. - No significant negative impacts are anticipated if all regulatory permit conditions are followed. - Appendix K features are expected to minimize snow drifting, winter maintenance requirements (including use of salt and de-icing materials) and associated impacts on groundwater and surface water.

Table 9.1: Net Impacts and Mitigation - continued

NO.	POTENTIAL IMPACT	MITIGATION MEASURES	NET IMPACT
		- Hydraulic modeling of the proposed bridge crossings to be updated to ensure no negative impacts to Regulatory flood elevations and that proposed channel realignments be reviewed with the appropriate review agencies. - Existing culverts to be assessed to establish form and capacity. - Proposed culverts through East Boundary Road detailed design to be suitably designed for flow capacity or equalization function. - Ensure major overland flow routes are provided through intersections (including roundabouts), where applicable. - The existing SWM facility at the south end of the Region of Waterloo Waste Management Site is in the path of the proposed East Boundary Road route, and will need consideration through detailed design, prior to implementation. - During detailed design, a copy of the <i>Region of Waterloo Cambridge Waste Management Site – Stormwater Management and Design Brief (Lonsdale Consulting Engineers Inc., 2003)</i> should be reviewed to ensure any SWM facility revisions maintain existing quality, and quantity, controls. - The Region's Salt Management Road Design Assessment Form has been completed with Region Water Services (Hydrogeology and Source Water) and Operations, as well as City of Cambridge Operations, staff (Appendix K). - Recommendations and Best Practices of Appendix K will be reviewed and implemented, as appropriate, during detailed design. - Potential impacts to groundwater and surface water due to chlorides will be considered through the Region Water Services Division's Curb the Salt Program. Additional potential impacts to source water will be considered through the Region's Water Services division, per the Region's Source Protection Plan (SPP) – Clean Water Act requirements.	
1.2	Potential habitat loss and fragmentation.	- Woodland edge pre-stressing to fragmented forest edges prior (1 to 2 years) to site clearing and construction as feasible. - Habitat compensation measures to be considered in conjunction with agency approvals include: - Planting native vegetation (shrubs and grasses) in existing agricultural lands within the East Boundary Road right-of-way, where beneficial and/or impactful. - Remnant surplus lands should be considered for planting potential habitat buffers/improvements. - Evaluate a grade-separated wildlife crossing at the proposed Moffat Creek crossing location, including naturalization for wildlife movement and habitat linkage.	- Alternative B4 was selected due to its reduced impact on natural environment areas, compared to the other alignments. - Route B4 Impacts are expected to be fringe/peripheral, as opposed to the bisecting/severing impacts of other alternatives, per MNRF correspondence. - A potential wildlife crossing at Moffat Creek would further mitigate fringe impacts.
1.3	Disruption or modification of animal behavior from road noise and street lighting.	- Roadway illumination requirements will be reviewed as part of detailed design and comply with the Region's Illumination Policy and applicable standards. - Modern LED roadway illumination has less light spill into adjacent property (i.e habitat) than traditional/historical roadway illumination and can be further mitigated by shields at the lamp heads. - Consider contour grading (berming) or coniferous vegetation to block vehicle lights and to dampen and deflect noise directed into natural areas where grading and the right-of-way permit. Maximize separation distances between the road alignment and core wildlife habitat where practical. - Cease construction near core habitats during key wildlife breeding and spawning periods, per applicable regulatory permit conditions.	- Alternative B4 was selected due to its reduced impact on natural environment areas, compared to the other alignments. - Route B4 Impacts are expected to be fringe/peripheral, as opposed to the bisecting/severing impacts of other alternatives, per MNRF correspondence. - Long-term disruption or modification of animal behavior from road noise and street lighting is expected to be negligible to minor (e.g. fringe). - Wildlife (breeding, spawning, etc.) restrictions will be covered through required approval agency permitting processes.

Table 9.1: Net Impacts and Mitigation - continued

NO.	POTENTIAL IMPACT	MITIGATION MEASURES	NET IMPACT
1.4	Disruption of wildlife corridors and movement in natural areas, as well as to other habitats within and contiguous to the Study Areas.	- The Proposed East Boundary Road crossing of Moffat Creek (complex) will be considered for a grade-separated crossing. - Wildlife crossing structure (“eco-passage”) may be considered for amphibians, reptiles, and small to medium-sized mammals to cross under the road at locations identified as beneficial and/or impactful through regulatory permit review processes. - The proposed wildlife East Boundary Road crossing at Mill Creek (complex) is the shortest of alternatives considered. - Creek banks and other areas that remain dry during non-flood periods at the Moffat Creek and Mill Creek bridges can be considered for a design that enhances and encourages wildlife movement.	- Alternative B4 was selected due to its reduced impact on natural environment areas, compared to the other alignments. - Route B4 Impacts are expected to be fringe/peripheral, as opposed to the bisecting/severing impacts of other alternatives, per MNRF correspondence. - Long-term disruption or modification of animal behavior from operation of the corridor is expected to be negligible to minor.
1.5	Degradation of the structure, functions, or ecological interrelationships of habitat that sustain representative community associations or populations of significant or sensitive species.	- Apply pre-stressing measures to fragmented forest edges prior (1 to 2 years) to site clearing and construction as feasible. - Use fill material that meets MECP regulation. - Where feasible, plant native trees within the ROW to improve canopy closure where alignments pass through a forest. - Establish buffers and setbacks, where feasible, in accordance with final agency approvals.	- Alternative B4 was selected due to its reduced impact on natural environment areas, compared to the other alignments. - Route B4 Impacts are expected to be fringe/peripheral, as opposed to the bisecting/severing impacts of other alternatives, per MNRF correspondence.
1.6	Loss or reduction in the populations or reproductive capacity of common or rare plant and wildlife species.	- Consider wildlife crossing structures (refer to mitigation in Item No. 1.4 above) if determined to be beneficial and/or impactful to reduce road mortality and wildlife population isolation. - Use traffic signage in an effort to reduce road mortality rates. - Salvage and transplant rare species as identified through regulatory permit review. - Place sediment control and protective fencing around retained isolated trees (e.g. mature large-diameter trees in hedgerows) to prevent impacts during construction. - Apply mitigation measures recommended for disruption of animal behavior to reduce effects on wildlife reproductive success and predator-prey interactions.	- Alternative B4 was selected due to its reduced impact on natural environment areas, compared to the other alignments. - Route B4 Impacts are expected to be fringe/peripheral, as opposed to the bisecting/severing impacts of other alternatives, per MNRF correspondence.
1.7	Introduction and spread of invasive non-native plant species.	- Apply pre-stressing measures to fragmented forest edges prior (1 to 2 years) to site clearing and construction as feasible. - Landscaping and planting plans must consider locally-appropriate, self-sustaining native vegetation for any proposed road right-of-way contiguous to Core Environmental Features, consistent with Regional Official Plan policy 7.1.14. - Consider opportunities to integrate preparation of landscaping and planting plans with the overall corridor stormwater management plan (i.e. water quality control). - Minimize removal of existing trees. Where removal is unavoidable, a planting compensation plan should be considered.	- Alternative B4 was selected due to its reduced impact on natural environment areas, compared to the other alignments. - Route B4 Impacts are expected to be fringe/peripheral, as opposed to the bisecting/severing impacts of other alternatives, per MNRF correspondence.
1.8	Negative impacts to stormwater quantity and quality due to impervious road surface.	- Stormwater quality and quantity impacts due to the East Boundary Corridor will be addressed through roadside ditching, grade adjustments, construction of a forebay, as well as existing and future SWM facilities. - A detailed erosion and sedimentation control plan will be implemented in order to obtain required agency approvals. - Potential impacts to groundwater and surface water due to chlorides (i.e. road salt) to be considered through the Region’s Water Services division’s Curb The Salt program. Additional potential impacts to source water to be considered per the Region’s Source Protection Plan (SPP) – Clean Water Act	All stormwater collected from the East Boundary Road will be treated in accordance with applicable agency approvals. Monitoring of stormwater will be considered near adjacent sensitive environmental areas.

Table 9.1: Net Impacts and Mitigation - continued

NO.	POTENTIAL IMPACT	MITIGATION MEASURES	NET IMPACT
		requirements.	
2.0	Socio-Economic Environment		
2.1	Property required to implement recommended design	- For any property to be acquired as identified by the final approved detailed design, the owner would be compensated by the Region of Waterloo for the required land at fair market value, per Region Policy. An independent appraisal will be completed for the land based upon recent local sales to determine fair market value. - Any lands disturbed as a result of construction, such as with working/temporary easements, would be restored to their current state at minimum.	- Implementation of the recommended design may require obtaining easements during the construction period and the purchase of property. Refer to Figure 8.8 or Appendix M for preliminary property acquisition requirements. - More detailed property requirements will be identified during the detailed design stage of the study.
2.2	Potential reduction in air quality due to dust and/or emissions from construction equipment.	- Dust/debris control measures shall be undertaken to control roadway dust. Measures to be included in the construction plans may include, but not necessarily be limited to: - Application of water or non-chloride based compounds; - Soil and other material storage piles to be stabilized/covered to prevent wind and rain erosion; and/or - Fine particulate materials to be covered during transportation to and from the site. - Contractor to use new or well-maintained heavy equipment and machinery, fitted with fully functional emission control systems/ muffler/exhaust baffles and engine covers.	Construction air quality impacts are temporary in nature, but may be noticeable during typical working hours.
2.3	Potential noise impacts associated with construction activities.	- Construction should be limited to the time periods allowed by the locally applicable By-law/s. If construction activities are required outside of the hours, the Contractor must seek permits / exemptions directly from the City, Township, and/or Region in advance. - There should be explicit indication that Contractors are expected to comply with all applicable requirements of the contract and local Noise By-law/s. - All equipment should be properly maintained to limit noise emissions. As such, all construction equipment should be operated with effective muffling devices that are in good working order. - The Contract documents should contain a provision that any initial noise complaint will trigger verification that the general noise control measures agreed to be in effect. - In the presence of persistent noise complaints, all construction equipment should be verified to comply with (MOE/MECP) NPC-115 guidelines. - In the presence of persistent complaints and subject to the results of a field investigation, alternative noise control measures may be required, where reasonably available. In selecting appropriate noise control and mitigation measures, consideration should be given to the technical, administrative, and economic feasibility of the various alternatives. - Any blasting operations (if required) should be designed to meet any applicable overpressure and vibration limits established by the MOE/MECP in Publication NPC-119 and by the MTO in OPSS 120.	Construction noise impacts are temporary in nature, but may be noticeable during typical working hours at residential noise sensitive areas.
2.4	Future noise impacts resulting from increased traffic volumes.	A preliminary Noise Study undertaken for the recommended design (Appendix L) indicates that projected noise levels are predicted to be less than 5 dBA over the existing ambient levels and less than 65 dBA as the maximum threshold requiring mitigation considerations, with the exception of 980 Avenue Road.	- Based on the recommendations of the preliminary noise assessment study completed as part of the East Boundary Corridor EA Study Preliminary Design, no noise mitigation is warranted other than at 980 Avenue Road. - Application of noise mitigation measures will be further investigated during the detailed design phase of the study and will comply with Regional

Table 9.1: Net Impacts and Mitigation - continued

NO.	POTENTIAL IMPACT	MITIGATION MEASURES	NET IMPACT
			Noise Policy in effect at the time of construction.
2.5	Visual Impacts to nearby homes from roadway illumination.	- Roadway illumination requirements will be reviewed as part of detailed design and comply with the Region's Illumination Policy. As a minimum, illumination will be provided at intersections and potential hazard areas. - Modern LED roadway illumination has less light spill onto adjacent properties than traditional/historical roadway illumination and can be further mitigated by shields of the lamp heads.	Visual impacts to nearby homes from roadway illumination are expected to be negligible to minor.
3.0	Cultural Environment – Archaeological/Cultural Heritage		
3.1	Archaeological resource impacts associated with construction activities.	- A Stage 2 Archaeological assessment will be conducted by a licensed consultant archaeologist using the pedestrian survey method at 5m intervals in areas which have been recently ploughed and are in appropriate condition at the time of the survey (areas marked in orange in Figure 2.4). - A Stage 2 archaeological assessment will be conducted by a licensed archaeologist using the test pit survey method at 5m intervals in areas which have not recently been ploughed or do not have appropriate conditions for pedestrian survey at the time of the Stage 2 assessment (areas marked in green in Figure 2.4). - No further archaeological assessments are recommended for areas that are marked in red in Figure 2.4, as these areas are disturbed or have been previously subject to an archaeological assessment. - The Stage 2 archaeological assessment will follow the requirements set out in the 2011 Standards and Guidelines for Consultant Archaeologists (MTCS, 2011). - It is an offence to alter any archaeological site without MTCS concurrence. No grading or other activities that may result in the destruction or disturbance of an archaeological site are permitted until notice of MTCS approval has been received. - The following MTCS conditions also apply: - Should deeply buried archaeological remains be found during construction activities, the Heritage Operations Unit of the Ministry of Tourism, Culture and Sport should be immediately notified; and - In the event that human remains are encountered during construction, the proponent should immediately contact the Ontario Ministry of Tourism, Culture and Sport and the Registrar or Deputy Registrar of the Cemeteries Regulation Unit of the Ontario Ministry of Government Services, Consumer Protection Branch.	No negative impacts are anticipated, providing the recommendations of the Stage 1 Archaeological Assessment are undertaken (Appendix E).
3.2	Heritage Landscape and Built Heritage Resource impacts associated with construction activities.	- If the proposed alignment has a direct impact (i.e. removal) on any Designated or Listed Heritage Property, Principle no. 2 of the Ontario Ministry of Culture's <i>Eight Guiding Principles in the Conservation of Built Heritage Properties</i> (2007) is applicable: "Respect for the Original Location: Do not move buildings unless there is no other means to save them. Site is an integral component of a building or structure. Change in site diminishes cultural heritage value considerably." - If the proposed alignment has an indirect impact (i.e. encroachment, setting) on any Designated or Listed Heritage Property, the Provincial Policy Statement (2005) 2.6.3 is applicable: "Development and site alteration may be permitted on adjacent lands to protected heritage property where the proposed development and site alteration has been evaluated and it has been demonstrated that the heritage attributes of the protected heritage property will be conserved. Mitigative measures and/or alternative development approaches may be required in order to conserve the heritage attributes of the protected heritage property affected by the adjacent development or site alteration." - The proposed alignment of the East Boundary Road impacts the property at 1791 Dundas Street	- No negative impacts to cultural landscape or built heritage resources are anticipated from implementation of the preferred alignment and/or the implementation of the recommendations of: - Built Heritage and Cultural Landscape Assessment Report (Appendix D1); - Cultural Heritage Evaluation Report William McArthur House (Appendix D2); and - Documentation Report – Clyde Road Roadscape and the former Credit Valley Railway Corridor (Appendix D3).

Table 9.1: Net Impacts and Mitigation - continued

NO.	POTENTIAL IMPACT	MITIGATION MEASURES	NET IMPACT
		South (impacts property only and does not impact the actual building structures). As a Cultural Heritage Evaluation Report could not be completed for 1791 Dundas Street South (William McArthur House), the property should be evaluated against O. Reg. 9/06 and 10/06 prior to construction.	
4.0	Transportation Environment		
4.1	Potential disruption to vehicular traffic (travelling public and commercial vehicles).	• Traffic disruption on existing roads shall be minimized as much as possible during construction where the East Boundary Road intersects or impacts these roads; at least one lane (under the control of flag persons) shall remain open at all times on existing roads to maintain two-way traffic. • A Construction staging and traffic management plan will be developed during the detailed design phase of the project.	• Vehicles should expect minor delays in travel time on existing roads where construction of the new East Boundary Road intersects those roads.
4.2	Potential disruption to emergency response (i.e. ambulance, police, and fire) vehicles.	• Emergency services to be notified by contractor of construction – related activities and schedule to minimize/avoid delays during emergencies. • As above, maintaining two-way traffic at all times during construction is a Region Guideline. ○ Region work permits include notifications of impacts to Emergency Services prior to work commencing.	• Emergency response vehicles may experience negligible to minor delays in travel time during emergencies.
4.3	Potential disruption to transit services.	• GRT Transit to be notified of construction – related activities and schedule to minimize/avoid delays. • As above, maintaining two-way traffic at all times during construction is a Region Guideline. ○ Region work permits include notifications of impacts to GRT prior to work commencing.	• Transit vehicles should expect minor to moderate delays in travel time.
4.4	Potential disruption to pedestrians and cyclists.	• Safe passage shall be maintained on existing roads for existing pedestrian and cyclist facilities during construction.	• Pedestrian and cyclist safety will be maintained on existing roads during construction.
4.5	Bridge design opportunities to be considered prior to tendering and construction.	• Per Section 8.1.6.1, 8.1.6.2, and 8.1.6.3 of this Environmental Study Report, there are various design opportunities for each of the Moffat Creek, Mill Creek, and CP Rail Bridges for review during detailed design.	• The proposed bridge General Arrangement drawings should reviewed, for noted, and other, design opportunities during detailed design to ensure compliance with applicable codes and best practices at that time.

10.0 PUBLIC AND AGENCY CONSULTATION

10.1 Consultation with the Public and Review Agencies

Early and ongoing consultation with the public and agencies is a key feature of the environmental assessment planning process. Consultation is a two-way process between the proponent (Region of Waterloo) and interested stakeholders, which provides opportunities for information exchange and for those affected or interested parties to provide input into the project and process.

It is important to identify the various stakeholders and interested parties for a Class EA project. For this project they include:

The Proponent: It is important to keep all Departments and entities of the proponent (Region of Waterloo) aware of the study status and issues being addressed. Members of various Region of Waterloo Departments were members of the project team directing this project, and they in turn reviewed various issues with staff of other Divisions on issues that may be of concern. In addition, prior to all Public Consultation Centres (PCCs), members of the Region's Planning and Works Committee were advised of the issues being presented at the PCC via the respective PCC Information Packages. Final approval of the Recommended Design was also presented to both the Planning and Works Committee and Regional Council for approval.

The Public: This includes individual members of the public who may be affected or impacted by the project, including property owners, developers, residents, businesses, and special interest groups (e.g. cycling interests, community associations, etc.). A number of meetings were held with developers throughout the course of the study to update them on progress and to ensure details of the East Boundary Road 30% design did not unduly impact their proposed plans.

Review Agencies: Government Agencies that represent the policy positions of their respective departments, ministries, or authorities (e.g. Grand River Conservation Authority; Ministry of Natural Resources and Forestry; Ministry of Environment, Conservation and Parks; etc.). Also included in this group are other entities such as the Waterloo Region District School Board and the Waterloo Catholic District School Board.

Municipalities (other than the Proponent): The Regional Municipality is made up of a number of local municipalities. The Study Area has two Region of Waterloo Municipalities; the City of Cambridge and the Township of North Dumfries. In addition, the northeast portion of the East Boundary Road Pre-Project Scoping Report Study Area is located within the Township of Puslinch, which is located in the County of Wellington – outside the Region of Waterloo. Representatives of each of the listed municipalities were members of the East Boundary Road Project Team or were invited and kept current of issues discussed at the Project Team Meetings. In addition, several meetings were held with City of Cambridge staff to review and discuss issues relevant to their community.

The various Municipal Class Environmental Assessment schedules have different mandatory points of contact. Schedule C projects have (a minimum of) three (3) mandatory points of contact. The main points of contact for this study are summarized in the subsequent sections. In addition, information and notices etc. were posted on the Region of Waterloo website as part of the public

notification process. The link to the Region's website is https://www.regionofwaterloo.ca/en/living-here/resources/Documents/Future-Construction/DC_07299_InfoSheet_3.pdf.

10.2 Notice of Study Commencement

A Notice of Study Commencement was advertised on the following dates in the noted publications:

- Tuesday, February 26, 2013 – Waterloo Region Record and Cambridge Times;
- Wednesday, February 27, 2013 – Ayr News; and
- Friday, March 1, 2013 – Wellington Advertiser.

A copy of the Notice of Study Commencement was also mailed to property owners and residents identified as being in or within 200 metres of the Study Area. Staff of various agencies and other interest groups were also mailed copies of the Notice of Study Commencement.

A copy of the Notice of Study Commencement and mailing list is included in **Appendix H1**.

10.3 Public Consultation Centre No. 1

PCC No. 1 was held on April 3, 2014 at Holy Spirit Catholic Elementary School, 15 Gatehouse Drive, Cambridge, from 5:00 pm to 8:00 pm. Approximately 129 people signed in at PCC No. 1.

Notifications for PCC No. 1 were advertised in the Waterloo Region Record, Cambridge Times, Ayr News, and Wellington Advertiser. In addition, a PCC Notice was mailed to members of the public and agencies. The mailing list for PCC No. 1 consisted of property owners within 200 metres of the Study Area, as well as people who expressed an interest in the project as a result of the Notice of Study Commencement and others. In addition, PCC No.1 Notice Boards were placed at least one week prior to PCC No.1 on roadways adjacent to the Study Area.

Copies of the Notice of PCC No. 1, Information Package, Display Boards, advertisement, and sign-in sheets are contained in **Appendix H2**.

10.4 Public Consultation Centre No. 2

PCC No. 2 was held on December 9, 2015 at the Cambridge Golf Club, 1346 Clyde Road, Cambridge from 5:00 pm to 8:00 pm. Approximately 131 people signed in at PCC No. 2.

Notifications for PCC No. 2 were advertised in the Waterloo Region Record, Cambridge Times, Ayr News, and Wellington Advertiser. In addition, a PCC Notice was mailed to members of the public and agencies. The mailing list for PCC No. 2 consisted of property owners within 200 metres of the Study Area, as well as people who expressed an interest in the project as a result of the Notice of Study Commencement, at PCC No. 1, and others. In addition, PCC No. 2 Notice Boards were placed on roadways adjacent to the Study Area at least one week prior to PCC No. 2.

Copies of the Notice of PCC No. 2, Information Package, Display Boards, advertisement, and sign-in sheets are contained in **Appendix H3**.

10.5 Public Consultation Centre No. 3

PCC No. 3 was held on February 1, 2018 at the Cambridge Golf Club, 1346 Clyde Road, Cambridge from 5:00 pm to 8:00 pm. Approximately 133 people signed in at PCC No. 3.

Notifications for PCC No. 3 were advertised in the Waterloo Region Record, Cambridge Times, Ayr News, and Wellington Advertiser. In addition, a PCC Notice was mailed to members of the public and agencies. The mailing list for PCC No. 3 consisted of property owners within 200 metres of the Study Area, as well as people who expressed an interest in the project as a result of the Notice of Study Commencement, PCC No.'s. 1 and 2, and others. In addition, PCC No. 3 Notice Boards were placed on the adjacent roadways to the Study Area at least one week prior to PCC No. 3.

Copies of the Notice of PCC No. 3, Information Package, Display Boards, a compiled mailout list for all PCC's, advertisement, and sign-in sheets are contained in **Appendix H4**.

10.6 Region of Waterloo Planning and Works Committee and Council Approvals

10.6.1 Planning and Works Committee

After reviewing comments from the public and agencies following PCC No. 3, Region of Waterloo staff prepared a report making a recommendation regarding the East Boundary Road Class EA to the Planning and Works Committee – a standing Committee of Region of Waterloo Council - for the May 28, 2018 meeting. The recommendation read as follows:

“That the Regional Municipality of Waterloo take the following actions with respect to the Class Environmental Assessment for the East Boundary Road Corridor Study, in the City of Cambridge and Township of North Dumfries:

- a) Approve the Recommended Design Alternative for the proposed construction of an East Boundary Road from Dundas Street South (Highway 8) to Avenue Road/Gore Road as described in Report TES-DCS-18-11, dated May 29, 2018; and
- b) Direct staff to file the Notice of Completion with the Ministry of Environment and climate Change (MOECC) for this Class Environmental Assessment study and place the Environmental Study Report on the public record for a review period of 30 days.”

Staff Report TES-DCS-18-11 can be found in **Appendix I**. **Appendix I** also includes background information, the mailing list and notification letter sent to members of the public who requested to be on the mailing list. The Region's Planning and Works Committee approved the Recommendations of Report TES-DCS-18-11, to be considered by Region of Waterloo Council. Minutes from the May 29, 2018 Planning and Works Committee Meeting, as it relates to Staff Report TES-DCS-18-11, can be found in **Appendix I**.

10.6.2 Council

On June 6, 2018, Staff Report TES-DCS-18-11 was considered by Region of Waterloo Council. The relevant East Boundary Road Class EA recommendations contained in the June 6, 2018 Council Agenda is contained in **Appendix I**. Also included in **Appendix I** is the June 6, 2018 Council Minutes indicating that Region of Waterloo Council approved the recommendations of Staff Report TES-DCS-18-11.

10.7 Notice of Study Completion

In accordance with Region of Waterloo Council approval for the East Boundary Road project, the Environmental Study Report was completed and the Notice of Study Completion advertised during the week of **May 21–24, 2019** in the Waterloo Region Record, Cambridge Times, Ayr News, and Wellington Advertiser. The Notice of Study Completion can be found in **Appendix N**.

11.0 SUBMISSION OF ENVIRONMENTAL STUDY REPORT AND PART II ORDER REQUESTS

Hard copies of this Environmental Study Report (ESR) have been made available for the 30-day review period in the Clerk's offices in each of the Region of Waterloo, City of Cambridge, County of Wellington, and Township of North Dumfries' municipal offices. The ESR is also available for review on the Region of Waterloo's website at https://www.regionofwaterloo.ca/en/living-here/resources/Documents/Future-Construction/DC_07299_InfoSheet_3.pdf.

About Part II Orders - If you feel that significant outstanding issues have not been addressed in a Class Environmental Assessment process and could be better addressed through an Individual Environmental Assessment process, you can ask for a higher level of assessment. This is known as a Part II Order and anyone can make the request. A Part II Order request, should not be made in an effort to delay or stop the planning and implementation of a class environmental assessment project.

When to submit a Part II Order request - A Part II Order request can be made after the proponent issues the Notice of Study Completion and within the specified review period outlined in the notice. A Part II Order request should only be made when issues can't be resolved through:

- the class environmental assessment process;
- discussions with the proponent; and/or
- mediation.

How to make a Part II Order request - As of July 1, 2018, A Part II Order Request Form must be used to request a Part II Order.

To submit your Part II Order Request, download the Part II Order Request Form at <http://www.forms.ssb.gov.on.ca> and search for “Part II Order Request”. Complete the form and include the following information:

- name and address;
- project name;

- proponent name (i.e Region of Waterloo);
- specific reasons why the request is being made – e.g. concerns and issues;
- why a higher level of environmental assessment would address your concerns;
- information about efforts to date to discuss and resolve concerns with the proponent;
- the outcome you are seeking from the Minister; and
- other matters relevant to the request.

A request must:

- focus on potential environmental effects of the project or the class environmental assessment process;
- not focus on decisions outside the class environmental assessment process (e.g., land-use planning decisions made under the *Planning Act* or issues related to municipal decision-making about the process); and
- not raise issues unrelated to the project.

Unless otherwise stated in a request, any personal information provided will become part of the public record and will be released, if requested, to any person.

Where to send request – A completed Part II Order Request Form must be sent to the Minister of Environment, Conservation and Parks or delegate. You should also send a copy of the form to the Director of Environmental Assessment and Permissions Branch as well as the proponent:

Minister of the Environment, Conservation and Parks
 Ministry of the Environment, Conservation and Parks
 Floor 11
 77 Wellesley Street West
 Toronto ON M7A 2T5
Minister.mecp@ontario.ca

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

The Part II Order Request Form must also be sent to the Region of Waterloo (proponent) and their Consultant Project Manager:

Justin Armstrong, P.Eng.
 Senior Project Manager
 Regional Municipality of Waterloo
 150 Frederick Street, 6th Floor
 Kitchener, Ontario N2G 4J3
 Telephone: 519-575-4757, Ext. 3164
 Email: juarmstrong@regionofwaterloo.ca

Dave Hallman, P.Eng.
 Senior Project Manager
 MTE Consultants Inc.
 520 Bingemans Centre Drive
 Kitchener, ON N2B 3X9
 Telephone: 519-743-6500, Ext. 1336
 Email: dhallman@mte85.com

Timeline - Each class environmental assessment establishes timelines for the Ministry’s review of requests.

Minister’s Decision - Minister’s decisions on Part II Order requests are final. The minister has 4 options for a decision on a Part II Order request:

- refer the matter to mediation before making a decision;
- deny the request and inform the proponent and requester;
- deny the request but impose conditions; and/or
- require the proponent to comply with the Part II Order and prepare a terms of reference and individual environmental assessment.

If a request is denied, the proponent can implement the project subject to any conditions imposed.

If a request is granted, the proponent can begin preparing terms of reference for an individual environmental assessment, if they still wish to move ahead with the project.

Factors for Minister Making Decision

The Minister of the Environment, Conservation and Parks will consider the following when making a decision:

- purpose of the *Environmental Assessment Act*;
- factors suggesting the proposed project differs from other projects in the class to which the Class EA applies;
- significance of the factors, and of the differences mentioned above;
- any reasons given by the requester;
- proponent’s response to the request; and
- mediator’s report—if available.

The Minister will also consider:

- extent and nature of public concern;
- potential for significant adverse environmental effects;
- proponent’s consideration of alternatives;

- considerations of urgency;
- requester’s participation in the planning process;
- nature of the request;
- implications for matters of significant provincial interest; and
- degree to which public consultation and dispute resolution have taken place.

12.0 CONSTRUCTION COST ESTIMATE

A construction cost estimate has been prepared based on the recommended design for the East Boundary Road, reflected in the 30% (Preliminary) Design Drawings (**Appendix J**). The construction cost estimate was derived by calculating preliminary estimated quantities and multiplying them by projected 2019 costs determined at the time of writing of this report. The total estimated construction cost is estimated to be approximately \$59,000,000 as outlined in **Table 12.1**. It should be noted that actual final costs will be based on detailed design, construction timing and staging, detailed geotechnical studies that will determine bridge foundation, pavement structure, dewatering and (unsuitable) fill conditions and requirements, and various approval agency requirements, as applicable.

Table 12.1 has been prepared under the following assumptions and conditions:

- Geotechnical Investigation must be completed to confirm soil conditions for bridge foundations, road sub-base, and potential dewatering & sub-excavation;
- Grading quantities (Item 1.0) assumes 150mm of topsoil (avg.) is required to be removed. 110,000 cm of cut material from road and SWM ponds is available for fill for road;
- Grading quantities (Item 1.0) are total quantities for entire length of East Boundary Road. Construction staging will impact cut/fill balance for each construction stage.
- Construction costs are estimated based on 2019 construction prices;
- The total road construction cost estimate has been updated since PCC#3 (\$58.8M); and
- Estimate does not include specific utility relocation costs at intersections of current existing streets.

Table 12.1: East Boundary Road - Estimated Construction Cost

	Road Construction Cost				
Item No.		Unit	Est. Qnty.	Unit Price	Total Estimated Cost
1.0	Area Grading to Road Subgrade				
1.1	Excavation (material) from road and SWM Ponds to be placed in fill areas	m ³	110,000	\$10	\$1,100,000
1.2	Import fill material from off site	m ³	415,000	\$18	\$7,470,000
1.3	Excavate and stockpile topsoil	m ³	38,000	\$6	\$228,000
2.0	Roadway Granular Base				
2.1	Granular B - 450mm depth (0.3m outside of back of curb)	Tonne	130,000	\$15	\$1,950,000
2.2	Granular A - 150mm depth	Tonne	40,000	\$18	\$720,000
3.0	Install Concrete Curb and Gutter				
3.1	500mm Curb and Gutter OPSD 600.040	m	22,000	\$60	\$1,320,000
3.2	700mm Semi-mountable Curb OPSD 600.020	m	500	\$70	\$35,000
3.3	250mm Narrow Curb and Gutter OPSD 600.080	m	1,100	\$65	\$71,500
4.0	Asphalt Pavement				
4.1	SP19.0 - 100mm thick	Tonne	20,000	\$100	\$2,000,000
4.2	SP12.5 - 50mm thick	Tonne	10,000	\$130	\$1,300,000
5.0	Multi-use Trail, Concrete Aprons in Roundabouts				
5.1	Multi-use Trail - 3.0m wide, 50mm HL4 and 40mm HL3-F	m ²	27,600	\$60	\$1,656,000
5.2	Coloured impressed concrete apron in Roundabout	m ²	2,000	\$100	\$200,000
6.0	Storm Sewer - Pipe				
6.1	300mm dia. storm sewer	m	370	\$280	\$103,600
6.2	375mm dia. storm sewer	m	6,750	\$320	\$2,160,000
6.3	450mm dia. storm sewer	m	1,050	\$390	\$409,500
6.4	525mm dia. storm sewer	m	520	\$440	\$228,800
6.5	600mm dia. storm sewer	m	1,020	\$540	\$550,800
6.6	675mm dia. storm sewer	m	144	\$620	\$89,280
6.7	750mm dia. storm sewer	m	170	\$680	\$115,600
6.8	900mm dia. storm sewer	m	370	\$720	\$266,400
6.9	1050mm dia. storm sewer	m	40	\$900	\$36,000
7.0	Storm Sewer Structures and Leads				
7.1	1200mm Dia. storm CBMH	each	2	\$4,500	\$9,000
7.2	1500mm Dia. storm CBMH	each	1	\$6,000	\$6,000
7.3	1200mm Dia. storm DCBMH	each	1	\$4,500	\$4,500
7.4	1200mm Dia. storm SICBMH	each	56	\$4,500	\$252,000
7.5	1500mm Dia. storm SICBMH	each	12	\$6,000	\$72,000
7.6	1800mm Dia. storm SICBMH	each	1	\$7,200	\$7,200
7.7	2400mm Dia. storm SICBMH	each	1	\$8,000	\$8,000
7.8	1500mm Dia. storm SIDCBMH	each	8	\$6,000	\$48,000

	Road Construction Cost				
Item No.		Unit	Est Qty	Unit Price	Total Estimated Cost
7.9	1200mm Dia. storm OGS	each	1	\$8,000	\$8,000
7.10	Headwall	each	5	\$8,000	\$40,000
7.11	600x600mm Concrete Catch Basin	each	5	\$2,200	\$11,000
7.12	600x600mm Concrete Side Inlet Catch Basin	each	61	\$2,200	\$134,200
7.13	450x600mm Concrete Double Side Inlet Catch Basin	each	6	\$3,200	\$19,200
7.14	300mm dia. storm lead to CB	m	1,600	\$280	\$448,000
7.15	100mm dia. perforated subdrain c/w filter fabric sock	m	10,950	\$21	\$229,950
8.0	Stormwater Management (SWM) Facilities				
8.1	SWM Pond 1	ha.	0.36	\$1,200,000	\$432,000
8.2	SWM Pond 2	ha.	0.54	\$1,200,000	\$648,000
8.3	SWM Pond 3	ha.	1.26	\$950,000	\$1,197,000
8.4	SWM Pond 4	ha.	0.37	\$1,200,000	\$444,000
8.5	SWM Pond 5A	ha.	0.24	\$1,200,000	\$288,000
8.6	SWM Pond 5B	ha.	0.47	\$1,200,000	\$564,000
9.0	Bridges				
9.1	Moffat Creek	each	1	\$2,500,000	\$2,500,000
9.2	CP Rail	each	1	\$4,750,000	\$4,750,000
9.3	Mill Creek	each	1	\$8,600,000	\$8,600,000
9.4	Allowance for culverts	L.S.	1	\$1,000,000	\$1,000,000
10.0	Landscaping				
10.1	Median Island- 150mm topsoil c/w seed and mulch	m ²	19,900	\$9	\$179,100
10.2	Boulevards and restoration - 150mm topsoil c/w seed and mulch	m ²	66,430	\$9	\$597,870
10.3	Roundabout central island - 150mm topsoil c/w seed and mulch	m ²	2,540	\$25	\$63,500
10.4	Landscaping/Tree allowance (Approx. 2%)	L.S.	1	\$1,200,000	\$1,200,000
11.0	Streetlighting				
11.1	Supply and Install 50mm dia. Conduit & wiring	m	10000	\$30	\$300,000
11.2	Supply & Install 32.5' concrete streetlight poles along 4600m	each	230	\$3,500	\$805,000
11.3	Supply & Install 32.5' concrete streetlight poles in (4) Roundabout	each	32	\$3,500	\$112,000
11.4	Supply/Install 8' mast and 150W HPS luminaries - 1 per pole	each	230	\$1,750	\$402,500
12.0	Property Acquisition				
12.1	Road Allowance and temporary easements	ha.	20.51	\$70,000	\$1,435,700
12.2	SWM Ponds	ha.	3.26	\$70,000	\$228,200
13.0	Contingency for miscellaneous (guiderail, noise barrier, environmental remediation, etc.) and unforeseen items (soil remediation, fencing etc.)	L.S.	1	\$10,000,000	\$10,000,000
	Total Road Construction Cost				\$59,054,400