



Environmental Study Report

Wyecroft Road Improvements from Bronte Road to Kerr Street

Submitted to Town of Oakville
by IBI Group
January 2020

Wycroft Road Improvements Bronte Road to Kerr Street

Municipal Class Environmental Assessment



Prepared for Town of Oakville
by IBI Group
January 2020

EXECUTIVE SUMMARY

1 Introduction

The Town of Oakville is studying ways to improve Wycroft Road and a portion of South Service Road West from Bronte Road to Kerr Street. The diverse nature of the 6.4 kilometre study area provided a challenging background for the study and required the development of multiple context sensitive designs to adequately address the needs of the specific segments throughout the corridor.

An environmental assessment was initiated to study potential solutions to improve the corridor. The improvements are required to meet the needs of the Town to 2041, including satisfying travel demand to and across the study area and supporting the Town's vision. The Town retained IBI Group in March 2018 to undertake the Class Environmental Assessment Schedule 'C' to develop and evaluate the improvements.

The study was influenced by the exciting opportunities to support growth in the area, such as the planned intensification within the Major Transit Station Area surrounding the Bronte GO Station, and constraints including the Queen Elizabeth Way and Fourteen Mile Creek. This Environmental Study Report documents the study from its initiation through to the development of the recommended design.

The study area, as shown in **Exhibit ES – 1**, is designated as a Multi-purpose Arterial in the Town's Official Plan, the Livable Oakville Plan. The study area includes intersections with Bronte Road and with Dorval Drive, which are under the jurisdiction of Halton Region and are not being assessed for improvements. The study area was divided into three segments for the purpose of evaluating planning and design alternatives due to the varied nature of the corridor.

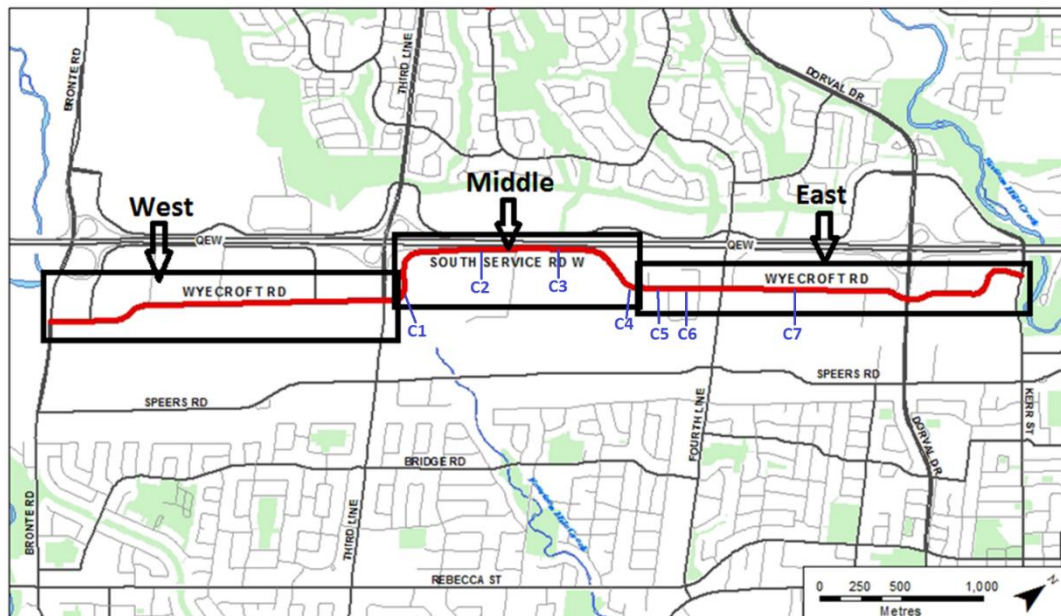
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Exhibit ES – 1: Study Area



This Class EA study is supported by the Region of Halton Official Plan, the Livable Oakville Plan and the Town's Active Transportation Master Plan, among other policies and previously completed studies. An overview of the relevant documents is provided in Section 1 of the Environmental Study Report.

Most relevant is the Livable Oakville Plan (2009), which promotes providing mobility choices through the development of a network of complete streets.

Study Process

As previously mentioned, this environmental assessment is being conducted as a Schedule 'C' Class (under the Ontario *Environmental Assessment Act*).

Exhibit ES – 2 illustrates the five-phase planning process that the study followed. This Environmental Study Report is part of Phase 4 of the process.

Phase 5, Implementation, is the next step, after the completion of the Environmental Study Report and a 30-day public review period. Phase 5 is outside the scope of this study.

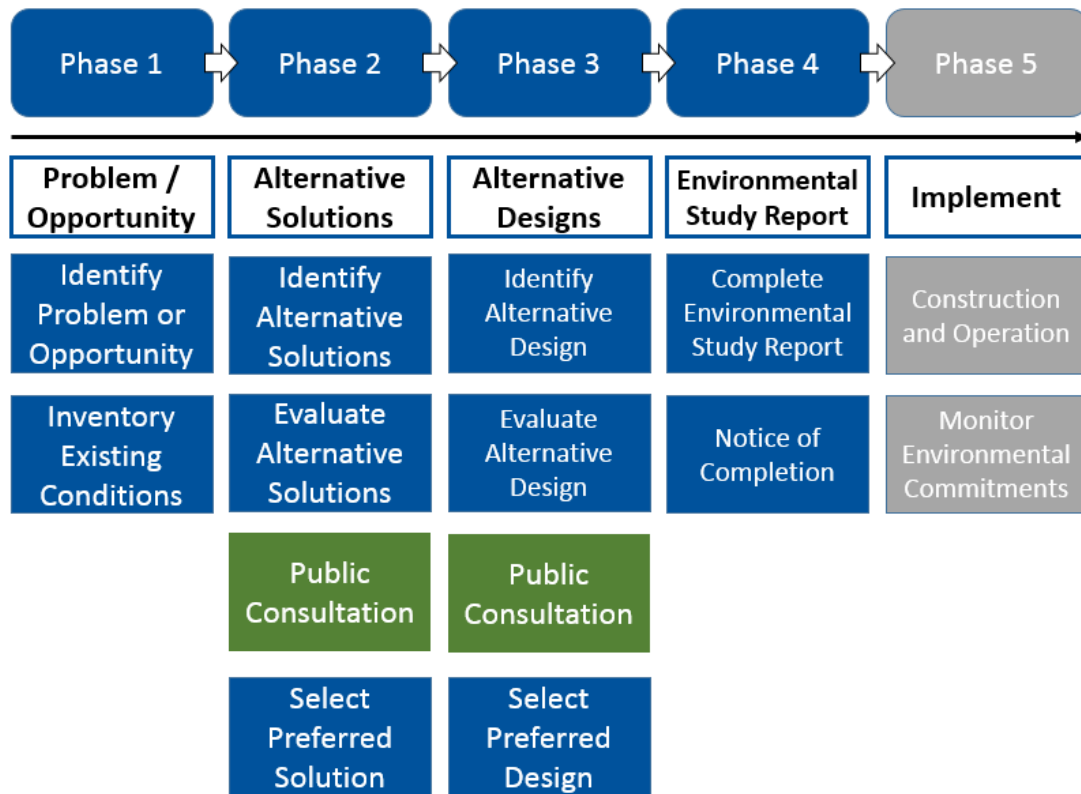
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Exhibit ES – 2: Municipal Class Environmental Assessment Process



Part II Order Request Process

Members of the public, interest groups or technical agencies may submit a Part II Order request to the Ontario Minister of the Environment, Conservation and Parks. The request must outline why the requestor believes that a proponent should comply with Part II of the Environmental Assessment Act and complete an Individual Environmental Assessment for the proposed undertaking. The Minister of the Environment, Conservation and Parks then decides whether to deny the request, refer the matter to mediation, or require the proponent to comply with Part II of the Environmental Assessment Act. Further details on the process are available on the MECP website (<https://www.ontario.ca/page/class-environmental-assessments-part-ii-order>).

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2 Problem and Opportunity Statement

A problem and opportunity statement was developed based on the needs identified in previous studies. Other challenges and considerations for the future were identified by the Town's project team. The following problem and opportunity statement guided this study:

Wycroft Road and South Service Road between Bronte Road and Kerr Street is a multi-purpose arterial that connects existing employment lands to Regional roads and the QEW. Corridor improvements are required to meet the needs of the town to 2041 and support future population and employment growth.

Providing appropriate infrastructure will encourage active transportation (walking, cycling) and transit, in an attractive and safe way, in support of the Town's vision to be the most livable town in Canada.

Corridor improvements are required that:

- *Integrate planned facilities for pedestrians, cyclists, and transit with regard for the movement of trucks and general traffic*
- *Optimize traffic operations to increase capacity, improve safety, and manage local access*
- *Protect or improve the natural environment, including existing watercourse crossings, treescape and natural areas*
- *Maintain existing access during construction and protect for future land uses and access*

This statement guided the development and evaluation of alternative planning solutions and alternative designs to select the recommended design.

3 Existing Conditions

Existing conditions were inventoried to provide a baseline for the study area. The existing natural environment, cultural environment and built environment conditions, including utilities and structures, are documented in Section 3 of the Environmental Study Report.

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4 Transportation

Existing traffic conditions and road safety concerns within the corridor were reviewed to provide a baseline for the transportation analysis. Future traffic conditions were projected for 2031 and a sensitivity analysis that tested the proposed improvements with projected traffic volumes in 2041 was completed. The following sections summarize the key components of the transportation analysis, which is provided in Section 4 of the Environmental Study Report.

Existing Traffic Conditions

Existing traffic operations are generally acceptable along Wycroft Road and South Service Road West, however six traffic operation issues were identified:

- At the Bronte Road intersection, turning movements are near capacity, limiting potential to accommodate development-related traffic growth. Queues from the Queen Elizabeth Way on-ramp intersection on Bronte Road have the potential to extend south to the intersection with Wycroft Road;
- Around the Bronte GO Station, traffic operations are characterized by sharp peaks in traffic volumes related to train arrivals and departures;
- At the Third Line intersection, long queues form for the southbound right-turn in the a.m. peak hour. In the p.m. peak hour, the opposite movement of eastbound left-turn has higher demands;
- Between Bronte Road and Third Line, there is a high frequency of driveways;
- The intersection with South Service Road #4 is close to the intersection of Dorval Drive. Queues for the eastbound left-turn extend past this intersection, adding to congestion and creating safety concerns. The driveway at 690-710 Dorval Drive adds conflict points with westbound left-turning traffic, adding to congestion and safety concerns; and,
- Speeding is a concern, with 85th percentile speeds generally more than 10 km/h above the posted speed limit throughout the study area.

Each of these issues are further explained in Section 4 of the Environmental Study Report.

Road Safety Review

Collision data from 2007 to 2017 was analysed to gain an understanding of existing trends and interactions between users along the study corridor.

The four main safety concerns identified along the corridor include:

1. Conflict points at driveways in the west and east segments of the study area;

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2. Traffic congestion and queuing at signalized intersections, particularly Bronte Road, Third Line and Dorval Drive;
3. Reverse horizontal curves, particularly east of Third Line; and
4. High operating speeds throughout the study corridor, with the highest speeds found between Third Line and Progress Court.

Five locations have a higher recorded frequency of collisions: east of Bronte Road, around and east of Third Line, around Fourth Line, around Dorval Drive, and west of Kerr Street. Each of these locations are further assessed in Section 4 of the Environmental Study Report.

2031 Future Traffic Conditions

To determine the future need for improvements and lane requirements, traffic volumes were projected to 2031.

Two major projects will have the most influence on traffic conditions in 2031: the extension of Wycroft Road west over Bronte Creek, and the proposed intensification near the Bronte GO Major Transit Station Area. The traffic generated from these projects was considered in addition to the background growth for the corridor.

Based on the future projections, if no improvements are made to the study area, the following is expected:

- In the west segment, future demand will exceed the capacity of the existing infrastructure.
- In the middle segment, traffic will operate well. However, the intersection of Wycroft Road and Third Line will be over capacity.
- In the east segment, future demand will approach capacity of the Dorval Drive intersection. The operation of the Dorval Drive intersection is complicated by the intersection of South Service Road West just 70 metres to the west. Improvements to this Regional road intersection is outside the scope of this environmental assessment. Overall, the east segment will operate well with a single lane per direction.

2041 Sensitivity Analysis

A sensitivity analysis was completed for 2041 traffic volume projections with full development of the Bronte GO Major Transit Station Area and annual background growth.

Overall, the sensitivity analysis shows that the mid-block demand is well served in 2041 with 4-lanes from Bronte Road to Third Line, and 2-lanes from Third Line to Kerr Street. However, some intersections may require additional improvements to operate within acceptable parameters.

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The sensitivity analysis illustrates that the full potential development of the Bronte GO Major Transit Station Area will require strategic improvements.

The proposed density should be coupled with increased non-auto mode share and additional capacity of several intersections and north-south roads, particularly Bronte Road and Third Line. It is recommended that the Town consider the broader transportation network needs to support the Major Transit Station Area through the completion of a separate transportation study.

5 Development and Evaluation of Planning Solutions

Seven planning solutions were considered to improve Wycroft Road and South Service Road West.

Each of the planning solutions were evaluated against a number of criteria, grouped into five themes: transportation, social environment, natural environment, technical, and cost. The full criteria are provided in Section 5.

Due to the varying land use and natural environment conditions, the study area was divided into three segments for the evaluation: west (Bronte Road to Fourteen Mile Creek), middle (Fourteen Mile Creek to 1146 South Service Road West), and east (1146 South Service Road West to Kerr Street) (**Exhibit ES – 1**).

The technically recommended planning solution for the three segments was to improve infrastructure for all modes. This solution was presented at Public Information Centre #1 in November, 2018, and was confirmed as the preferred planning solution based on feedback received from the public.

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6 Development and Evaluation of Design Alternatives

Design alternatives were developed for the three segments based on the preferred planning solution: infrastructure improvements for all modes.

The design alternatives were evaluated against the same criteria used to evaluate the alternative planning solutions, described in Section 5. The following sections outline the design alternatives and the results of the evaluation, by segment.

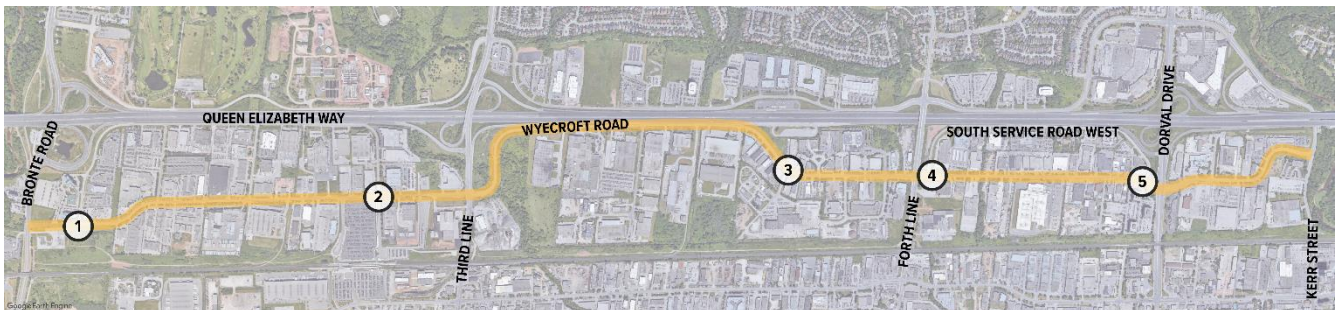
Corridor-wide Roundabout Screening

Roundabouts were considered in five locations, as shown in **Exhibit ES – 3**:

1. South Service Road West #1
2. South Service Road West #2 and Bronte GO Station Entrance
3. 1140 South Service Road (Central Operations Depot)
4. South Service Road West #3
5. South Service Road West #4

No intersections were carried forward for conversion to a roundabout based on an evaluation at each location.

Exhibit ES – 3: Corridor-wide Roundabout Screening



Active Transportation

A variety of active transportation design alternatives were developed to provide appropriate facilities for cyclists and pedestrians. Different alternatives were carried forward for each segment to reflect existing and future conditions.

West Segment

Two active transportation design alternatives were evaluated:

1. Multi-use Trail on south side, sidewalk on north side, no on road bike lanes; and,
2. Multi-use Trail on south side, sidewalk on north side, buffered bike lanes in both directions.

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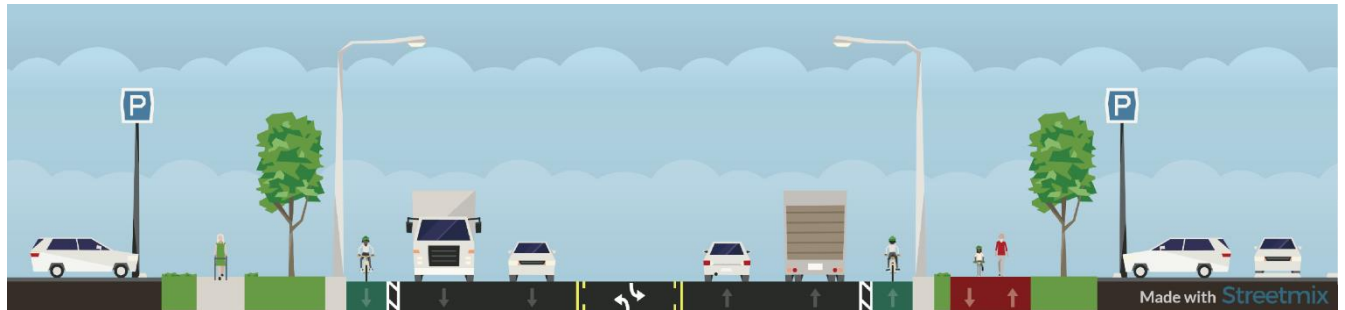
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Design alternative two was carried forward as the technically preferred alternative (**Exhibit ES – 4**). Providing a range of active transportation infrastructure will best support the proposed intensification surrounding the Bronte GO Major Transit Station Area. During detail design, the appropriate buffer treatment will be confirmed, such as pavement markings, and may also include a physical buffer such as curbs or bollards.

Exhibit ES – 4: West Segment – Technically Preferred Active Transportation Alternative



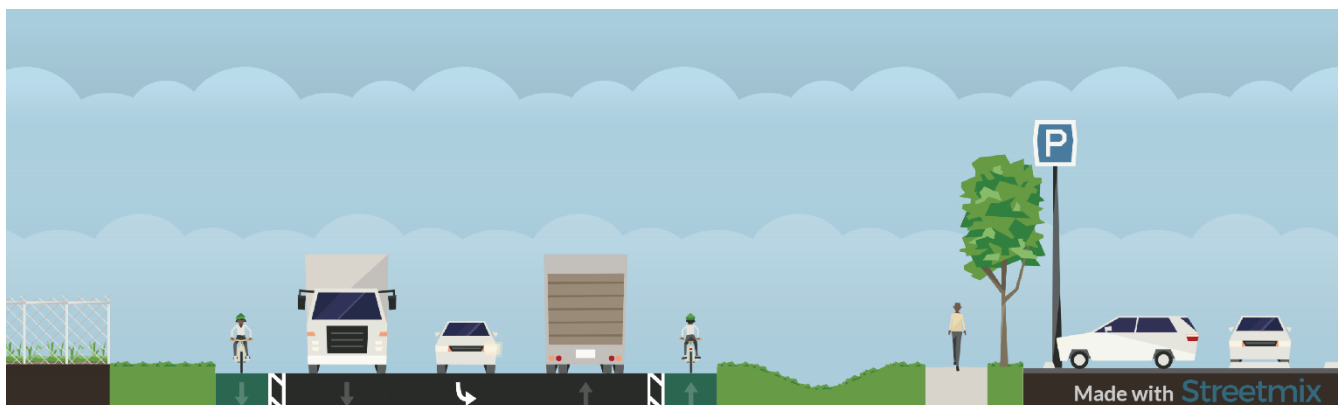
Middle Segment

Three active transportation design alternatives were evaluated:

1. Buffered bike lanes on both sides and sidewalk on the south side;
2. Cycle track on both sides and a sidewalk on the south side; and,
3. Multi-use Trail on the south side, no on road bike lanes.

Design alternative one was carried forward as the technically preferred alternative (**Exhibit ES – 5**). As part of the design, concrete pads will be added for two transit stops on the north side of South Service Road West. This design respects the presence of the QEW on the north side and provides continuous cycling infrastructure.

Exhibit ES – 5: Middle Segment – Technically Preferred Active Transportation Alternative



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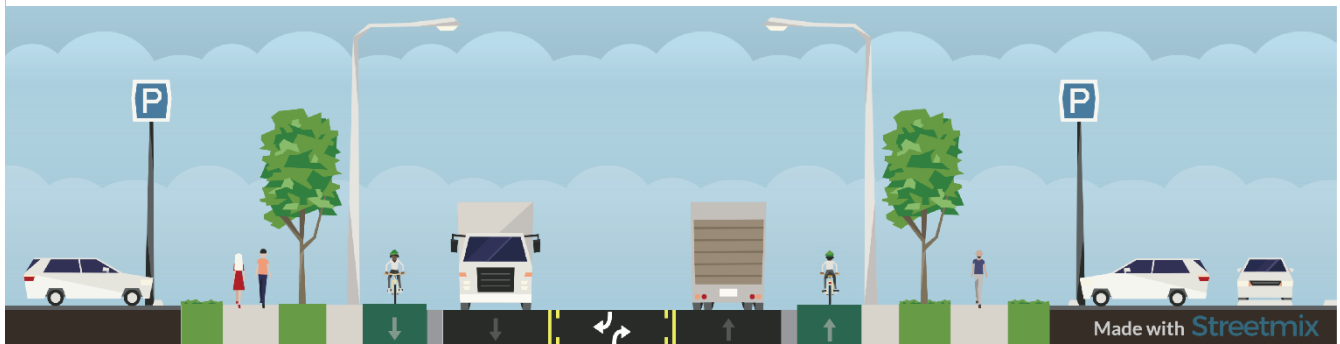
East Segment

Two active transportation design alternatives were evaluated.

1. Buffered bike lanes and sidewalk on both sides; and,
2. Cycle track and sidewalks on both sides.

Design alternative one was carried forward as the technically preferred alternative (**Exhibit ES – 6**). This design supports existing and future land uses on both sides and provides continuous cycling infrastructure.

Exhibit ES – 6: East Segment – Technically Preferred Active Transportation Alternative



South Service Road West Realignment

An alternate alignment was evaluated for South Service Road West, east of Fourteen Mile Creek. Design alternative one proposes to realign South Service Road West, east of Third Line, to increase the radius of the existing curves in response to road safety concerns. Realigning South Service Road West was carried forward as the technically preferred alternative.

South Service Road West #4

Five design alternatives were considered to improve traffic and road safety concerns at the intersection of South Service Road West #4 and Wycroft Road (**Exhibit ES – 7**):

1. Convert the intersection to right-in right-out by extending the existing median by approximately 45 metres west;
2. Realign South Service Road West to align with Weller Court, with a cul-de-sac at the existing intersection to maintain driveway accesses;
3. New north-south road between Fourth Line and Dorval Drive, west of Weller Court, with a cul-de-sac at South Service Road West to maintain driveway accesses;
4. Convert the intersection to right-in right-out plus a roundabout at Oakville Transit to facilitate U-turns; and,
5. Close the intersection of South Service Road West #4 with a cul-de-sac.

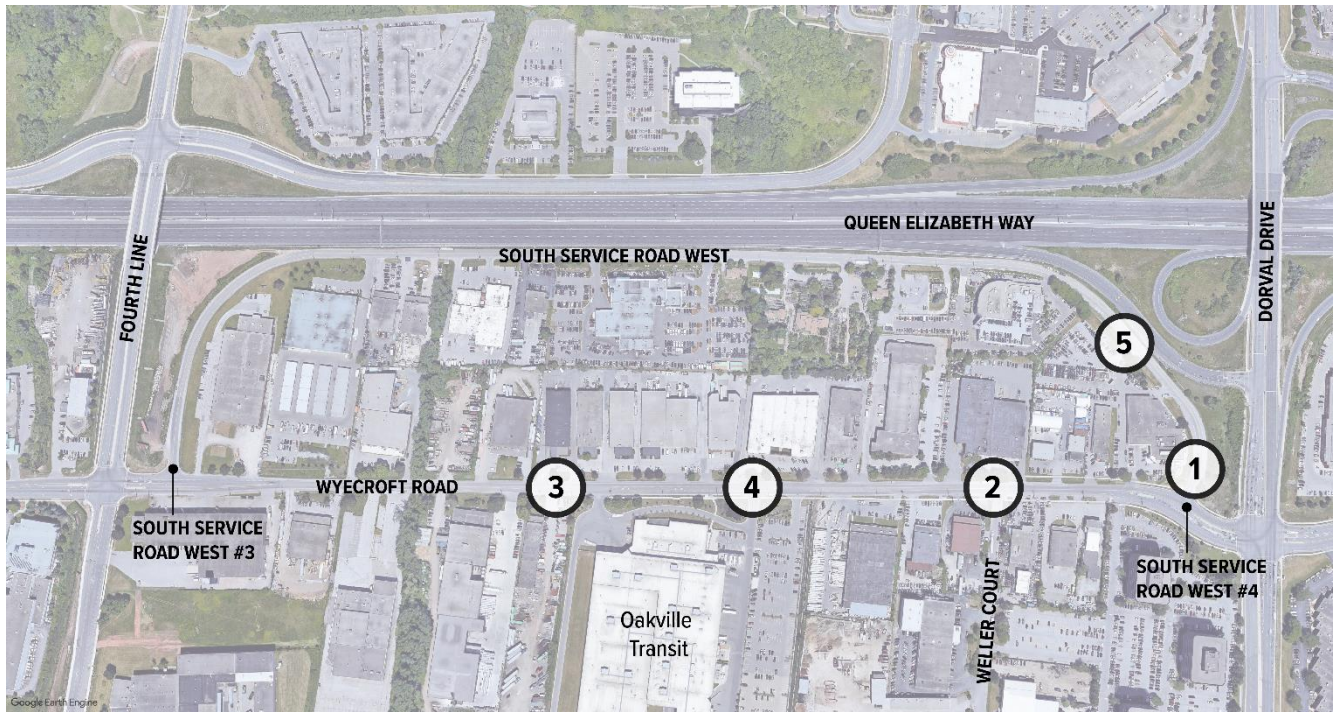
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Exhibit ES – 7: South Service Road West #4 Design Alternatives



Design alternative one was carried forward as the technically preferred alternative.

Technically Preferred Design

The technically preferred design was presented to members of the Business Owner Working Group, the Technical Agency Committee, and the public at Public Information Centre #2, held June 2019. Based on the feedback received, the technically preferred design was confirmed as the recommended design concept.

7 Recommended Design Concept

The preliminary design of Wycroft Road and a portion of South Service Road West meets the needs of the Town to 2041 and supports future population and employment growth.

The recommended design concept was developed with special attention to active transportation and transportation safety, as well as improvements for general vehicle traffic. Providing appropriate infrastructure will encourage active transportation and transit. Key elements of the recommended design are detailed by segment below:

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West

The recommended design includes widening to four lanes (two in each direction) with a centre two-way left-turn lane. Other design elements include:

- 1.8 metre sidewalk and 1.5 buffered bike lane on the north side;
- 3.0 metre Multi-use Trail and 1.5 buffered bike lane on the south side;
- Street trees on both sides; and,
- An urban cross-section.

Other recommendations in the west segment include:

- A traffic signal at the Bronte GO Station bus loop for transit priority in coordination with Metrolinx plans for the Bronte GO bus loop; and,
- Intersection improvements such as turn lanes at Pacific Road and Third Line.

The ultimate right-of-way is required to implement the design in the west segment.

Middle

The recommended design includes maintaining one lane in each direction. At Progress Court, a westbound left-turn lane is proposed. The design proposes to realign South Service Road West, east of Third Line, to increase the radius of the existing curves in response to road safety concerns. Other design elements include:

- 1.8 metre sidewalk on the south side;
- 1.5 metre buffered bike lane on both sides;
- Street trees on the south side; and,
- A semi-urban cross-section maintaining some sections of existing ditches.

Other recommendations in the middle segment include:

- A signal at Progress Court to improve pedestrian access to transit, influence driver speed, and manage conflicts with turning traffic; and,
- A posted speed limit reduction from 60 km/h to 50 km/h.

Some property is required to implement the design in the middle segment, but less than the ultimate right-of-way.

East

The recommended design includes maintaining one lane in each direction with a centre two-way left-turn lane, or dedicated left-turn lanes, as appropriate. Other design elements include:

- 1.8 metre sidewalk on both sides;

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- 1.5 metre buffered bike lane on both sides;
- Street trees on both sides; and,
- An urban cross-section.

Other recommendations in the east segment include:

- Intersection median extensions east and west of Dorval Drive to discourage unsafe U-turns and left-turns; and,
- Protecting for a future traffic signal at the Kerr Street intersection, subject to traffic signal warrant and sightline review in detail design.

Some property is required to implement the design in the east segment, but less than the ultimate right-of-way.

Structures and Culverts

To improve hydraulic capacity and infrastructure lifespans, rehabilitation or replacement is recommended for five of the seven structures, as summarized in **Exhibit ES - 8**. Extensions at two culverts will be required to accommodate the recommended design.

Exhibit ES - 8: Structure and Culvert Recommendations

Culvert #	Location	Notes
C1 Fourteen Mile Creek	Just east of Third Line	Replacement
C2 Drainage feature	175 m west of Progress Court	Extension in coordination with MTO
C3 Upper McCraney Creek	270 m east of Progress Court	Extension in coordination with MTO
C4 Drainage feature	160 m west of Cranberry Court	Rehabilitation and extension
C5 Drainage feature	Just east of Cranberry Court	Replacement
C6 Taplow Creek	Just west of Fourth Line	Rehabilitation and extension
C7 Glen Oak Creek	310 m east of Fourth Line	Replacement

Utilities and Illumination

Utilities

Due to the proposed improvements, which include road widening, relocation and/or protection of various utilities will be required. Utility companies will continue to be consulted as the design progresses.

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Illumination

Throughout the corridor, street lights will be installed and/or relocated in accordance with the Town's standards. Street lights will be located on new and/or relocated hydro poles, or standalone direct buried concrete poles where appropriate. Lights are to be arranged in a staggered configuration, except on South Service Road West from the area adjacent to the Queen Elizabeth Way to Redwood Square where lights will be placed on the south side only.

Property Impacts

In the west and east segments, property is required on both the north and south side of Wycroft Road to implement the recommended design, as shown in Appendix M. In the middle segment, the realignment of South Service Road West, east of Third Line, requires approximately 25,000 m² of property from 1450 South Service Road West.

Capital Cost

The preliminary cost estimate to implement the design from Bronte Road to Kerr Street is approximately \$42 million, excluding property acquisition and taxes. The cost estimate includes a 15% contingency. A capital cost estimate is provided for each segment in Section 7 of the Environmental Study Report.

8 Public, Agency and Stakeholder Consultation and Indigenous Community Engagement

Consultation was conducted over the duration of the study in an effort to engage the public, businesses, agencies, stakeholders and Indigenous communities. Details are provided in Section 8 of the Environmental Study Report and Appendix A.

Public Consultation

The public was invited to attend two Public Information Centres (PIC): PIC #1, held November 28, 2018, and PIC #2, held June 13, 2019.

Both events were advertised through the following methods:

- Notice of PIC mailed to property owners within 300 m;
- Notice of PIC emailed to project mailing list;
- Advertisement in the Oakville Beaver; and,
- Signs with event information located at a minimum of three locations within the corridor.

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A total of 13 members of the public signed-in at PIC #1. Overall, attendees were generally supportive of improving road safety and the inclusion of active transportation facilities, and noted increasing congestion in the corridor.

A total of 12 members of the public signed-in at PIC #2. Overall, attendees were generally supportive of the technically preferred design. Suggestions to improve concerns related to access and goods movement were received.

Technical Agency Committee

A Technical Agency Committee (TAC) was formed to effectively consult with agencies with approvals and/or a direct interest in the project. The TAC included members from provincial, regional and municipal levels of government, conservation authorities and utilities.

Two TAC meetings were held: TAC #1 on August 16, 2018, and TAC #2 on April 29, 2019. Attendees provided information related to on-going studies within their jurisdiction and suggested coordination with future improvement projects.

Business Owner Working Group

A Business Owner Working Group was established to help the project team better understand the needs of the businesses within the study area.

Businesses who have previously shown an interest in the study, and are in proximity to the study area of Wycroft Road including South Service Road West from Bronte Road to Kerr Street, were invited to join.

The Business Owner Working Group meeting was held on April 8, 2019. Eight individuals representing eight businesses in the study area attended. Attendees were asked to share insights on issues and opportunities that exist in the corridor and were invited to comment on preliminary design concepts for the three segments. Attendees noted increasing congestion and existing road safety concerns within the corridor. Overall, support was received for the technically preferred design, as it was thought to improve business access and address existing road safety concerns.

Indigenous Community Engagement

The Environmental Assessment and Permissions Branch of the Ministry of the Environment, Conservation and Parks was requested to identify which Indigenous communities might have an interest in the project.

The Indigenous communities that were identified as having potential interest were contacted by Town of Oakville at the project's commencement. Indigenous communities were also informed of both Public Information Centres through mailed letters.

Indigenous communities expressed interest in the archaeological and natural environment components of the study. Prior to study completion, reports were provided to those who had requested copies.

9 Environmental Impacts and Mitigation Measures

Overall, the project is expected to create a net benefit to the environment. The improvements are not expected to result in impacts to any significant or rare natural environmental features, or species at risk. Further, no cultural heritage, air quality or noise and vibration impacts are anticipated.

Generally, the natural environment impacts are considered minor and are limited to Fourteen Mile Creek and the realignment of South Service Road West. The replacement of three of the existing culverts provides an opportunity to increase hydraulic capacity and provide opportunities to improve wildlife mobility and habitat linkage and to remove fish barriers within the culverts.

The proposed improvements would result in the provision of continuous active transportation facilities, which provides the public with more choice for sustainable modes of transportation.

Section 9 of the Environmental Study Report documents the potential impacts and proposes mitigation measures to limit adverse effects to the environment.

10 Permits, Approvals and Commitments to Future Work

Various permits and approvals are required as the project proceeds to detail design and implementation, such as permits under the Endangered Species Act (2007) for works at Fourteen Mile Creek. These requirements are outlined in Section 10 of the Environmental Study Report. Section 10 also outlines commitments to future work to be completed during detail design, construction and/or post-construction. Examples of such commitments include coordinating construction with infrastructure improvements planned by Halton Region and MTO, among other commitments.

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List of Acronyms

ATMP – Active Transportation Master Plan

CH – Conservation Halton

CSPA – Corrugated Steel Pipe Arch

DFO – Department of Fisheries and
Oceans Canada

EA – Environmental Assessment

ESA – Endangered Species Act

ESR – Environmental Study Report

GGH – Greater Golden Horseshoe

GO – Government of Ontario

LID – Low Impact Development

LIO – Land Information Ontario

MBCA – Migratory Bird Convention Act

MECP – Ministry of Environment,
Conservation and Parks

MNRF – Ministry of Natural Resources and
Forestry

MTO – Ministry of Transportation Ontario

MTSA – Major Transit Station Area

NHIC – Natural Heritage Information
Centre

OP – Official Plan

OPA – Official Plan Amendment

OR – Openness Ratio

PIC – Public Information Centre

PPS – Provincial Policy Statement

QEW – Queen Elizabeth Way

ROP – Regional Official Plan

ROW – Right of Way

SAR – Species at Risk

SPP – Source Protection Plan

TAC – Technical Agency Committee

TMP – Transportation Master Plan

TPZ – Tree Protection Zone

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1 Introduction

This Environmental Study Report documents the work completed for the Municipal Class Environmental Assessment (Class EA) Schedule 'C' for improvements to Wycroft Road from Bronte Road to Kerr Street.

1.1 Study Purpose

The Town of Oakville is planning improvements to Wycroft Road from Bronte Road to Kerr Street, including a section of South Service Road West. The improvements are required to meet the needs of the Town to 2041, including satisfying travel demand to and across the study area and supporting the Town's vision. The Town retained IBI Group to undertake the Class EA Schedule 'C' to develop and evaluate the improvements in March 2018.

This Class EA is being completed in accordance with the requirements of the Municipal Engineers Association "*Municipal Class Environmental Assessment*," (October 2000, as amended to 2015).

1.2 Study Area

The study area, as shown in **Exhibit 1-1**, extends approximately 6.4 kilometres from Bronte Road to Kerr Street. Wycroft Road is designated as a Multi-purpose Arterial in the Livable Oakville Plan. The study area includes intersections with Bronte Road and with Dorval Drive, which are under the jurisdiction of Halton Region and are not being assessed for improvements.

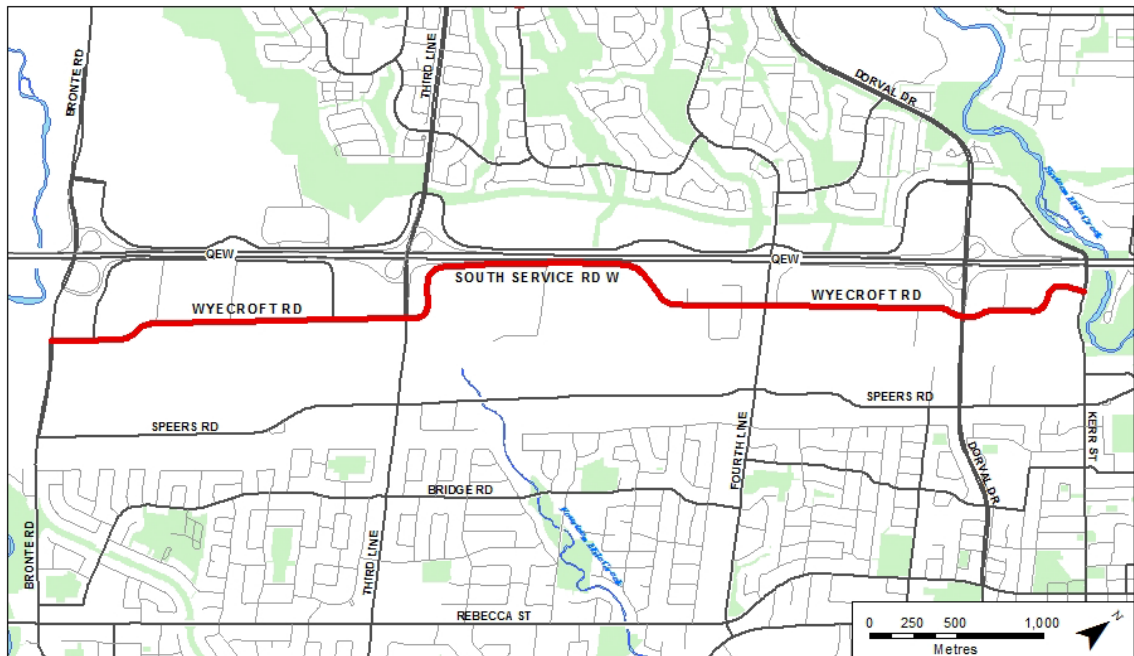
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Exhibit 1-1: Study Area



1.3 Related Studies

Several previous reports provide the basis for this Class EA study. Relevant portions of these reports are summarized in the following sections.

1.3.1 Provincial Policy Statement (2014)

The Provincial Policy Statement (PPS; 2014) provides direction on land use planning within the province to promote strong communities, a strong economy and a clean and healthy environment. Policies that are relevant to study are provided in Part V of the PPS:

- Part V, Section 1.5, Policy 1.5.1 states that “Healthy, active communities should be promoted by:
 - a) Planning public streets, spaces and facilities to be safe, meet the needs of pedestrians, foster social interaction and facilitate active transportation and community connectivity...”.
- Policy 1.6.7.1 states that “transportation systems should be provided which are safe, energy efficient, facilitate the movement of people and goods, and are appropriate to address projected needs”.
- Policy 1.6.7.3 further provides “As part of a multimodal transportation system, connectivity within and among transportation systems and modes should be maintained and, where possible, improved including connections which cross jurisdictional boundaries”.

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1.3.2 Growth Plan for the Greater Golden Horseshoe (2017)

Note: The Growth Plan was updated in May 2019, however the 2017 version was in force and effect through the majority of the study, and therefore the 2017 is referenced in the ESR.

The Growth Plan for the Greater Golden Horseshoe (Growth Plan; 2017) guiding principles state that the Plan will “support the achievement of complete communities that are designed to support healthy and active living and meet people’s needs for daily living throughout an entire lifetime”. The Growth Plan recognizes the importance of planning for transportation.

The Growth Plan also designates Bronte GO Station as a Major Transit Station Area (MTSA). The Growth Plan recognizes transit as a first priority for major transportation investments. The Growth Plan sets out a regional vision for transit and seeks to align transit with growth by directing growth to MTSA’s by providing growth targets. For MTSA’s served by the GO Transit rail network, such as Bronte GO Station, the growth target is 150 residents and jobs combined per hectare within a 500 m radius of the transit station.

General transportation policies that are relevant to the Wycroft Road study are contained in Section 3.2.2. Policy 3.2.2.2 states that “the transportation system within the GGH will be planned and managed to:

- a) Provide connectivity among transportation modes for moving people and for moving goods;
- b) Offer a balance of transportation choices that reduces reliance upon the automobile and promotes transit and active transportation;
- c) Be sustainable and reduce greenhouse gas emissions by encouraging the most financially and environmentally appropriate mode for trip-making and supporting the use of zero- and low-emission vehicles; and,
- d) Offer multimodal access to jobs, housing, schools, cultural, and recreational opportunities, and goods and services; [...]

Policy 3.2.2.3 states that “in the design, refurbishment, or reconstruction of the existing and planned street network, a complete streets approach will be adopted that ensures the needs and safety of all road users are considered and appropriately accommodated”.

The Ministry of Municipal Affairs and Housing released proposed amendments, titled “Proposed Amendment 1”, to the Growth Plan on January 15, 2019 with comments accepted until February 28, 2019. The proposed amendments allow upper and single-tier municipalities to identify the minimum density targets and boundaries of MTSA’s ahead of a municipal comprehensive review. Additionally, the amendments propose to expand the area identified for intensification from a 500 m radius surrounding the transit station to an 800 m radius.

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1.3.3 Halton Region Official Plan (2016)

The Halton Region Official Plan (ROP; 2009, as amended to 2016) is Halton Region's guiding document for land use planning. The ROP contains goals, objectives and policies that manage growth and direct physical change. The ROP also provides policy direction related to transportation. Specifically, the ROP states that "the goal for transportation is to provide a safe, convenient, accessible, affordable and efficient transportation system in Halton, while minimizing the impact on the environment and promoting energy efficiency".

The transportation objectives of the Region are further outlined in policies 172 and 173. Policy 172 (2) states that one objective is "to develop a balanced transportation system that:

- a) Reduces dependency on automobile use;
- b) Includes a safe, convenient, accessible, affordable and efficient public transit system that is competitive with the private automobile; and,
- c) Promotes active transportation".

Additional direction is provided in Policy 173 (16), which states that a policy of the Region is to "Implement, in conjunction with the Local Municipalities, a network of cycling facilities in Halton by requiring, in any re-construction or widening of Arterial Roads, consideration be given to the inclusion of such facilities within the Arterial right-of-way". Further, as described in 173 (17), to "Require, in the environmental assessment of any Arterial Road project, to address whether there are other transportation alternatives and how the project would implement the transportation goals, objectives and policies of the Plan and to consider, where appropriate, alternative design standards to mitigate environmental and social impact."

Wycroft Road is designated as a Multi-purpose Arterial on Map 3 of the ROP. When defining the function of a Multi-purpose Arterial, the ROP provides that the function is to "accommodate active transportation" and that "pedestrian infrastructure as well as on and/or off road cycling facilities where possible" be included in the general design criteria.

1.3.4 Halton Region Transportation Master Plan 2031 (2011)

Halton Region prepared a Transportation Master Plan (TMP; 2011), *The Road to Change*, to develop a sustainable, integrated transportation plan and associated strategies that considers all modes of travel (automobiles, transit, cycling, walking) to the year 2031. Section 2.2 of the TMP outlines the document's guiding principles, one of which is "Balanced Needs", which is defined by the two statements below:

- "Provide a high-quality network that supports Active Transportation, transit, automobile and goods movement by offering a safe,

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convenient, accessible, affordable and efficient transportation system to meet the daily needs of all residents”; and,

- “Provide infrastructure that is supportive of transit and Active Transportation and promotes Transportation Demand Management initiatives aimed at reducing reliance on single occupant vehicles.”

Another guiding principle is “Healthy Communities”, which is defined as:

- “Support healthier communities by promoting non-single-occupant auto travel choices such as Active Transportation and public transit;” and,
- “Provide a transportation system that supports a healthy and active lifestyle and addresses user safety and security, including support for compact urban form with land use intensification, including transit supportive nodes and corridor development.”

To the west of this study area, the Region identifies the extension Wycroft Road from Burloak Drive to Bronte Road as six (6) lanes in order to provide exclusive transit lanes.

1.3.5 Halton Region Active Transportation Master Plan (2015)

The Halton Region Active Transportation Master Plan (ATMP; 2015), outlines a plan for developing a regional network of infrastructure that supports active transportation, with a focus on cycling and walking.

Section 4.2 of the ATMP states that “...the preferred alternative to develop a Regional Cycling and Walking Network to support the Vision of the ATMP consists of active transportation facilities along all Regional roads. Regional roads in Urban Areas need cycling and walking facilities to serve residents, neighbourhoods and destinations located on both sides of the roads. Regional roads in rural areas need paved shoulders that connect residents and destinations over longer distances; these facilities can also be used by pedestrians.”

1.3.6 Halton Region Mobility Management Strategy (2017)

The Mobility Management Study was developed to address Regional transportation issues, needs and priorities to 2041. The plan aims to achieve modal split targets outlined in the Regional Official Plan and improve transit service and ridership within the Region. The study is based on a mobility-as-a-service vision. Figure ES-2 of the Mobility Management Strategy identifies the future Wycroft Road extension over Bronte Creek as a Transit Priority Corridor.

1.3.7 Livable Oakville Plan (2009)

The Livable Oakville Plan (2009, consolidated to April 4, 2017, as amended), the town’s Official Plan, contains policies on how Oakville’s lands should be used, and growth should be managed through to 2031. The Plan’s Guiding Principles

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are outlined in Section 2.2. Policy 2.2.2 b) “provide choices for mobility by linking people and places with sustainable transportation network consisting of roads, transit, walking and cycling trails”.

Section 6.3 provides urban design policy related to Complete Streets. Policy 6.3.1 states that “the design of new streets and enhancement of existing streets shall incorporate the following attributes of complete streets, where appropriate:

- a) Multi-modal choices;
- b) Circulation alternatives and convenient connections;
- c) Priority pedestrian, cyclist and transit usage;
- d) Comfortable, barrier-free and safe routes
- e) Ecologically sustainable features; and,
- f) Quality spaces for public life.

Section 8 of the Livable Oakville Plan set out the policies related to transportation within the Town of Oakville.

Section 8.1.1 states that “the general objectives for transportation are:

- a) to provide a safe, efficient and accessible transportation system with choices in mobility;
- b) to foster the use and development of a sustainable transportation network;
- c) to provide a public transit network that can offer a real alternative to private automobile use; and,
- d) to provide a network of on- and off-road pedestrian and cycling facilities that allow the use of active transportation modes as an alternative to the automobile.”

Schedule C, Transportation Plan designates Wycroft Road, and the portion of South Service Road West within the study area, as a Multi-purpose Arterial (**Exhibit 1-2**). Multi-purpose Arterials are to act as major transit corridors and accommodate high volumes of traffic through 4 or 6 lanes.

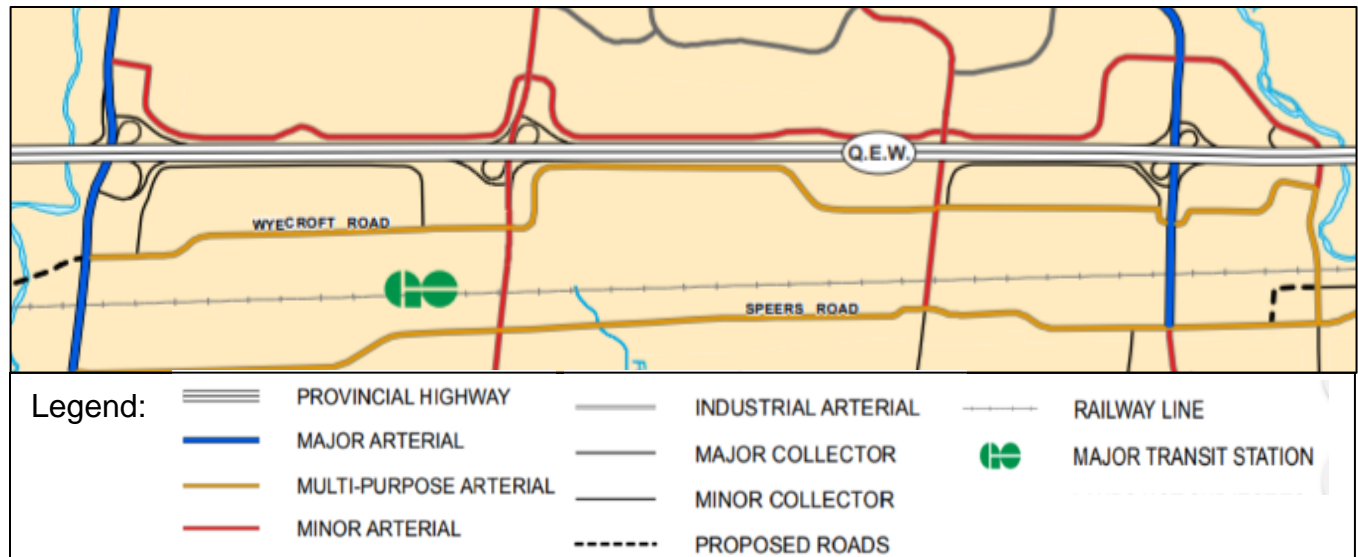
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Exhibit 1-2: Excerpt of Schedule C Transportation Plan in the Livable Oakville Plan



The study area lands are found on Schedule F (**Exhibit 1-3**) and Schedule G (**Exhibit 1-4**) of the Livable Oakville Plan. Wycroft Road from Bronte Road to Dorval Drive is found on Schedule F, while the lands east of Dorval Drive to Kerr Street are found on Schedule G.

On Schedule F, the lands surrounding Wycroft Road are primarily designated Business Employment and Industrial. A portion of the lands are designated Natural Area. There are two exceptions within the study area:

- 27.1.13: On the lands designated Business Employment known as 2231 Wycroft Road, a transportation terminal may also be permitted.
- 27.1.14: On the lands designated Industrial at the southeast corner of Wycroft Road and Redwood Square, special needs housing limited to an emergency shelter, may also be permitted.

On Schedule G, the lands surrounding Wycroft Road are designated Business Employment. There is one exception located near the north east quadrant of the intersection of Wycroft Road and Dorval Drive:

- 27.2.9: A portion of the lands designated Business Employment at the northeast corner of Wycroft Road and Dorval Drive may also be used for retail uses as regulated by the implementing zoning.

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Exhibit 1-3: Excerpt of Livable Oakville Plan Schedule F



Legend:

- OFFICE EMPLOYMENT
- BUSINESS EMPLOYMENT
- INDUSTRIAL
- BUSINESS COMMERCIAL
- INSTITUTIONAL
- NATURAL AREA
- PARKWAY BELT
- PARKS AND OPEN SPACE

* Refer to Part E, Growth Area Policies

⊙ Refer to Part E, Exceptions

Exhibit 1-4: Excerpt of Livable Oakville Plan Schedule G



- SCHEDULE AREA BOUNDARY
- OFFICE EMPLOYMENT
- BUSINESS EMPLOYMENT
- INDUSTRIAL
- BUSINESS COMMERCIAL
- INSTITUTIONAL
- NATURAL AREA
- PARKWAY BELT
- PARKS AND OPEN SPACE
- PRIVATE OPEN SPACE
- WATERFRONT OPEN SPACE
- UTILITY
- GROWTH AREA*
- SPECIAL POLICY AREA
- RAILWAY

* Refer to Part E, Growth Area Policies

⊙ Refer to Part E, Exceptions

An Official Plan Amendment (OPA 28) was approved by Council on May 15, 2018. The purpose of the amendment was to update the Livable Oakville Plan based on the Active Transportation Master Plan (2017) update. OPA 28 replaces the existing Schedule D, Active Transportation Master Plan, with a new town-wide map of existing and planned active transportation facilities. OPA 28 also adds the definition of 'active transportation' from the Provincial Policy Statement (2014) and the Growth Plan for the Greater Golden Horseshoe (2017). Schedule D identifies a segment of the study area from Bronte Road to

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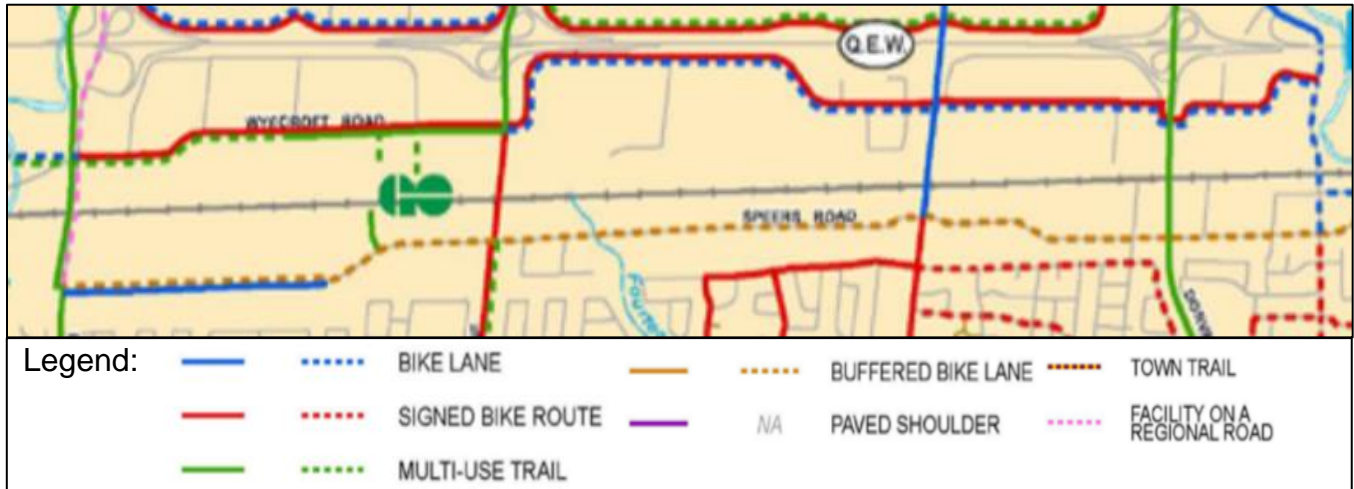
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Third Line as a candidate for a Multi-Use Trail and a segment from Third Line to Kerr Street as a candidate for Bike Lanes (**Exhibit 1-5**).

Exhibit 1-5: Excerpt of Schedule D Active Transportation Master Plan in the Livable Oakville Plan



Official Plan Amendment 15 (adopted by Town Council September 26, 2017, approved by Region of Halton on April 26, 2018, currently undergoing an LPAT appeal) proposes to establish a town-wide urban structure and provide a framework for the accommodation of growth to 2041. Specifically, the urban structure confirms that Bronte GO Station is identified as a Major Transit Station Area by the Growth Plan and is intended to accommodate transit-supportive growth and intensification.

Schedule A1 of OPA 15 identifies the study area as an Employment Area and the Bronte GO station as a Regional Transit Node and a Node and Corridor for Future Study.

Additionally, the urban structure provides direction on the development of Employment Areas, which is the designation provided to the majority of the corridor, excluding Natural Heritage System designation near Fourteen Mile Creek. Specifically, "Employment Areas shall be planned to accommodate a more compact, transit-supportive and pedestrian-oriented environment, with a range of employment-supportive amenities."

1.3.8 Switching Gears Transportation Master Plan (2013 and 2018 TMP Review)

Launched in 2013, "Switching Gears" is the Town's guiding document for developing practical, sustainable, long-term plans to guide the Town's transportation system to meet the needs of its anticipated growth to 2031. Incorporating transportation, land use planning and financial strategies, Switching Gears respects the social, environmental and economic goals as defined in the Livable Oakville Plan, the Halton Region Official Plan and

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provincial strategies. Section 3.4 of the TMP outlines that “the Problem and Opportunity for this study mainly focus on the transit modal share, and achieving an increase in transit modal share within the town”. The study “supports alternative modes of transportation to automobiles including the promotion of Travel Demand Management initiatives and the improvements to the Active Transportation network and facilities”.

As part of the study, it was determined that the preferred scenario for Oakville future transportation network is growth in Active Transportation and Transportation Demand Management, local transit and inter-regional transit.

The TMP Review assessed the transportation network improvements focusing on future transit targets to accommodate growth to 2031, and provided input into the town's upcoming Development Charge By-Law (Exhibit 1-6).

Exhibit 1-6: Excerpt of Table 6 of the Transportation Master Plan Review (2018)

Street	Location	Improvement Type	Construction Year
Wycroft Road	Bronte Road to Third Line	Reconstruction and widening to a 5 lane urban roadway	2026
South Service Road West	Third Line to Fourth Line	Reconstruction and widening to a 3 lane urban roadway	2025
Wycroft Road	East of Fourth Line to Weller Court	Widening and resurfacing to a 5 lane urban roadway	2020
Wycroft Road	Sinclair Road to Kerr Street	Reconstruction of a 2 lane rural to 4 lane urban roadway and centre turn lane	2021
Kerr Street	Speers Rd to north of QEW	Reconstruction to 4 lanes with grade separation at CN Rail line	2023/2024

1.3.9 Town of Oakville Active Transportation Master Plan (2009)

The Town of Oakville's Active Transportation Master Plan (ATMP) (2009, updated in 2017) recommended an extensive network of facilities composed of on-road and off-road paths designed to expand the existing network and promote cycling and walking in Oakville. The recommendations from the ATMP were carried forward into the Livable Oakville Plan through OPA 28.

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Part of the ATMP's vision is that "The Town of Oakville is a pedestrian and cycling supportive community that encourages active transportation for both utilitarian and recreational travel through:

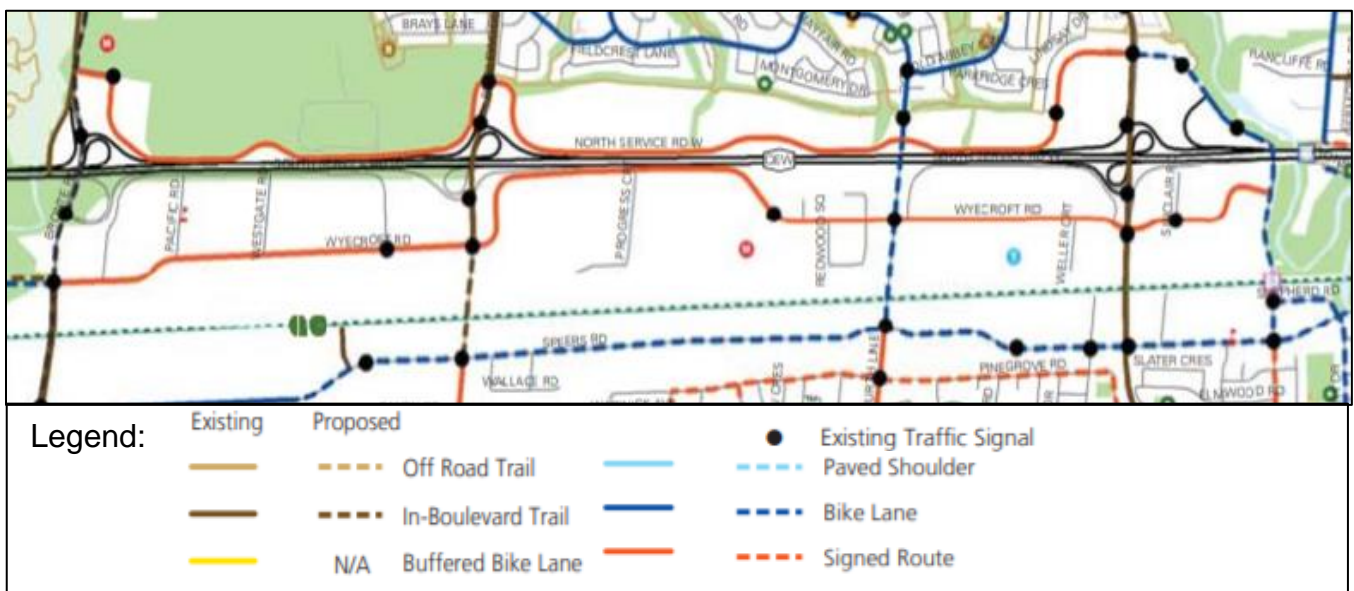
- Encouraging that every street accommodates pedestrians and cyclists; and,
- A Town-wide visible and connected active transportation network of on-road and off-road facilities designed with safety in mind, that are comfortable, convenient and accommodate the needs of existing and future users".

Map 2 of the ATMP identifies Wycroft Road and South Service Road West from Bronte Road to Kerr Street as an Existing Signed Route (**Exhibit 1-7**).

Map 3 identifies Wycroft Road from Bronte Road to Third Line as a candidate for an In-Boulevard Trail (**Exhibit 1-8**).

Map 6 and Map 7 illustrate recommended pedestrian and cycling routes (**Exhibit 1-9** and **Exhibit 1-10**). An in-boulevard trail shared by cyclists and pedestrians is recommended for Wycroft Road from Bronte Road to Third Line. A sidewalk on one side is recommended for South Service Road West and Wycroft Road between Third Line and Kerr Street. A signed cycling route is recommended for South Service Road West to Redwood Square, and on-road bike lanes are recommended from Redwood Square to Weller Court, and from Sinclair Road to Kerr Street.

Exhibit 1-7: Excerpt of Map 2 – Existing and Previously Proposed Cycling Conditions of the Oakville ATMP



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Exhibit 1-8: Excerpt of Map 3 – Existing, Previously Proposed and Candidate Pedestrian Routes of the Oakville ATMP

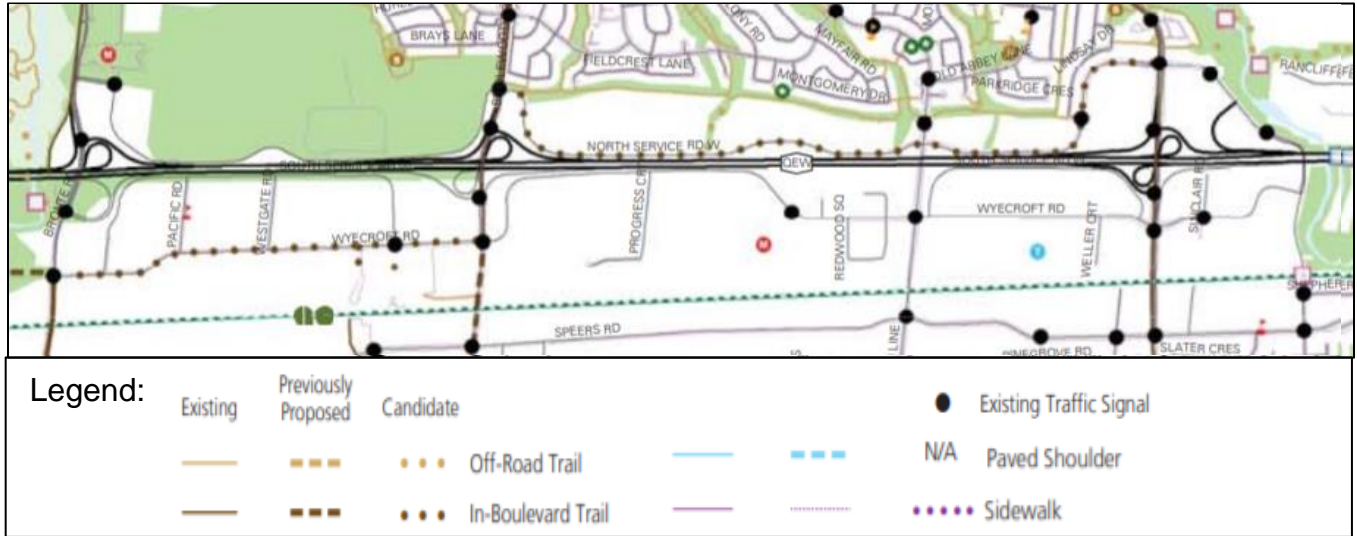
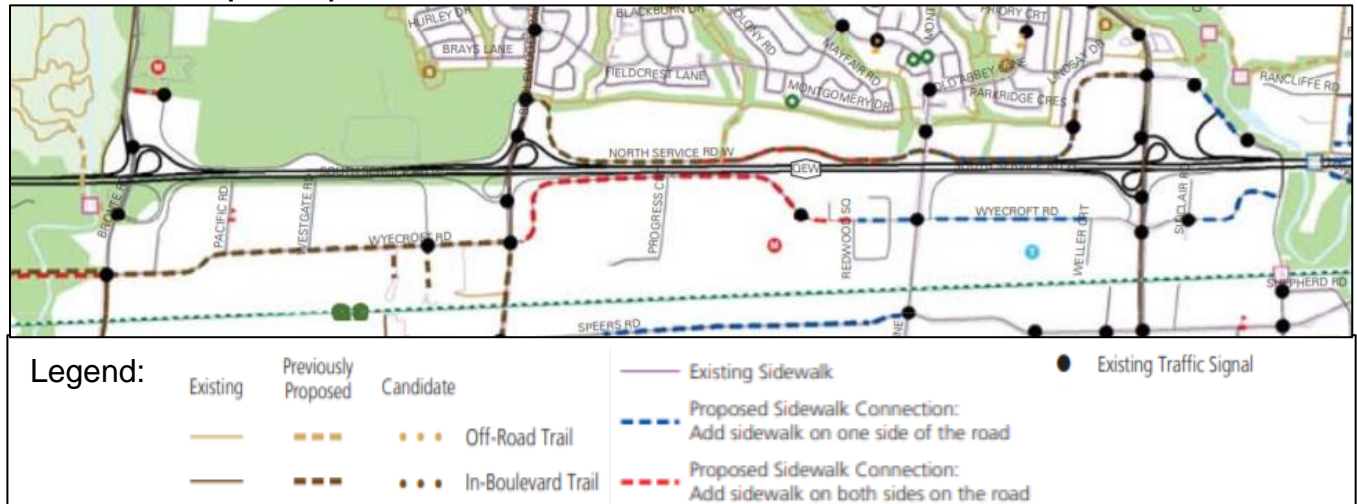


Exhibit 1-9 Excerpt of Map 6 – Recommended Pedestrian Routes of the Oakville ATMP



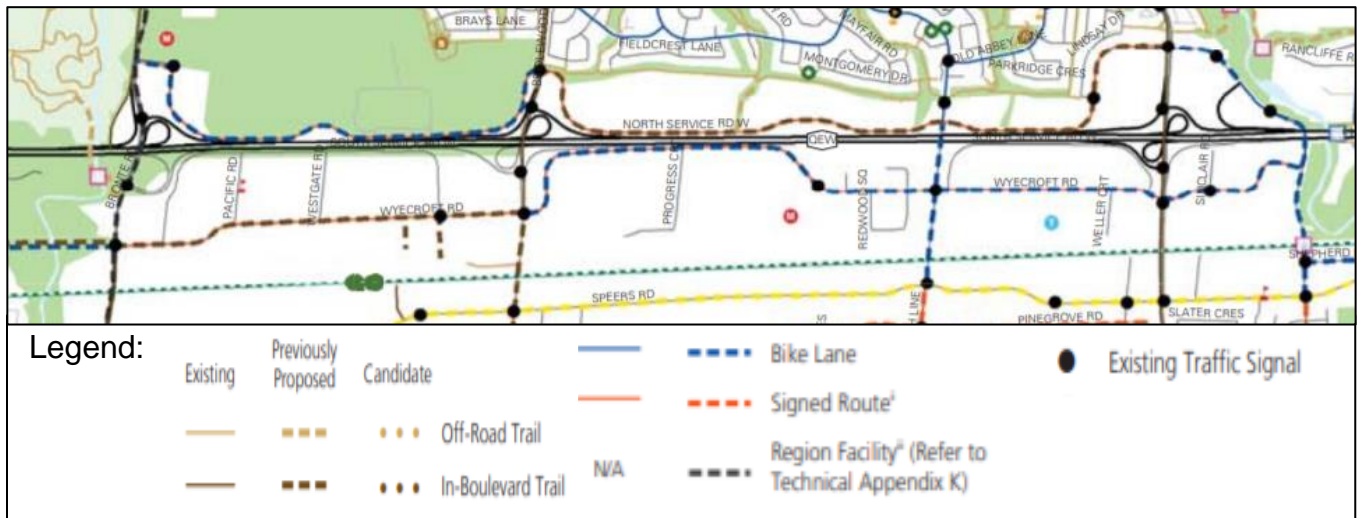
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Exhibit 1-10 Excerpt of Map 7 – Recommended Cycling Routes of the Oakville ATMP



1.3.10 Town of Oakville Zoning By-law 2014-014

As shown in **Exhibit 1-11**, lands north of Wycroft Road and South Service Road West are primarily zoned Business Employment (E2), excluding portions that are adjacent to the QEW, zoned Utility (U), and portions that are zoned Natural Area (N). The Natural Area zones correspond with the watercourses within the study area, which are located near the intersection of Wycroft Road and Third Line, South Service Road West between Equestrian Court and Fourth Line, and Wycroft Road between Fourth Line and Weller Court.

The lands south of Wycroft Road and South Service Road West from Bronte Road to Weller Court are primarily zoned Industrial (E3). Exceptions include the watercourses, zoned Natural Area, and a Stormwater Management Facility (SMF) along the west side of Fourth Line, south of South Service Road West (Taplow Creek). The lands south of Wycroft Road from Weller Court to Kerr Street are zoned E2. A number of special provisions apply to the lands within the study area including Special Provisions 3, 4, 6, 56, 168, 253, 263, 335, 336, 348, and 368.

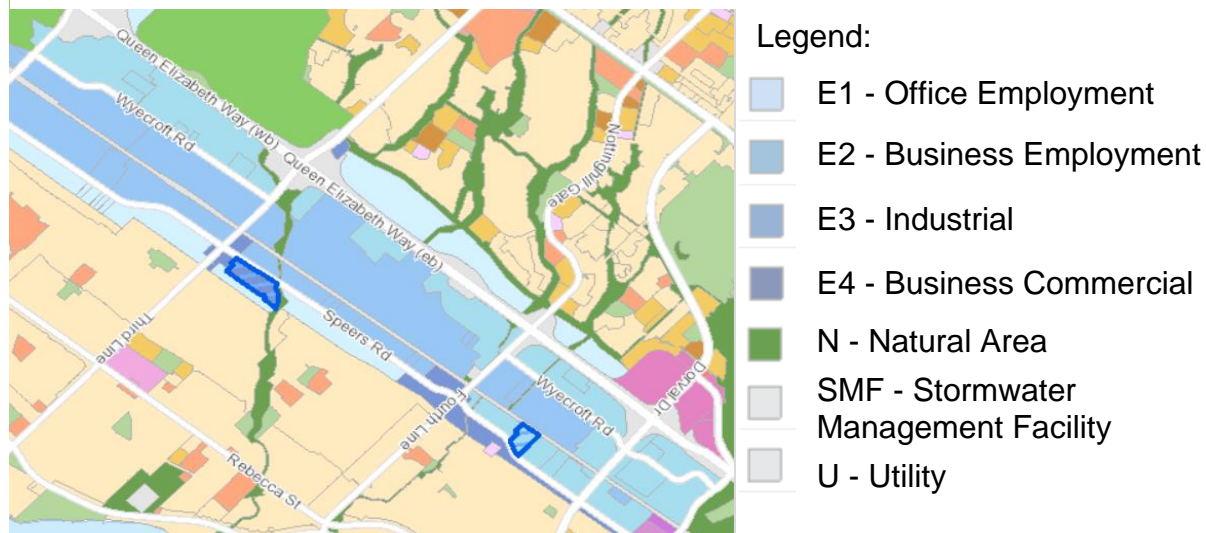
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Exhibit 1-11: Town of Oakville Zoning By-law 2014-014 Map



1.3.11 GO Rail Station Access Plan (2016)

Metrolinx produced the GO Rail Station Access Plan in 2016 as an update to the 2013 GO Transit Rail Parking & Station Access Plan. The Plan was updated in response to the Provincial commitment to Regional Express Rail and seeks to identify the necessary improvements needed to support the increase in service. The Plan identifies the current and future (2031) amenities to be provided to support the vision, which is that “GO Transit rail station access will be planned and delivered in an integrated, sustainable, and financially efficient manner to grow ridership, enhance all customers’ experience and safety, and reduce the dependency on single-occupant vehicles”.

The Bronte GO Station is predicted to be the home station for between 4,001 to 8,000 daily riders in 2031, compared to the 2016 value of 3,850. To support the projected growth, the following facilities will be added:

- 96 covered bike spaces;
- 48 secure bike spaces;
- 250 surface parking spaces; and,
- 12 bus bay facility with dedicated access on the south side.

The bus facility on the north side is to be removed. Other proposed improvements include creating dedicated pedestrian pathways through the north and south parking lots and extending the east tunnel to the south side of the corridor. The plan encourages Oakville Transit to explore options to deliver micro-transit service in a 4 to 5 kilometre radius of the station, and to align high-frequency bus routes that connect to Bronte GO with express train service. The

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plan also considers developing a pick-up/drop-off facility on the north parking lot that repurposes the current dedicated bus loop access.

1.3.12 Oakville Transit Service Review (2015)

In 2015, Oakville Transit completed a services review to improve transit efficiencies, identify and implement industry best practices, increase overall ridership, and maximize cost recovery. The services review recommended a number of modifications to existing routes. The plan includes a long-term vision to increase service on route 10, which travels on Wycroft Road, from rush hour only to all day service, with hourly headways. The study identified both Wycroft & Burloak and Dorval & Wycroft as a high ridership routes. Existing transit routes are shown in **Exhibit 1-12**.

Exhibit 1-12 Existing Transit Routes in the Study Area (March 2018)



1.3.13 Town of Oakville Streetscape Strategy (2014)

The Town of Oakville Streetscape Strategy (2014) aims to provide a strategic approach to streetscape planning, design, and implementation by guiding the creation of comprehensive streetscape plans and initiatives. According to the strategy, streetscape studies are to:

- Incorporate design, function and maintenance requirements;
- Provide for some adaptability to accommodate unique situations, funding constraints or windfalls;
- Stand the test of time in overall design and selected elements;
- Incorporate elements that are durable, low-maintenance and eco-friendly;
- Reflect the stakeholders vision and community expectations;
- Connect seamlessly to abutting streets to maintain vehicular, pedestrian, cyclist and transit connectivity; and,

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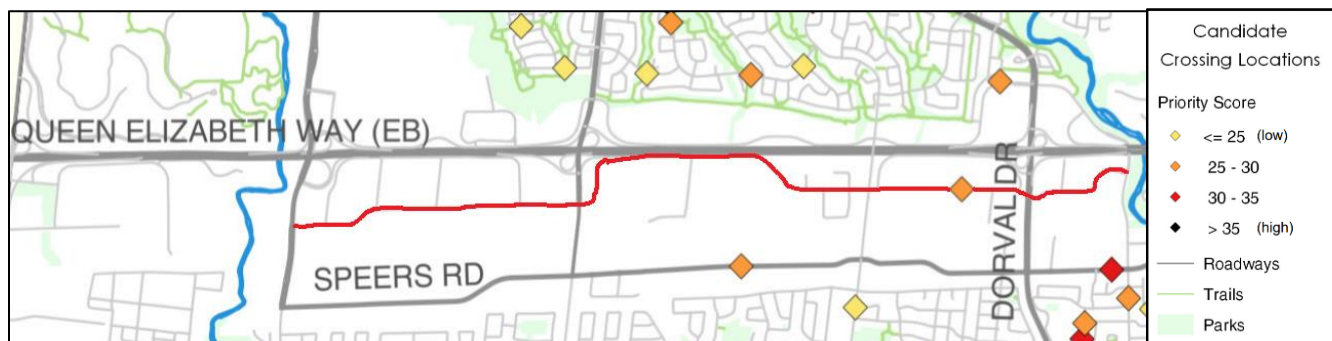
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- Include all the above attributes, yet can be installed and maintained within the construction and operating budgets established.

1.3.14 Town of Oakville Pedestrian Safety Program (2017)

The Pedestrian Safety Program (2017) was developed to systematically and proactively address pedestrian safety issues in the Town of Oakville. A candidate crossing location near 300 Wycroft Road, west of Weller Court, was identified on Figure 5.1 of that report (**Exhibit 1-13**).

Exhibit 1-13: Excerpt of Figure 5.1 of the Pedestrian Safety Program



1.3.15 Future Wycroft Road Extension

An Environmental Assessment was completed for northerly and southerly crossings of Twelve Mile Creek (now known as Bronte Creek) in 1994. The northerly crossing (an extension of Wycroft Road) was identified for implementation in the longer term. In 2006, the Town of Oakville carried out a study to review the Wycroft Road extension and prepared an Addendum to the 1994 Environmental Study Report in accordance with the Municipal Class Environmental Assessment (Class EA) process.

On July 11, 2018, a staff report was received by Regional Council that recommended that the Region apply the Move Ontario Quick Win funding to the Wycroft Road extension which includes a bridge crossing. The bridge would:

- Connect Wycroft Road east of Bronte Creek to Wycroft Road west of Bronte Creek through the construction of a new east-west 4-lane urban roadway.
- Allow for east/west connections for all modes of travel through Halton Region in keeping with Regional Official Plan, Transportation Master Plan and the Mobility Management Strategy.
- Enhance connections to the Bronte and Appleby GO stations, further improving the first and last mile connections, which supports the Metrolinx 2041 Regional Transportation Plan (2018).

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For the purpose of this EA, it is assumed the bridge will be constructed by 2031, which is consistent with the Oakville TMP. The Wycroft Road extension is outside of the scope of this environmental assessment. Traffic network impacts are considered in this study.

1.3.16 Other Related Studies

Other related studies that were referenced during this Environmental Assessment include:

- Town of Oakville Official Plan Review;
- Town of Oakville Town Wide Flood Study (2008);
- Oakville Transit Strategy Study (2010);
- Metrolinx Regional Transportation Plan (2018);
- Defining Major Transit Requirements in Halton (2019);
- Fourteen Mile Creek Flood Mitigation Study (On-going);
- Town of Oakville Stormwater Management Plan Study (On-going);
and,
- Town of Oakville OSIM Inspection Reports.

1.4 Municipal Class Environmental Assessment Process

The Municipal Class EA Process is a five-phase planning procedure under the Ontario *Environmental Assessment Act*, which applies to public infrastructure projects. Projects undertaken through this planning process are classified as one of four “Schedule” types in accordance with their degree of anticipated environmental impact and magnitude. Key features of the Class EA process, as well as a detailed outline of the process are shown in **Exhibit 1-14**.

A Schedule ‘C’ Class EA generally includes the construction of new facilities and major expansions to existing facilities. This EA is being conducted as a Schedule ‘C’ EA, as it is a “reconstruction or widening where the reconstructed road or other linear paved facilities will not be for the same purpose, use, capacity or at the same location as the facility being reconstructed (e.g. additional lanes, continuous centre turn lane)”, and where the expected cost is anticipated to exceed \$2.4 million to construct.

A Schedule ‘C’ Class EA is required to address Phases 1 to 4 of the EA process. This Environmental Study Report is completed as part of Phase 4. Once Phase 4 has been completed, the project can move onto Phase 5, Implementation:

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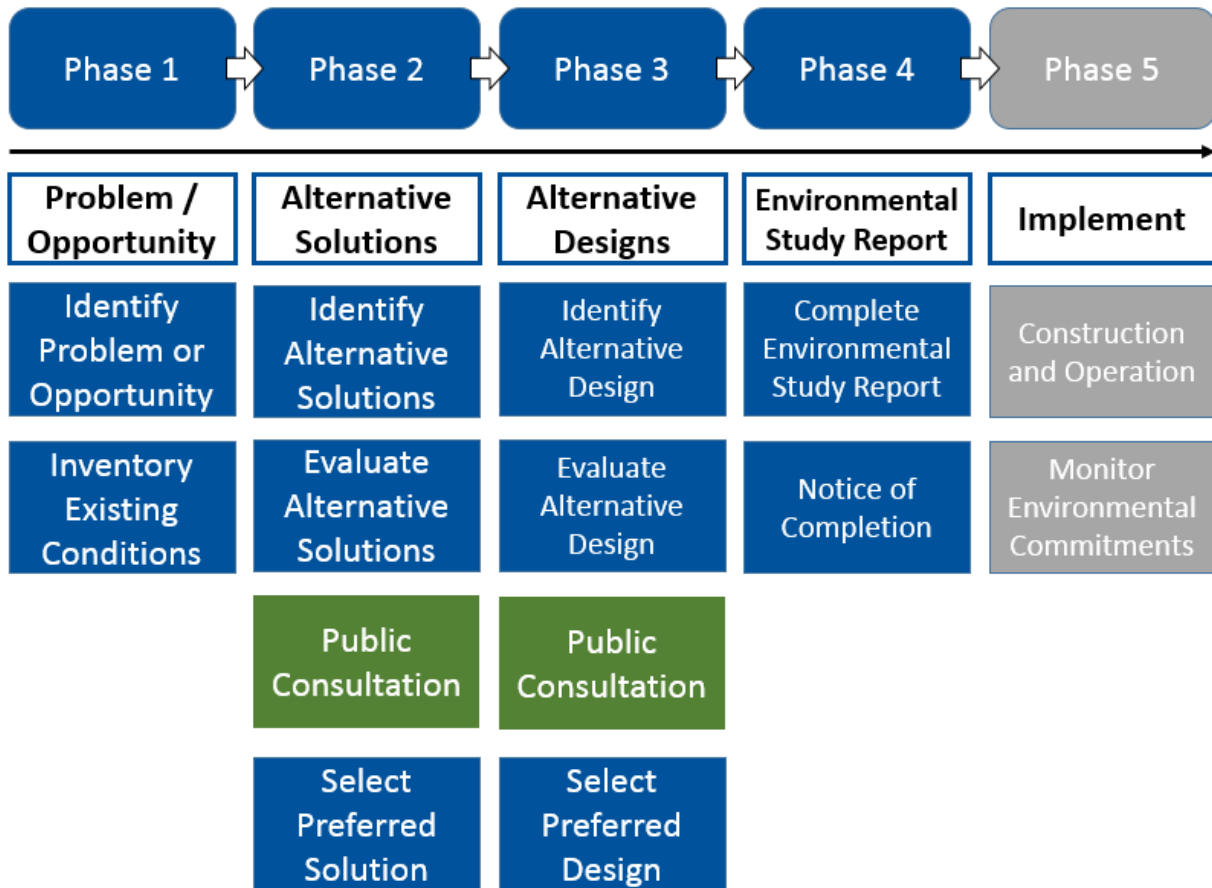
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- Phase 1: Identify the problem or opportunity
- Phase 2: Identify alternative solutions, evaluate and select preferred solution
- Phase 3: Identify alternative design concepts, evaluate and select the preferred design concept
- Phase 4: Document in an Environmental Study Report the rationale, planning, design and consultation process and place it on public record
- Phase 5: Project implementation, complete contract drawings and tender documents and proceed to construction and operation of the project

Exhibit 1-14: Municipal Class EA Process



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1.4.1 Part II Order Request Process

As part of the Class EA process, all stakeholders should work together to determine the preferred means of dealing with a problem or opportunity. Members of the public, interest groups or technical review agencies may submit a Part II Order request to the Ontario Minister of the Environment, Conservation and Parks (MECP). The request must outline why the requestor believes that a proponent should comply with Part II of the Environmental Assessment Act and complete an Individual Environmental Assessment for the proposed undertaking. The Minister of the Environment, Conservation and Parks then decides whether to deny the request, refer the matter to mediation, or require the proponent to comply with Part II of the Environmental Assessment Act.

The procedures for dealing with concerns follows:

1. For Schedule 'C' projects, a person or party with a concern should bring it to the attention of the Town of Oakville (the proponent) during the study process, up to Phase 4.
2. If a concern is not resolved through discussion with the proponent, the person or party raising the objection may request the Town of Oakville to voluntarily elevate the Schedule 'C' project to an Individual Environmental Assessment.
3. If the Town of Oakville declines, and the person or party with the concern wishes to pursue the matter, they may write the Minister of the Environment, Conservation and Parks, or delegate to request a Part II Order. These requests shall be copied by the requestor to the Town of Oakville at the same time they are submitted to the Minister, or delegate. For a Schedule 'C' project, a written request must be submitted to the Minister or delegate within the 30 day review period after the Notice of Completion has been issued.

1.5 Project Team

The study was carried out under the direction of the Project Team, which is comprised of staff from departments across the Town of Oakville.

IBI Group is the lead consulting firm, including specialists in transportation planning, traffic analysis, road safety, active transportation, public consultation, roadway design, structural engineering, stormwater management and hydraulics, utilities, noise analysis, streetscaping, and land use planning. IBI Group teamed with the following specialist firms:

- LGL Limited: natural environment and arborist services;
- ASI Heritage: archaeology and cultural heritage services; and,
- GEO Morphix: meander belt and fluvial geomorphology services.

2 Problem and Opportunity Statement

A problem and opportunity statement was developed based on the needs identified in previous studies, as documented in Section 1. Other challenges and considerations for the future were identified by the Town's project team. The resulting problem and opportunity statement is:

Wycroft Road and South Service Road between Bronte Road and Kerr Street is a multi-purpose arterial that connects existing employment lands to Regional roads and the QEW. Corridor improvements are required to meet the needs of the town to 2041 and support future population and employment growth.

Providing appropriate infrastructure will encourage active transportation (walking, cycling) and transit, in an attractive and safe way, in support of the Town's vision to be the most livable town in Canada.

Corridor improvements are required that:

- *Integrate planned facilities for pedestrians, cyclists, and transit with regard for the movement of trucks and general traffic*
- *Optimize traffic operations to increase capacity, improve safety, and manage local access*
- *Protect or improve the natural environment, including existing watercourse crossings, treescape and natural areas*
- *Maintain existing access during construction and protect for future land uses and access*

This statement guided the development and evaluation of alternative planning solutions and alternative designs to select the preferred design.

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3 Existing Conditions

The following sections outline the existing features and uses of the Wycroft Road and South Service Road West study area.

3.1 Land Use

The study area contains a mix of commercial and industrial land uses, most of which are low-rise and low-density, including many car-dealerships, manufacturing facilities, warehouse facilities, fast-food restaurants and hotels. The majority of the corridor is developed; undeveloped areas generally contain natural heritage features.

The built-form is predominantly comprised of low-rise buildings. Exceptions include mid-rise hotel buildings located at the west end of the study area and office buildings located at the southwest quadrant of the Dorval Drive and Wycroft Road intersection. The study area has an autocentric built form that is characterized by large setbacks, wide roads, and ample space between buildings. Parking lots are often located at the front of buildings along the corridor, which contributes to the auto-oriented landscape.

3.2 Natural Heritage

The following sections provide a summary of the existing natural heritage conditions within the study area. More information is available in Appendix B.

3.2.1 Physiography and Soils

The study area is located within the Iroquois Plain physiographic region in southern Ontario, a lowland region bordering Lake Ontario. Soils in the study area include Chinguacousy clay loam (rocky phase), and Jeddo clay loam. Chinguacousy clay loam (rocky phase) is an imperfectly drained soil. Jeddo clay loam is a poorly drained soil that is mainly found in narrow, shallow drainage basins or in the depressional areas associated with undulating or rolling topography). The soil is developed from slightly stony calcareous clay till.

3.2.2 Aquatic Habitats and Communities

The study area is located within the Bronte Creek, Fourteen Mile Creek, McCraney Creek and Sixteen Mile Creek Watersheds, located within the jurisdiction of Conservation Halton (CH) and the Ministry of Natural Resources and Forestry (MNR), Aurora District Office. There are three named watercourses within the study area that encompass the McCraney Creek system: Upper McCraney Creek, Taplow Creek and Glen Oak Creek.

The secondary source review included a species at risk screening through aquatic species at risk mapping (DFO; 2018), the Natural Heritage Information Centre database (MNR; 2018), the Land Information Ontario (LIO) database,

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and review of the most recent study conducted, the Fourteen and McCraney Creek Flood Mitigation Opportunities Study (AMEC 2001). Background review also included correspondence with the MNRF Aurora District Office and CH for natural heritage records.

Two species at risk, Redside Dace (*Clinostomus elongatus*) and American Eel (*Anguilla rostrata*), have occurrence records within the vicinity of the study area. Both of these species are listed as Endangered by the Status of Species at Risk in Ontario (COSSARO). Redside Dace has species and habitat regulation as defined in Ontario Regulation 242/08.

LGL conducted an aquatic assessment on May 17, 2018, approximately 50 m upstream and 150 m downstream of Wycroft Road, using the Ontario Ministry of Transportation (MTO) protocol Fish Guide (MTO; 2009). The physical habitat attributes assessed included: instream cover, bank stability, substrate characteristics, stream dimensions, barriers, stream morphology, terrain characteristics, stream canopy cover, aquatic vegetation, ground water seepage areas, and visual fish observations.

3.2.2.1 Fourteen Mile Creek

The main branch of Fourteen Mile Creek crosses under South Service Road West, just east of Third Line and the QEW via a twin cell structure (**Exhibit 3-1**). Upstream of South Service Road West, morphology is comprised of mostly riffle and run habitat, as well, a long pooling zone is located approximately 50 m upstream of South Service Road West. Bankfull dimensions average 7.5 m wide in the upstream reach.

An existing low concrete lip was observed between the culvert inlet wingwall and crosses the channel within 1 m of the culvert inlet. This lip could represent a partial barrier to fish movement during low flow conditions. Some slope erosion is notable and continues along both banks within the downstream reach. The riparian habitat supports deciduous swamp vegetation downstream of Wycroft Road.

Fourteen Mile Creek supports a warmwater thermal regime, as well as some coolwater and migratory coldwater species. Forage fish appeared abundant in both the upstream and downstream reaches of this watercourse. Species noted include White Sucker (*Catostomus commersonii*), Blacknose Dace (*Rhinichthys atratulus*), Fathead Minnow (*Pimephales promelas*) and shiner species. A total of nine species are confirmed from fish stations within the vicinity of Wycroft Road.

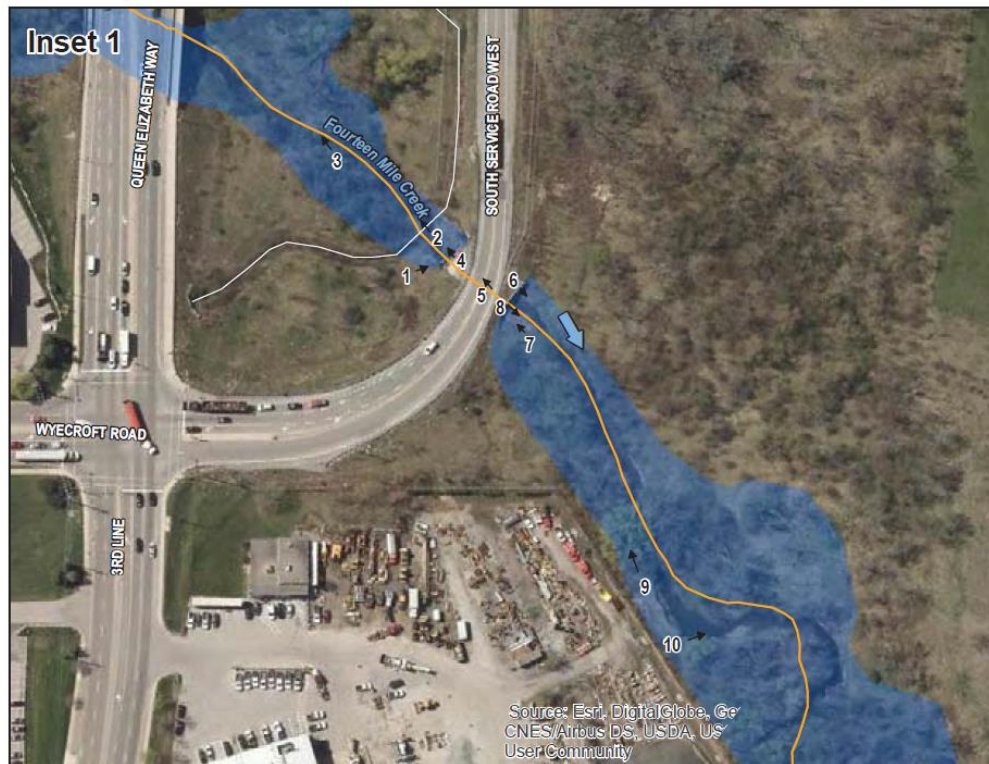
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Exhibit 3-1: Fourteen Mile Creek



*Numbers correspond to site visit photos included in Appendix B.

3.2.2.2 Upper McCraney Creek

McCraney Creek crosses South Service Road West approximately 270 m east of Progress Court. The reach upstream of South Service Road West was not investigated, as this watercourse is enclosed under a road corridor (QEW, North Service Road) for approximately 95 m (**Exhibit 3-2**).

Downstream of South Service Road West, a hardened trapezoidal channel exists, comprised of concrete bottom and steep concrete banks. The banks are experiencing erosion and are caving in along the top of the concrete bank near the culvert outlet. In addition, the lower banks have been scoured out.

The closed bottom culvert is perched approximately 53 cm above the channel bottom or 46 cm from the water surface. Rip-rap has been placed at the outlet, presumably for erosion control. No substrates are present in the culvert and numerous perches were visible.

Forage fish were observed in stream and overhead vegetative cover (overhanging willows) increases within this reach. McCraney Creek supports a warmwater thermal regime, and supports forage fish species. A total of six species are confirmed from fish stations within this system.

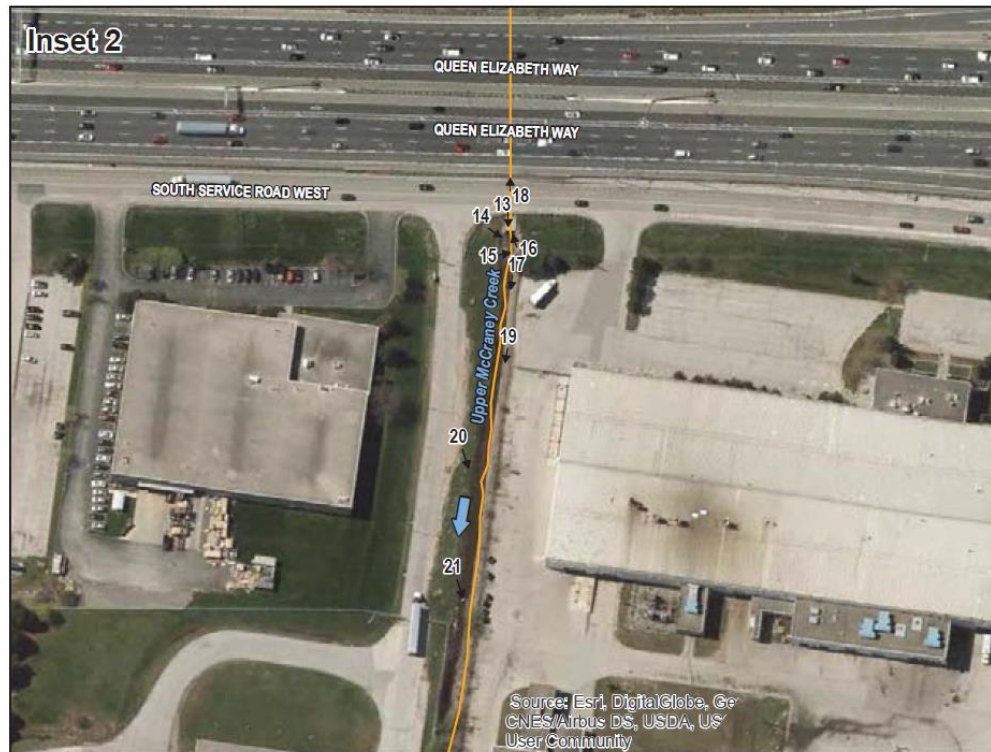
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Exhibit 3-2: Upper McCraney Creek



*Numbers correspond to site visit photos included in Appendix B.

3.2.2.3 Taplow Creek

This watercourse crosses South Service Road West, just west of Fourth Line and is channelized within the assessment reach as well as downstream of the study area. Taplow Creek appears to support natural channel characteristics upstream of the QEW, based on ortho interpretation (**Exhibit 3-3**). This watercourse is fenced off both upstream and downstream of South Service Road West.

Channel substrates and banks are comprised of the concrete block material, which is eroding within one area along the west bank. Some deposition of sand and gravel is occurring in between the block material.

Taplow Creek supports a warmwater thermal regime, and supports forage fish species. A total of three species are confirmed from fish stations within this system.

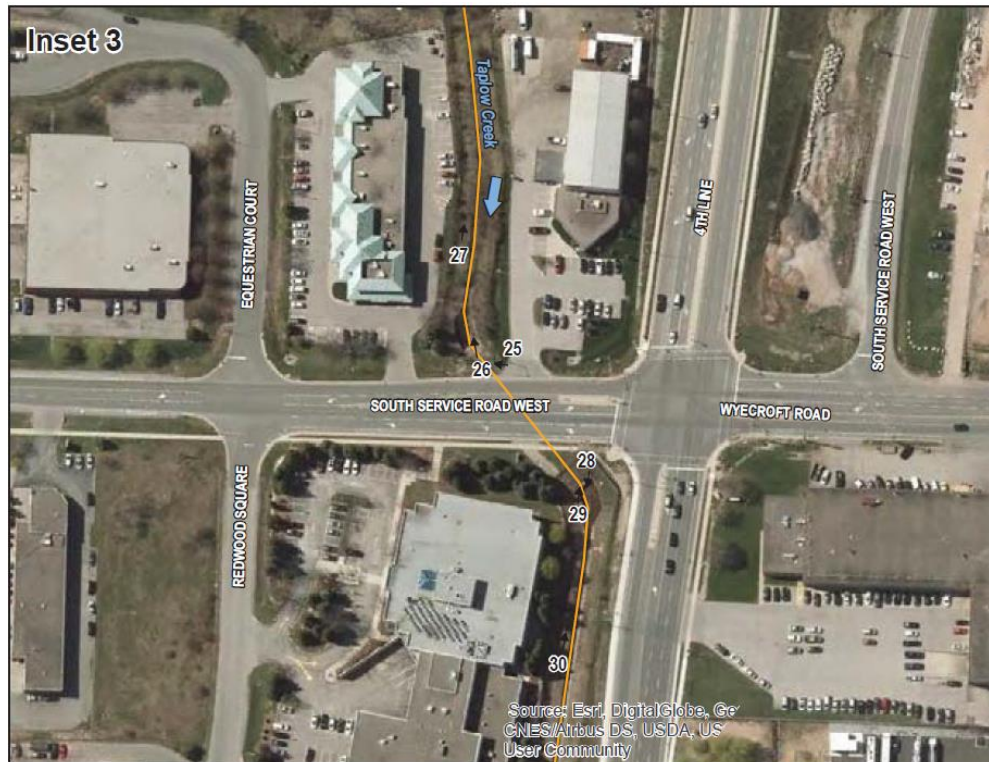
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Exhibit 3-3: Taplow Creek



*Numbers correspond to site visit photos included in Appendix B.

3.2.2.4 Glen Oak Creek

This creek crosses Wycroft Road approximately 300 m east of Fourth Line. Within the assessment reach, this watercourse supports natural banks and bottom, unlike the other two McCraney Creek systems present within the study area. Upstream of Wycroft Road, the creek flows through a very narrow riparian corridor between industrial properties (**Exhibit 3-4**).

The riparian cover is more open near the culvert as a hydro line crosses the channel. Downstream of this area, riparian cover increases; however, similar to the upstream reach, some areas of bank do not support vegetation or a minimal riparian width.

Glen Oak Creek supports a warmwater thermal regime, and supports forage fish species. A total of five species are confirmed from fish stations within this system. An additional genus, bullhead (*Ameiurus* sp.), was observed in addition to Creek Chub (*Semotilus atromaculatus*) using the pool habitats at the time of survey.

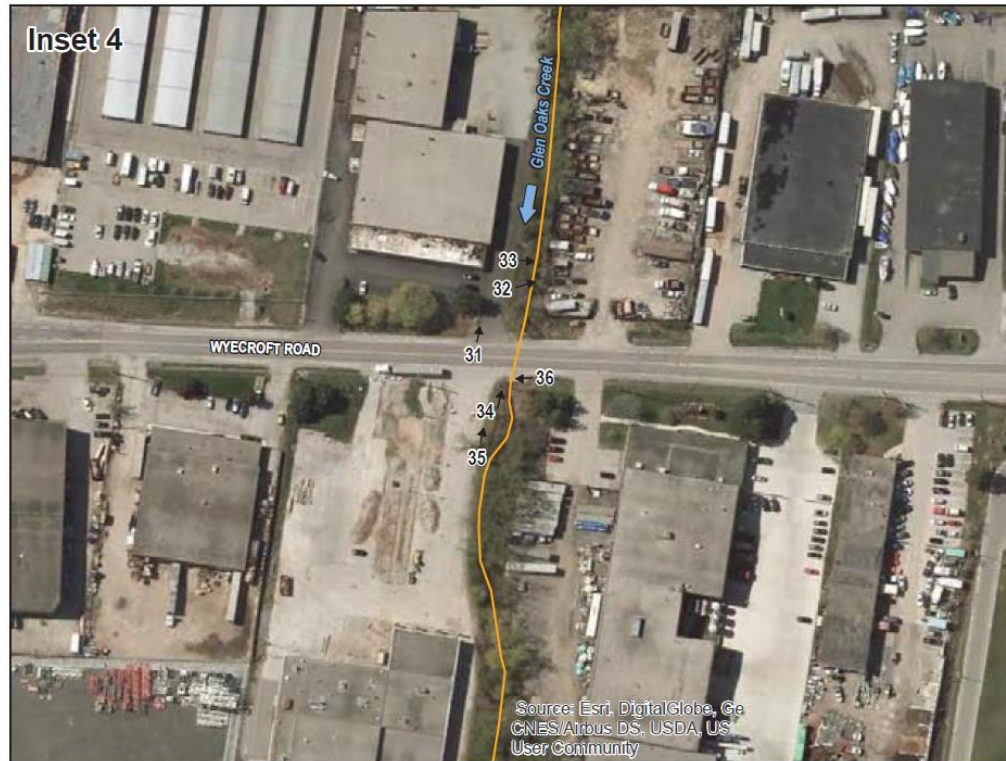
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Exhibit 3-4: Glen Oak Creek



*Numbers correspond to site visit photos included in Appendix B.

3.2.2.5 Summary

Of the species observed in the watercourses within the study area, only Redside Dace is a Species at Risk. American Eel, which is also a Species at Risk, are known to occur within the vicinity of the study area. Neither were observed by the project team during field investigations.

Opportunities exist to improve the aquatic habitats and communities for these species. Existing conditions such as scoured out banks, debris build up, and concrete lips in structures that pose a partial barrier for fish movement can be remediated.

3.2.3 Vegetation and Vegetation Communities

The geographical extent, composition, structure and function of the vegetation communities were identified through air photo interpretation and a field investigation in May 2018.

The vegetation communities were classified according to the “Ecological Land Classification for Southern Ontario: First Approximation and Its Application” (Lee et al. 1998). A plant list and a description of the general structure of vegetation communities were obtained during the field investigation. Plant species status was reviewed for Ontario (Oldham; 2009), and Halton Region (Varga; 2000 and

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Riley; 1989). Vascular plant nomenclature follows Newmaster et al. (1998) with a few exceptions that have been updated to Newmaster et al. (2005).

Vegetation communities identified within the study area consist primarily of manicured grass dominated areas with planted amenity trees including numerous planted Kentucky coffee trees (*Gymnocladus dioicus*).

One Willow Mineral Swamp Thicket was identified along Fourteen Mile Creek, and this community is bisected by Wycroft Road. The portion of the swamp community within the ROW is more open with few large trees but occasional to abundant shrub cover. Species identified include red ash (*Fraxinus pennsylvanica*), Manitoba maple, black walnut, white willow (*Salix alba*) and sandbar willow (*Salix exigua*).

Cultural vegetation communities identified during the botanical investigation include Mineral Cultural Meadows, Cultural Thicket, and Mineral Cultural Woodlands. Cultural vegetation communities typically persist in areas that are regularly disturbed, and generally contain a high proportion of invasive and/or non-native plant species that are disturbance tolerant.

Overall, the vegetation communities identified within the study area are considered widespread and common in Ontario and are secure globally. There are many Manicured areas identified within the study area that are not defined by the ELC, these areas include mown lawns, gardens and planted trees.

3.2.4 Wildlife and Wildlife Habitat

Field investigations were conducted to document wildlife and wildlife habitat and to characterize the nature, extent and significance of wildlife usage within the study area between May and June of 2018. Wildlife investigations were focused within and adjacent to the right of way, from Bronte Road to Kerr Street. Direct observations, calls and tracks were used to record wildlife within the study area. Breeding bird surveys and an anuran call survey were also completed.

3.2.4.1 Wildlife Habitat

The study area is dominated by commercial and industrial development. Natural areas are largely associated with Bronte Creek, Fourteen Mile Creek and Sixteen Mile Creek valleylands.

Natural areas associated with Bronte Creek are found at the western limit of the study area, with treed cover found immediately west of Bronte Road. Cultural meadow and cultural woodland communities were noted to provide habitat for forest/forest edge and open-country bird species. North-south wildlife movement opportunity is facilitated by the natural heritage communities associated with the valleylands. Communities found immediately west of Bronte Road were noted to largely host species considered tolerant of anthropogenic influences.

Natural areas associated with Fourteen Mile Creek cross Wycroft Road in the vicinity of Third Line. Cultural meadow and deciduous swamp communities were

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noted to provide habitat for forest/forest edge, aquatic and open-country bird species. A number of mammal tracks including white-tailed deer (*Odocoileus virginianus*) were identified along the banks of the watercourse. North-south wildlife movement opportunity is facilitated by the natural heritage communities associated with the valleylands.

Natural areas associated with Sixteen Mile Creek are found at the eastern terminus of Wycroft Road in the vicinity of Kerr Street. Deciduous forest habitat types dominate the valleylands and were noted to provide habitat for forest/forest edge bird species. Overall, wildlife species were noted to be largely absent from natural areas immediately adjacent to Wycroft Road/Kerr Street and most species were identified a distance from the forest edge.

Cultural Meadow and Manicured habitat types were found across much of the study area. Cultural Meadows were found to contain a moderately diverse wildlife assemblage. These communities provide nesting habitat for some bird species.

Wildlife and wildlife habitat was found to be largely distributed across the entire study area. Core wildlife habitat areas were associated with Bronte Creek, Fourteen Mile Creek and Sixteen Mile Creek valleylands. On the local landscape scale, these natural areas are likely to provide wildlife movement opportunity and function.

Several small watercourse features cross through the study area; however, these watercourses provide only seasonal flows, contain little vegetation and are found within highly anthropogenic settings, limiting their capacity to support wildlife species. Wildlife species identified within the study area are generally considered urban or tolerant of anthropogenic features and disturbance.

3.2.4.2 Fauna

Based on field observations and secondary source data, 42 species of wildlife could be verified in the study area. The majority of these records came from identification through calls and sightings of bird species with more modest numbers of herpetofauna and mammal species identified. The wildlife assemblage is typical of urban settings and includes wildlife species that are tolerant of human activity and habitat disturbance.

3.2.4.3 Anuran Species

Modified methodologies outlined in the Marsh Monitoring Program Protocol (2000) were applied to confirm presence/absence of anuran species, document potential breeding habitat/areas, and confirm the nature, extent and significance of amphibian usage. As a result of project timing, only a single anuran survey was completed. Stations were strategically placed where amphibian breeding habitat was suspected, based on air-photo interpretation and a review of the study area. Field investigations within the study area were conducted on May 30, 2018, and ran from one half hour after sunset and ended prior to midnight.

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The survey was undertaken during periods of peak anuran breeding activity and vocalization for mid to late breeding species (e.g., Gray Treefrog (*Hyla versicolor*) and Green Frog (*Lithobates clamitans*)).

No anuran breeding evidence was documented during the 2018 survey. Overall, anuran use of the area is expected to be limited, but most prevalent within aquatic and valleyland habitats. No suitable amphibian breeding habitat was identified immediately adjacent to Wycroft Road.

3.2.4.4 Herpetofauna Species

Secondary source data indicates that several records exist for three herpetofauna species including Eastern Gartersnake (*Thamnophis sirtalis*), Dekay's Brownsnake (*Storeria dekayi*) and Northern Watersnake (*Nerodia sipedon*), which were previously recorded in the vicinity of Sixteen Mile Creek, at the eastern limit of the study area, but were not observed during field investigations. Eastern Gartersnake and Dekay's Brownsnake are ranked abundant and common, respectively, by CH. Northern Watersnake is ranked uncommon; however, this species is considered common across the province.

3.2.4.5 Breeding Bird Species

Breeding bird surveys were conducted on two separate mornings during the 2018 breeding bird season to document breeding bird evidence and to characterize the nature, extent and significance of breeding bird usage of the habitats within the study area.

The study area contained a modest to moderate number of breeding bird species representing several habitat types. Breeding evidence was obtained for 31 of the 32 observed species of birds. Confirmed breeding includes species such as Red-winged Blackbird (*Agelaius phoeniceus*) and European Starlings (*Sturnus vulgaris*). Two species, including Red-eyed Vireo (*Vireo olivaceus*) and Savannah Sparrow (*Passerculus sandwichensis*), are considered area-sensitive and/or interior species according to the Significant Wildlife Habitat Technical Guide (MNRF 2000).

No nests of migratory bird species were identified on any bridge or culvert structure within the study area.

3.2.4.6 Mammal Species

Seven mammal species were identified during field investigations in the study area. Eastern gray squirrel (*Sciurus carolinensis*) and red squirrel (*Tamiasciurus hudsonicus*) were commonly encountered in treed habitats within the study area. Eastern cottontail (*Sylvilagus floridanus*), northern raccoon (*Procyon lotor*) and groundhog (*Marmota monax*) (or evidence of the species) were noted infrequently across the industrial portion of the study area. White-tailed deer, American mink (*Neovison vison*) and muskrat (*Ondatra zibethicus*) tracks were noted along the banks of Fourteen Mile Creek.

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The mammal species documented represent an assemblage that readily utilizes human influenced landscapes.

3.2.4.7 Species at Risk

Of the 42 wildlife species recorded within the study area, none are regulated under the Ontario Endangered Species Act, 2007 (ESA). An information request was sent to the MNRF requesting information on species at risk previously identified within proximity to the study area.

A review of the NHIC database (MNRF 2018) for rare species records indicated element occurrences for four species at risk within the vicinity of the study area, including Northern Bobwhite (*Colinus virginianus*), Eastern Meadowlark (*Sturnella magna*), Northern Map Turtle (*Graptemys geographica*) and Milksnake (*Lampropeltis triangulum*).

3.2.4.8 Summary

Overall, 42 species of wildlife could be verified in the study area. Of the 42, 32 species of birds, and seven mammals were identified during field investigations. There was no suitable amphibian breeding habitat identified and no nests of migratory birds species identified on any bridge or culvert in the study area.

3.3 Fluvial Geomorphology

Four channels cross the study area: Fourteen Mile Creek, and three tributaries of McCraney Creek (Upper McCraney Creek, Taplow Creek and Glen Oak Creek).

All the watercourses in the study area travel through shale bedrock, which is an erodible material. The shale is vulnerable to hydraulic forces as well as weathering and can break down into smaller particles with a platy form. To assess the existing conditions of the watercourses, a field investigation was completed on June 1, 2018, and included the following:

- Reach-scale habitat sketch maps based on Newson and Newson (2000) outlining channel substrate, flow patterns, geomorphological units (e.g., riffle, run, pool), and riparian vegetation;
- Descriptions of riparian conditions;
- Estimates of bankfull channel dimensions;
- Bed and bank material composition and structure;
- Observations of erosion, scour, or deposition; and,
- Collection of photographs to document the watercourses, riparian areas and/or valley, surrounding land use, and channel disturbances such as crossing structures.

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The observations and measurements collected for the four regulated watercourse crossings are available in Appendix C.

For this study, the full length of each reach was not verified due to site access limitations. As the full length of each reach could not be assessed, **Exhibit 3-5** provides a list of the reaches as well as their locations and the primary characteristics that define and distinguish each reach.

The results for Fourteen Mile Creek (Reach 14MC-1) indicated the reach was in transition with evidence of degradation and widening. The reach for the tributary north of the QEW was assessed to be in good condition with channel stability as the limiting feature. The Fourteen Mile Creek tributary was also assessed to be in good condition with water quality as the limiting feature.

The meander belt width was examined only for Fourteen Mile Creek Reach 14MC-1 as this reach was the only one that was not straightened, channelized and armoured within the road allowance.

A meander belt width of 58 m was calculated for the main channel of Fourteen Mile Creek at Wycroft Road, based on the maximum amplitude of the largest meander bend located downstream of Wycroft Road, the average channel bankfull width, and a 20% factor of safety. A 30 m riparian buffer was added to either side of the meander belt width to delineate the extent of regulated Redside Dace habitat, as per Ontario Regulation 242/08.

The meander belt width is the measured or modelled width that an alluvial sinuous watercourse would require in a natural corridor. However, the ability of Fourteen Mile Creek to migrate and establish a naturally meandering planform is restricted by the adjacent upstream structure of Third Line over Fourteen Mile Creek, which is a 20 metre clear span. As a result, if the South Service Road West structure is to be replaced, a 20 metre clear span could be considered as the maximum opening. This exceeds the minimum required by CH of three times the bankfull channel width ($3 \times 6.53 \text{ m} = 19.59 \text{ m}$).

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Exhibit 3-5: Reaches of Watercourses that cross Wycroft Road and South Service Road

Name	Reach	Extent Assessed	Length	Reach-Defining Characteristics
Fourteen Mile Creek	14MC-1	100 m south of QEW to first meander bend downstream of Wycroft Road	585 m	Confined valley; bedrock channel; confined pattern planform; mature, wooded riparian buffer
Tributary of Fourteen Mile Creek	14MCT-1	Forested area north of QEW to QEW	75 m	Unconfined valley; bedrock channel; irregular meanders; immature, non-wooded riparian buffer
Tributary of Fourteen Mile Creek	14MCT-2	Wycroft Road to GE Distribution Centre.	130 m	Unconfined valley; Concrete-lined bed and banks; straight channel; no riparian vegetation
Taplow Creek	TC-1	125 m upstream and downstream from Wycroft Road	250 m	Unconfined valley; Concrete cable block lined bed and banks; straight channel; immature riparian buffer
Glen Oak Creek	GO-1	125 m upstream and downstream from Wycroft Road	250 m	Unconfined valley; bedrock channel; narrow riparian buffer consisting of grasses and herbaceous species

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3.4 Cultural Heritage

3.4.1 Archaeology

Background research identified 11 previously registered archaeological sites within one kilometre of the study area, none of which are within 50 metres of the corridor.

Two portions were determined to have archaeological potential, a portion of land directly west of Bronte Road (outside of the study area) and an area around Fourteen Mile Creek, east of Third Line. These areas will require the completion of a Stage 2 archaeological assessment during detail design for any road widening. Details are provided in Appendix D.

3.4.2 Built Heritage

Based on a review of available municipal, provincial, and federal data, there are no previously identified built heritage resources within and/or adjacent to the study area. A field review was conducted for the entire study area to identify any potential cultural heritage resources. No potential resources were identified. Details are provided in Appendix E. No further cultural heritage work is required in this corridor.

3.5 Noise and Vibration

Based on an initial corridor-wide land use screening, six potential noise sensitive points of reception were identified. The six receptors were reduced to two, based on the Region of Halton's guidelines. These receptors are listed in **Exhibit 3-6**. The noise levels at the two modelled sensitive points of reception were simulated for both present and future conditions. For the two points of reception, the sound level difference between the current (2018) and future (2041) traffic conditions is less than 5 dBA. As such, according to the Halton Region noise criteria for road widenings, noise attenuation will not be required for the two points of reception. Noise impacts will be considered in the evaluation of design alternatives. Details are provided in Appendix F.

Exhibit 3-6: Potential Sensitive Noise Receptors

Property	Municipal Address
Holiday Inn / Oakville Conference Centre	2511 Wycroft Road
The Salvation Army	750 Redwood Square

Vibration levels are not anticipated to change based on the potential range of alternative solutions and designs under consideration by the Town.

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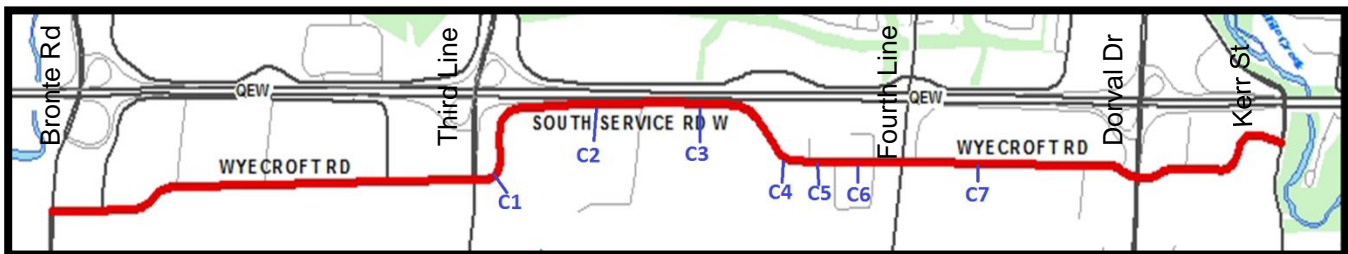
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3.6 Stormwater Management and Drainage Conditions

The study area is located within the Bronte Creek, Fourteen Mile Creek, McCraney Creek and Sixteen Mile Creek Watersheds, located within the jurisdiction of CH and MNR, Aurora District Office. The headwaters for the Watersheds originate on the Peel Plain and flow south to Lake Ontario.

There are a total of seven structures and culverts within the study area (**Exhibit 3-7**). Of the seven, there are two twin cell concrete box culverts, two concrete box culverts, one corrugated steel pipe arch (CSPA), a twin-cell CSPA, and one open footing concrete structure. All culverts were field verified, with the exception of culvert 5. The recommendations for each location are provided in Section 7.3.

Exhibit 3-7: Structures and culverts in the study area



The existing roadside ditches provide water quality and quantity control for runoff from Wycroft Road and South Service Road West. The runoff from the ditches is discharged into receiving systems:

- Runoff from Bronte Road to Third Line is primarily collected by catchbasins and conveyed by storm sewers that discharge to Fourteen Mile Creek or to the Bronte Road sewer system.
- A storm sewer system from approximately 350 m west of Weller Court to just west of Weller Court conveys roadway runoff and discharges to the existing channel south of Wycroft Road approximately 175 m west of Weller Court. The size of the storm sewer ranges from 750 mm to 1050 mm.
- There have been occurrences of stormwater overtopping the ditches and spilling into the road west of Dorval Drive on Wycroft Road.

Existing Culverts

The hydraulic capacity of the existing culverts was assessed. The analysis showed that C1, C2, C5, and C7 do not meet the minimum 1.0 metre freeboard requirement as required by design standards, with C7 overtopping the roadway for the design flow.

Due to the hydraulic inefficiency, C1, C5, and C7 are recommended to be replaced and upsized. C2 is owned by MTO and therefore upgrading will be determined by MTO. C3, C4 and C6 meet the hydraulic requirements.

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Exhibit 3-8: Stormwater Management Assessment Results

Culvert #	Location	Water Course	Results
C1	Just east of Third Line	Fourteen Mile Creek	Replacement recommended
C2	175 m west of Progress Court	Drainage feature	Replacement recommended
C3	270 m east of Progress Court	Upper McCraney Creek	Design standards met
C4	160 m west of Cranberry Court	Drainage feature	Design standards met
C5	Just east of Cranberry Court	Drainage feature	Replacement recommended
C6	Just west of Fourth Line	Taplow Creek	Design standards met
C7	310 m east of Fourth Line	Glen Oak Creek	Replacement recommended

Existing Storm Sewers

A storm sewer assessment was conducted to determine the hydraulic performance of the existing Wycroft Road sewers under existing design flows. The results of the hydraulic assessment for the existing storm sewers along Wycroft Road indicate that based on a 5-year design return period, seven sewer legs are deficient in capacity and require replacement and upsizing.

Additional details are provided in Appendix G. Stormwater and drainage improvements will be considered in the evaluation of design alternatives.

3.7 Source Water Protection & Salt Management

The study area is located within the jurisdiction of the Halton Region Source Protection Plan (SPP) in the Halton-Hamilton Source Protection Region.

Specifically, the study area is in an Intake Protection Zone 2, which has a vulnerability score of 4.8, related to the intake for the Town of Oakville municipal drinking water system.

Halton Region (Public Works) confirmed that the project activities are not considered significant drinking water threats and do not pose a risk to drinking water. Therefore, the project activities considered in this Class EA study are not subject to SPP policies (refer to Appendix A for correspondence dated 2018-07-03).

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Town of Oakville recently updated the Salt Management Plan (approved by Council on June 25, 2018) in accordance to SPP policy T-35-C/S. The Salt Management Plan includes reference to the vulnerable areas defined in the approved Halton Region Assessment Report along with enhancements to winter maintenance practices within these areas. These practices will apply to Wycroft Road and South Service Road.

The Transportation Association of Canada Synthesis of Best Practices – Road Salt Management (2013) outlines methods that can reduce salt requirements and reduce the impact of salt. Examples to consider in the design of the roadway include locating obstructions downwind of the road, allocating space for wide shoulders to allow for snow storage, and considering snow plow path in the road design. Principles to consider in the design include: reducing shaded areas, providing adequate drainage to minimize salt usage, and accounting for snow storage areas.

3.8 Existing Utilities

The following municipal services and private utilities are located within the Wycroft Road and South Service Road West right-of-way:

- Watermain;
- Sanitary Sewer;
- Oakville Hydro;
- Hydro One;
- Rogers;
- Bell;
- Cogeco Cable; and,
- Union Gas.

Hydro One currently owns and operates a transformer station at the south-east corner of Bronte Road and Wycroft Road. There is also a hydro easement located approximately 400 m east of the Bronte Road and Wycroft Road intersection. Utility impacts will be considered in the evaluation of alternatives.

3.9 Structures

There are five structures within the study area. **Exhibit 3-9** summarizes the existing conditions of the structures and the preliminary recommendations. Additional details, including field observations, are provided in Appendix H. For a map of the locations of the structures, refer to **Exhibit 3-7**.

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Exhibit 3-9: Existing Condition of Structures

Structure and Watercourse	Location	Type	Size	Preliminary Recommendation
C1 – Fourteen Mile Creek	110 m east of Third Line	Twin-cell cast-in-place reinforced concrete box culvert	Clear cell span of 6.0 m and vertical opening of 3.05 m, length of 23.5 m	Minor rehabilitation works including patch repairs to improve the durability of the structure and prevent further concrete deterioration.
C3 – Upper McCraney	270 m east of Progress Court	Centre section structure: single cell cast in-place reinforced concrete box culvert. South and north extensions are cast in-place reinforced concrete open footing culverts	Clear span of the south extension culvert is 3.05 m, vertical opening of 1.6 m, length of 20.7 m	Rehabilitation works including concrete repairs and embankment restoration.
C4 – Drainage feature	160 m east of Progress Court	Single cell reinforced concrete non-structural box culvert	Clear span of the culvert is 2.4 m, vertical opening of 1.5 m, length of 43.6 m	Rehabilitation works including concrete and joint repairs.
C6 – Taplow Creek	40 m west of Fourth Line	Twin-cell cast in-place reinforced concrete box culvert	Clear span of the cell is 3.05 m, vertical opening of 1.8 m, length of 59 m	Requires rehabilitation works including concrete and joint repairs.
C7 – Glen Oak Creek	310 m east of Fourth Line	Single span cast-in-place reinforced concrete open footing culvert	Clear span of 6.1 m and a vertical opening of 1.1 m, length of 16.3 m	Replacement recommended due to condition and age of the structure, and significant sediment buildup within the barrel.

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4 Transportation

This section summarizes the traffic analysis completed for existing and future traffic conditions. Traffic analysis was also completed for potential mitigation measures to inform the development and evaluation of alternative planning solutions and design alternatives.

Turning movement counts (TMCs), speed survey data, and signal timings were provided by the Town of Oakville. The traffic analysis was conducted using Synchro (version 9) following Highway Capacity Manual (HCM 2000) methodologies of intersection analysis and Halton Region Traffic Impact Study guidelines. Traffic was analysed during the weekday a.m. and p.m. peak hours, when traffic volumes along the corridor are highest.

Overall intersection Level of Service¹ (LOS), and individual traffic movements identified through the Synchro analysis as LOS 'D' or higher, are summarized and discussed in the following sections. Details are provided in Appendix I.

4.1 Existing Traffic Conditions

Existing traffic volumes are provided in Appendix I. A summary of the existing conditions analysis is provided in **Exhibit 4-1** (a.m. peak and p.m. peak).

Wycroft Road and South Service Road West currently operate with some congestion for traffic during peak periods. East and west through movements along the corridor operate with acceptable levels-of-service with the exception of Bronte Road and Third Line, where turning movements are approaching capacity. North-south intersecting roads tend to have longer delays, with traffic demand near capacity at the intersections of Third Line, Bronte Road, and Dorval Drive.

¹ Level of Service (LOS) is a measure of traffic operations based on the average delay per vehicle. LOS A: less than 10 seconds. LOS B: 10 to 20 seconds. LOS C: 20 to 35 seconds. LOS D: 35 to 55 seconds. LOS E: 55 to 80 seconds. LOS F: greater than 80 seconds.

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Exhibit 4-1: 2018 Existing Conditions – Intersection Level of Service (LOS)

Signalized Intersection	Intersection LOS	
	a.m. peak	p.m. peak
Bronte Road	D	C
South Service Road West #2	A	B
Third Line	F	E
1140 South Service Road West / Fire Station Access	A	A
Fourth Line	C	C
Dorval Drive	C	D
Sinclair Road	A	A

**Traffic operations reported are following additional calibration effort described in Appendix I.*

While existing traffic operations are generally acceptable along Wycroft Road and South Service Road West, the following issues were identified:

- At the Bronte Road intersection, turning movements are near capacity, limiting potential to accommodate development-related traffic growth. Queues from the Queen Elizabeth Way on-ramp intersection on Bronte Road have the potential to extend south to the intersection with Wycroft Road.
- Around the Bronte GO Station, traffic operations are characterized by sharp peaks in traffic volumes related to train arrivals and departures.
- At the Third Line intersection, long queues form for the southbound right-turn in the a.m. peak hour. In the p.m. peak hour, the opposite movement of eastbound left-turn has higher demands.
- Along Wycroft Road between Bronte Road and Third Line, there is a high frequency of driveways. Provision of a two-way left-turn lane is evaluated in Section 4.3.3.4.
- The intersection with South Service Road #4 is close to the intersection of Dorval Drive. Queues for the eastbound left-turn extend past this intersection, adding to congestion and creating safety concerns. The driveway at 690-710 Dorval Drive adds conflict points with westbound left-turning traffic, adding to congestion and safety concerns.
- Speeding is a concern, with 85th percentile speeds generally more than 10 km/h above the posted speed limit. Speed is assessed further in the road safety review, summarized in the next section and detailed in Appendix I.

Existing traffic operations and the specific findings above were considered during the development and evaluation of alternatives.

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4.2 Road Safety Review

Collision data from the past 10 years (2007-2017), provided by the Town, was analysed to gain an understanding of existing trends and interactions between users along the study corridor. Details are provided in Appendix J.

Four main safety concerns were identified along the study corridor:

1. Conflict points at driveways;
2. Traffic congestion and queuing;
3. Reverse horizontal curves; and
4. High operating speeds.

While these concerns occur throughout the study area, there are five locations that have a higher frequency of collisions. These locations would benefit from operational or infrastructure improvements to improve safety performance. The development and evaluation of design alternatives (Section 6) considers safety.

The intersection of Wycroft Road at Third Line was ranked 8th for potential safety improvements, reported in the Town of Oakville's 2014 Network Screening Summary. The study area does not include any of the top 10 midblock segments identified by the network screening.

4.2.1 East of Bronte Road

A high proportion of all collisions in the west segment occurred within the 240 metre segment between Bronte Road and South Service Road 1. Potential contributing factors are peak period queuing from the intersection of Wycroft Road at Bronte Road, and vehicles entering/exiting the driveways between the intersections.

4.2.2 Around Third Line

A high number of collisions where the driver lost control occurred along the short segment between Third Line and Cranberry Court. This part of the corridor has a sharp reverse curve, which increases drivers workload compared to a straight section of roadway. When a driver is navigating a curve, the workload is effectively doubled with both maintaining speed and lane-keeping. Design alternatives could explore alternative horizontal alignments for this reverse curve.

4.2.3 Around Fourth Line

Fourth Line has the highest concentration of collisions in the east segment. The majority of collisions that resulted in an injury involved vehicles travelling westbound. Speed surveys showed speeding occurring east of Fourth Line, which indicates that higher operating speeds may be a contributing factor to collisions around Fourth Line.

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4.2.4 Around Dorval Drive

The short 100 m section between South Service Road 4 and Sinclair Road is complex. There are reverse curves, dual left-turns on multiple approaches at Dorval Drive, and a two-way stop controlled intersection 60 m away from a signalized intersection. The combination of these features and higher traffic volumes may contribute to the higher frequency of collisions around Dorval Drive. Factors affecting sightlines, such as daylight triangles, could be considered during roadway design. Other design options that could be considered, in consultation with Halton Region, are modifying adjacent intersections to right-in/right-out, closing adjacent intersections, or reconfiguring accesses on the intersection approaches.

4.2.5 West of Kerr Street

Similar to the middle segment (between Third Line and Progress Court), there is a reverse curve between Sinclair Road and Kerr Street, which may be a contributing factor to the higher frequency of collisions in this segment. The reverse curve west of Kerr Street also has multiple uncontrolled driveways located along the curve, further increasing driver workload as drivers must be aware of vehicles entering/exiting the driveways. Factors affecting sightlines, such as daylight triangles, could be considered during roadway design.

4.2.6 Signal at Progress Court

Signalizing the intersection of Progress Court is recommended as part of this environmental assessment to improve pedestrian access to transit, influence driver speed choice, and manage conflicts with turning traffic. It is understood that the signal warrant analysis completed for the traffic analysis found a signal is not justified based on traffic volumes (OTM Book 12, see separate appendix to the Environmental Study Report).

There is an existing westbound transit stop on the northwest corner of South Service Road West and Progress Court (stop ID 3319) served by bus route 10. Pedestrian safety and transit access would be improved at this intersection by allowing transit riders to activate the signal and cross the road without waiting for gaps in traffic. Improving pedestrian safety is especially important on arterials with high operating speeds.

Drivers on South Service Road West may be influenced to drive at a lower speed due to the presence of a signalized intersection. Vehicular safety can also be improved by the installation of a signal. In general, it is expected that converting an intersection to full signal control will result in a reduced number of angle and turning movement collisions, which tend to result more often in injury or fatality.

Volume counts indicate that left-turning drivers from Progress Court may experience difficulties finding acceptable gaps in through traffic. This is based on the high proportion of left-turning vehicles from Progress Court onto South

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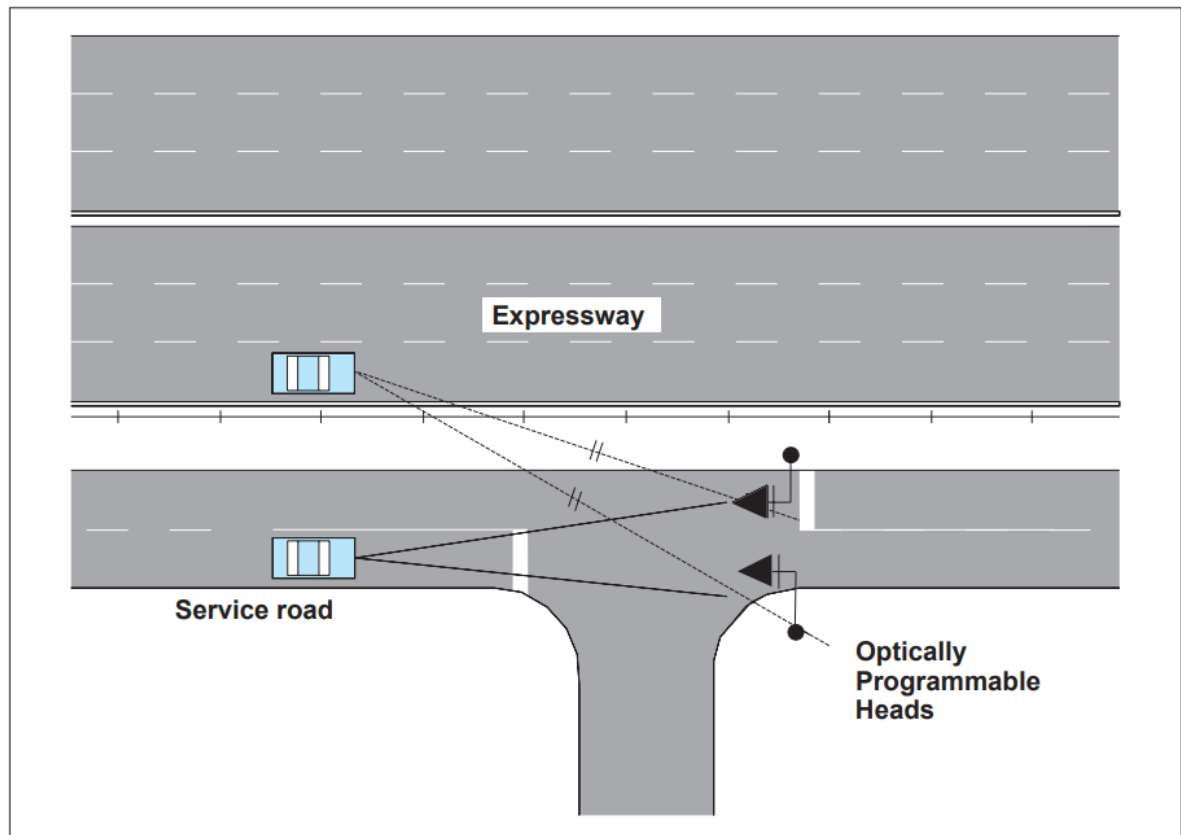
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Service Road West, compared to east and west through volumes throughout the day. Drivers on Progress Court who are unable to find acceptable gaps can become frustrated and may make more aggressive turns, increasing the potential for a collision to occur. Signal control would manage this conflict by separating the east-west and northbound vehicles in time.

The proximity of this intersection to the Queen Elizabeth Way is a potential issue. Specifically, the concern is that drivers on the freeway may see and react to the traffic signal. A potential mitigation measure is to install optically programmable signal heads, which restrict the visibility of the indication to a specific area. In other words, the signal indication would only be visible to drivers along South Service Road West, and not visible to drivers on the Queen Elizabeth Way. This is illustrated in **Exhibit 4-2**.

Exhibit 4-2: Example of Optically Programmable Heads Restricting Visibility to Service Road Drivers (source: Ontario Traffic Manual Book 12)



Other potential mitigation measures to restrict the visibility of the signal heads from the freeway include:

- Angle the signal heads to make the displays less visible to freeway drivers;

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- Use display filters or louvres to limit their visibility from the freeway; and
- Install a higher barrier along the QEW to block visibility to South Service Road West.

The feasibility of converting this intersection to full signal control, and the advantages of the various mitigation measures, should be reviewed by the Town in consultation with the MTO during detail design.

4.3 Future Traffic Conditions

To determine the future need for improvements and lane requirements, traffic volumes were projected to 2031 and a sensitivity analysis was completed for 2041.

Two major projects are planned to be completed in the study area by 2041. Both projects will increase traffic volumes along the Wycroft Road corridor, particularly at the west end, as described in the following sections.

4.3.1 Wycroft Road Extension

A new four-lane, east-west urban roadway (Multi-Purpose Arterial) over Bronte Creek is planned to connect the intersection of Harvester Road and Burloak Drive to Wycroft Road at Bronte Road. The extension is expected to be constructed by 2031, and was included in the 2031 traffic analysis and the 2041 sensitivity analysis.

Trip generation for this new connection was based on forecasts from the 2011 addendum to the 1994 ESR. Link volumes were extracted for the p.m. peak and projected using a 0.5% growth rate to horizon years 2031 and 2041. Wycroft Road Extension traffic was distributed based on local conditions and potential travel routes of the area. The generated p.m. peak volumes used for this study are 1038 and 1092 trips for years 2031 and 2041, respectively.

The lane configuration for the intersection of Wycroft Road and Bronte Road was assumed to include:

- North leg: two SBL, two SBT, dedicated SBR;
- East leg: one WBL, two WBT, dedicated WBR;
- South leg: one NBL, two NBT, dedicated NBR; and,
- West leg: two EBL, two EBT, dedicated EBR.

These lane configurations will be confirmed by Halton Region and Ministry of Transportation Ontario during the detail design phase of the Wycroft Road extension.

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4.3.2 Bronte GO Major Transit Station Area (MTSA) Re-development

Intensification surrounding Bronte GO Station is planned as part of the MTSA requirements of the Growth Plan. Regional and municipal official plan amendments will be required to direct the planned intensification. For the purpose of this study, the MTSA is assumed to be 50% developed by 2031 and 100% developed by 2041. These assumptions were based on a review of existing land uses and development applications and was endorsed by Town staff.

To generate traffic associated with this intensification, a minimum density of 150 residents and jobs combined per hectare was assumed, as directed by the Growth Plan. This density was split between jobs (employment) of 40% and residents (residential land use) of 60%. The number of residents and jobs along Wycroft Road, north of the rail corridor, provides the basis for generating future trips related to the intensification. Traffic generated by this re-development was distributed using Transportation Tomorrow Survey data and adjusted considering local conditions and travel routes (i.e. TMC) of the area.

Several assumptions were made for this study, and it is recommended that the Town consider the broader transportation network needs to support this potential re-development. This transportation study can be initiated after completion of the Bronte GO Major Transit Station Area Study, currently underway by the Town².

4.3.3 2031 Future Traffic

Background growth was estimated, in addition to future traffic generated by the Wycroft Road Extension and the Bronte GO MTSA. Background growth was calculated with a 0.8% compound annual growth rate applied to existing volumes. This corresponds to a growth of approximately 11% to year 2031, and 20% to year 2041.

Truck percentages and pedestrian volumes in the future were assumed to remain the same as existing. The analysis used optimized timings for all signalized intersections.

Overall intersection Level of Service³ (LOS), and individual traffic movements identified through the Synchro analysis as LOS 'D' or higher, are summarized and discussed in the following sections. Details are provided in Appendix I.

4.3.3.1 West Segment – Bronte Road to Third Line

A summary of the future conditions analysis for the west segment, if no improvements are made to the study corridor, is provided in **Exhibit 4-3**.

² Bronte GO Major Transit Station Area Study, initiated June 2018 at the Livable Oakville Council Subcommittee:
<https://www.oakville.ca/planoakville/bronte-go-mtsa.html>

³ Level of Service (LOS) is a measure of traffic operations based on the average delay per vehicle. LOS A: less than 10 seconds. LOS B: 10 to 20 seconds. LOS C: 20 to 35 seconds. LOS D: 35 to 55 seconds. LOS E: 55 to 80 seconds. LOS F: greater than 80 seconds.

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Wycroft Road at Bronte Road is not expected to sufficiently accommodate traffic demands and will operate at LOS F during both peak periods. In the AM peak, with future demand from the Bronte GO MTSA, the southbound left-turn demand will exceed capacity resulting in significant delays and long queues. In the p.m. peak, severe congestion is expected for the westbound right-turn movement.

Wycroft Road at South Service Road #2 is expected to operate poorly with LOS F in the p.m. peak. During the p.m. peak, the northbound and southbound through movements will be approaching capacity and the eastbound through demand will exceed capacity.

Unsignalized side-streets and accesses experience delays along this segment, although the volumes from these minor approaches are relatively low, particularly left-turn movements.

In summary, future demand is expected to exceed the capacity of the existing infrastructure of the west segment.

Exhibit 4-3: 2031 Do-Nothing – West Segment (Bronte Road to Third Line)

Wycroft Road Intersection	Peak Hour	Intersection LOS
Bronte Road (Signalized)	a.m.	F
	p.m.	F
South Service Road West #2 (Signalized)	a.m.	B
	p.m.	F

4.3.3.2 Middle Segment – Third Line to Cranberry Court

A summary of the future conditions analysis for the middle segment, if no improvements are made to the study corridor, is provided in **Exhibit 4-4**.

Wycroft Road at Third Line is not expected to sufficiently accommodate traffic demand and will operate at LOS F during both peak periods. Future demand, particularly the traffic from Bronte GO MTSA, results in all movements at this intersection operating either at or above capacity. The southbound approach in the a.m. peak, and the eastbound and northbound approaches in the p.m. peak, are expected to operate with severe congestion and long queues.

The unsignalized intersection of Progress Court operates well with one critical movement (i.e. northbound left-turn) during the p.m. peak.

In summary, the middle segment is expected to operate well. However, the intersection with Third Line will be over capacity.

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Exhibit 4-4: 2031 Do-Nothing – Middle Segment (Third Line to Cranberry Court)

Wycroft Road Intersection	Peak Hour	Intersection LOS
Third Line (Signalized)	a.m.	F
	p.m.	F

4.3.3.3 East Segment – Cranberry Court to Kerr Street

A summary of the future conditions analysis for the east segment, if no improvements are made to the study corridor, is provided in **Exhibit 4-5**.

Wycroft Road at Fourth Line is expected to experience moderate delays and operate with LOS C during both peak periods. Eastbound and westbound through movements are expected to be fairly congested with acceptable delays.

Wycroft Road at Dorval Drive is anticipated to operate poorly with LOS D and LOS E in the a.m. and p.m. peaks, respectively. During the a.m. peak, with the majority of green time allocated for the northbound and southbound movements, the eastbound left-turn movement becomes a critical movement with $v/c > 0.85$. In the p.m. peak, the eastbound left-turn will operate above-capacity (e.g., $v/c = 1.27$), requiring drivers to wait more than one cycle to clear the intersection. Southbound through demand competes with available green times during the northbound left-turn movement.

Unsignalized intersections along this segment are expected to operate well with only two critical movements in the p.m. peak: the shared northbound left-right turn movement at Weller Court (LOS D), and the shared eastbound left-right turn movement at Kerr Street (LOS F).

Along the segment, west of Fourth Line, demand is less than 600 vehicles per direction in the peak hour. This demand can be accommodated with a single lane per direction.

Along the segment, between Fourth Line and Dorval Drive, demand approaches 800 vehicles per direction in the peak hour. This demand can be accommodated with a single lane per direction.

Along the segment, east of Dorval Drive, demand is less than 500 vehicles per direction in the peak hour. This demand can be accommodated with a single lane per direction.

In summary, future demand is expected to approach capacity of the Dorval Drive intersection; however, improvements to this Regional road intersection is outside the scope of this environmental assessment. The segment overall operates well with a single lane per direction.

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Exhibit 4-5: 2031 Do-Nothing – East Segment (Cranberry Court to Kerr Street)

Wycroft Road Intersection	Peak Hour	Intersection LOS
Fourth Line (signalized)	a.m.	C
	p.m.	C
Dorval Drive (signalized)	a.m.	D
	p.m.	E

4.3.3.4 Corridor-wide Two-Way Left-turn Lane Review

The feasibility of adding a two-way left-turn lane along the corridor was reviewed. A two-way left-turn lane is a continuous paved lane on an undivided road that provides a deceleration and storage area for left-turning vehicles travelling in either direction.

A two-way left-turn is recommended in the west segment and the east segment, as four-lane undivided arterials with frequent commercial driveways operate more safely and efficiently with a centre two-way left-turn lane. Details are provided in Appendix I.

In the middle segments, a two-way left-turn lane is not recommended, as there are no driveways on the north side of this portion of South Service Road West.

4.3.3.5 2031 Mitigation Measures

Exhibit 4-6 summarizes the right and left-turn lane improvements along Wycroft Road. **Exhibit 4-7** illustrates the 2031 lane configurations with all improvements considered at each of the studied intersections within the study area.

Regional intersection improvements are outside of the scope of this environmental assessment. It is recommended that the Town work with Halton Region to review traffic operations at the Bronte Road and Dorval Drive intersections. It is also recommended that the Town consider the broader transportation network needs to support growth in the Bronte GO MTSA, particularly on Third Line.

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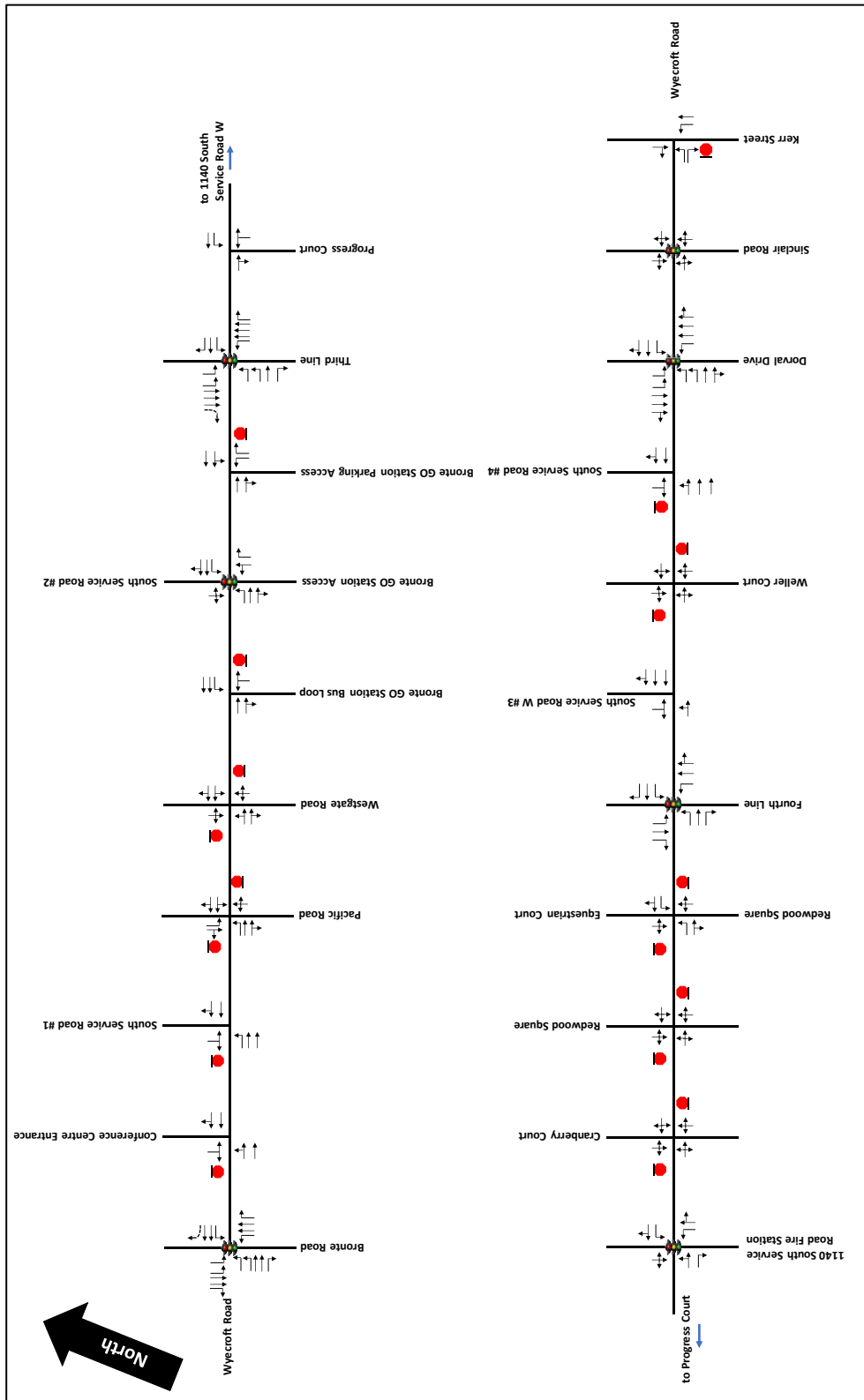
Exhibit 4-6: Summary of Improvements to be considered in Design Alternatives

Wycroft Road Intersection	Turn Lane
South Service Road #1	EBL
Pacific Road	EBL
	SBL
	SBR
	WBL
Bronte GO Station Bus Loop	WBL
Progress Court	WBL
Kerr Street	EBL
	EBR
West segment: Bronte Road to Third Line	TWLTL
East segment: 1146 South Service Road West to Kerr Street	TWLTL

NOTE: Regional intersection improvements are outside the scope of this study.

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Exhibit 4-7: 2031 Potential Lane Configurations (with all improvements considered)



NOTE: Regional intersection improvements are outside the scope of this study.

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4.4 2041 Sensitivity Analysis

The purpose of the sensitivity analysis was to test the 2031 potential lane configurations with additional background growth to 2041 and the full potential development (100%) of the Bronte GO MTSA, described in Section 4.3.2. The sensitivity analysis used the same optimized signal timings as the 2031 analysis.

As part of the sensitivity analysis, signal warrants were re-examined using 2041 volumes. Based on the analysis, no additional traffic signals are recommended to 2041. Details are provided in Appendix I. The following sections detail the results of the sensitivity analysis by segment.

4.4.1 West Segment – Bronte Road to Third Line

Wycroft Road at Bronte Road is expected to operate near capacity at LOS D during both peak periods. During the AM peak, the southbound left-turn movement will operate near or at capacity ($v/c = 0.98$), as it competes for green time from heavy northbound through volumes. One potential mitigation measure for this Regional intersection is a westbound free-flow right-turn lane, for consideration by Halton Region.

Wycroft Road at South Service Road #2 is expected to operate acceptably with LOS B and C in the a.m. and p.m. peaks, respectively. During the p.m. peak, with the additional eastbound through lane proposed for 2031 (i.e. two eastbound lanes), the eastbound through movement operates below capacity. However, due to high through demands along Wycroft Road, northbound and southbound through movements experience more delay.

Unsignalized side-streets and accesses are expected to experience delays, particularly for turning traffic. Mid-block demand is well-served in 2041 with 4-lanes on Wycroft Road (two eastbound, two westbound).

4.4.2 Middle Segment – Third Line to Cranberry Court

Wycroft Road at Third Line is expected to operate above capacity thresholds ($v/c > 1.0$), particularly for northbound and southbound traffic on Third Line. All movements are either critical or overcapacity with long delays and queues. As previously noted, it is recommended that the Town consider the broader transportation network needs to support growth in the Bronte GO MTSA.

Unsignalized side-streets and accesses are expected to operate well during the p.m. peak. Mid-block demand is well-served in 2041 with 2-lanes on South Service Road West (one eastbound, one westbound).

4.4.3 East Segment – Cranberry Court to Kerr Street

Wycroft Road at Fourth Line is expected to experience moderate delays and operate at LOS C and D for a.m. and p.m. peaks, respectively. In the a.m. peak, eastbound and westbound through movements are moderately congested, but

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with sufficient residual capacity. During the p.m. peak, with the increase in traffic growth, both eastbound and westbound through movements along with opposing left-turns are critical. Notably, the westbound left-turn is near the capacity threshold ($v/c = 0.98$).

Wycroft Road at Dorval Drive is expected to operate poorly with LOS D and LOS E in the a.m. and p.m. peaks, respectively. During the a.m. peak, with majority of the green time allocated for the high northbound and southbound movements, the eastbound left-turn movement will operate at capacity with high delays ($v/c = 1.04$). In the p.m. peak, the westbound through movement ($v/c = 1.09$) and opposing eastbound left-turn will operate past capacity thresholds ($v/c = 1.55$), requiring drivers to wait multiple cycles to clear the intersection. There are also high southbound through demands, which compete for available green times during the northbound left-turn movement. It is recommended that the Town work with Halton Region to improve operations at this intersection.

Unsignalized intersections along this segment are expected to operate without critical movements, except for Weller Court. Mid-block demand is well-served in 2041 with 2-lanes on South Service Road West and Wycroft (one eastbound, one westbound).

4.4.4 Summary of Sensitivity Analysis

Overall, the sensitivity analysis shows that the mid-block demand is well served in 2041 with 4-lanes from Bronte Road to Third Line, 2-lanes from Third Line to Kerr Street. However, some intersections may require additional improvements to operate within acceptable parameters, particularly Third Line.

The sensitivity analysis illustrates that the full potential development of the Bronte GO MTSA will require strategic improvements to increase the non-auto mode share and capacity of several intersections and north-south roads, particularly Bronte Road and Third Line.

As previously noted, it is recommended that the Town consider the broader transportation network needs to support growth in the Bronte GO MTSA.




5 Alternative Planning Solutions

As part of Phase 2 of the Environmental Assessment, planning alternatives were developed to address the study’s Problem and Opportunity Statement, outlined in Section 2.

5.1 Development of Alternative Solutions

Seven alternative planning solutions were considered as part of the road improvements for Wycroft Road and South Service Road. The planning solutions were developed to fully explore a range of alternatives through the environmental assessment process. Each of the seven alternative planning solutions are described in **Exhibit 5-1** below.

Exhibit 5-1: Alternative Planning Solutions




Planning Solutions	Description
1. Do nothing	This alternative includes no improvements or consideration for additional measures to address long-term project specific problems or opportunities on Wycroft Road. This alternative provides a baseline upon which other alternatives will be evaluated.
2. Traffic diversion to alternative routes 	Traffic diversion to alternative routes can be considered for through traffic only. Network measures would be required to divert traffic to other parallel corridors such as Speers Road. The alternative would not address the existing operational and safety concerns on Wycroft Road or provide an opportunity to incorporate active transportation infrastructure along the corridor.
3. Transportation demand management 	Transportation Demand Management (TDM) initiatives would help to alleviate some of traffic congestion by encouraging a shift in the mode of travel (e.g., from personal auto to transit, cycling, walking, etc.) and/or shift in travel time to outside peak periods or work at home. The impact on natural, social, and cultural environments would be minimal with the introduction of TDM initiatives. The alternative would not address the existing operational and safety concerns on Wycroft Road or provide an opportunity to incorporate active transportation infrastructure along the corridor.
4. Transportation systems management 	Transportation System Management (TSM) initiatives, such as intersection and signal improvements, are considered useful tools to improve traffic operations and help to alleviate some of the traffic congestion at the major intersections. The alternative would not address the existing operational and safety concerns on Wycroft Road or provide an opportunity to incorporate active transportation infrastructure along the corridor. The impact on the natural, social, and cultural environment would be minimal with the introduction of TSM initiatives.

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<p>5. Infrastructure improvements for active transportation</p> 	<p>Infrastructure improvements for active transportation to Wycroft Road and South Service Road West would include dedicated facilities such as sidewalks, and Multi-use Trails or bike lanes. This alternative solution may result in some impacts on the natural, social and cultural environment.</p>
<p>6. Transit priority measures and active transportation</p> 	<p>Transit priority measures and active transportation would include a combination of intersection improvements for transit such as queue jump lanes, and linear active transportation infrastructure. This alternative would not increase capacity for general traffic. This alternative may result in some impacts on the natural, social and cultural environment.</p>
<p>7. Infrastructure improvements for all modes</p> 	<p>Infrastructure improvements for all modes would include increasing the number of through and/or auxiliary lanes to resolve operational and traffic safety needs and linear active transportation infrastructure. This alternative may result in impacts on the natural, social and cultural environment.</p>

5.2 Evaluation Criteria

The alternative planning solutions were evaluated against a number of criteria. The criteria were grouped into five main themes: transportation, social environment, natural environment, technical, and cost, as illustrated in **Exhibit 5-2**.

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Exhibit 5-2: Evaluation Criteria

Transportation

- Traffic capacity
- Traffic network
- Transit service
- Transit network
- Active transportation
- Emergency management response
- Roadway safety

Social Environment

- Supports appropriate intensification
- Community building
- Construction phase impacts
- Noise and vibration impacts
- Travel time
- Cultural heritage impacts
- Emergency access

Natural Environment

- Areas of Natural and Scientific Interest
- Woodlots
- Treescape
- Creeks
- Wetlands
- Wildlife and birds
- Vegetation
- Floodplains
- Resilience

Technical

- Stormwater management
- Utilities
- Structures
- Illumination
- Policy framework

Cost

- Capital Costs
- Operating and life-cycle costs

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5.3 Evaluation Results

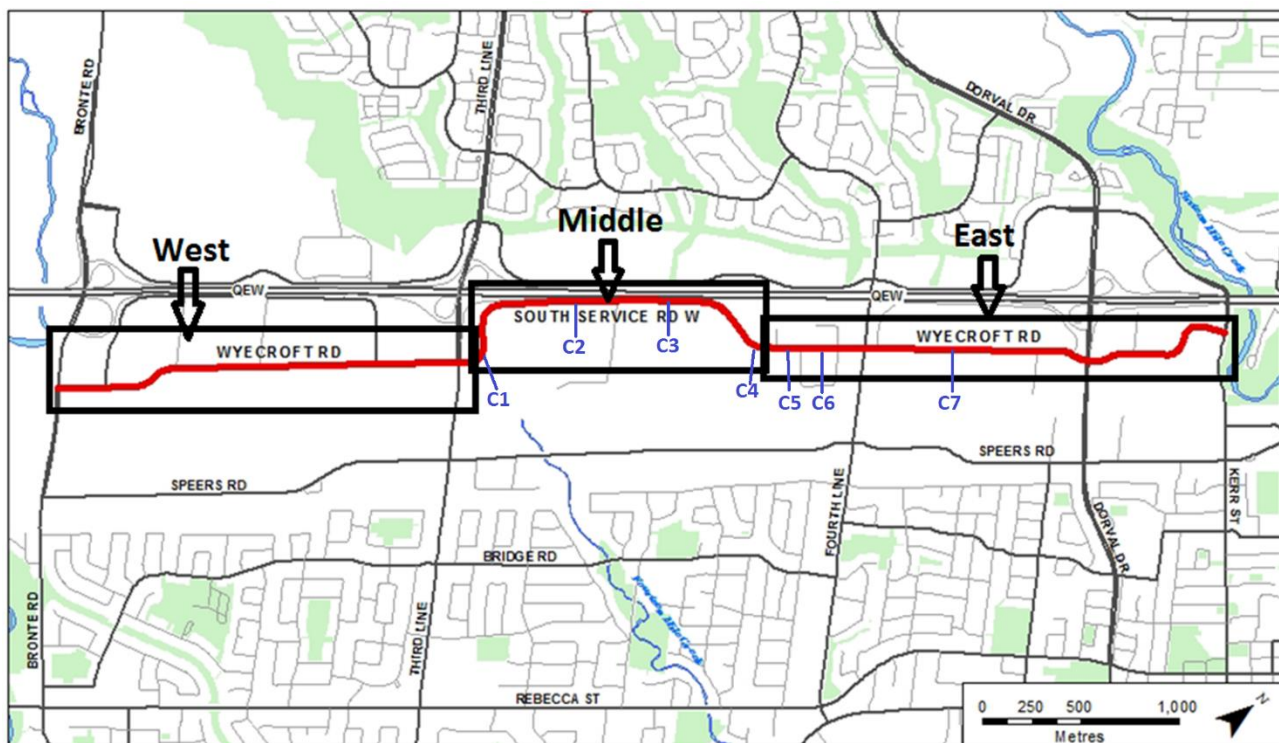
Due to the varying land use and natural environment conditions, the study area was divided into three segments for the evaluation as illustrated in **Exhibit 5-3**.

The west segment extends from Bronte Road to Fourteen Mile Creek, just east of Third Line. This segment includes the Bronte GO station, which will be a target area for future intensification due to its Major Transit Station Area (MTSA) designation. The MTSA requires a minimum density of 150 jobs and people per hectare in approximately a 500 metres radius⁴. Current land uses are generally split between business employment and industrial uses, with many driveways on both sides.

The middle segment extends from Fourteen Mile Creek to 1146 South Service Road West and is directly adjacent to the QEW. Land uses are predominately industrial in nature, with driveways on the south side. There are four culverts located within the middle segment.

The east segment extends from 1146 South Service Road West to Kerr Street. This segment includes the Oakville Transit facility. Business employment land uses are most common in this segment, with driveways on both sides. There are three culverts located within the east segment.

Exhibit 5-3: Evaluation Segments



⁴ Proposed Growth Plan Amendment #1 extends the radius to 800 metres.

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5.4 Evaluation Tables

Summary evaluation tables for each of the three segments are provided in **Exhibit 5-4**, **Exhibit 5-5**, and **Exhibit 5-6**. Alternative planning solutions 1 through 4 do not adequately address the problem and opportunity statement (outlined in Section 2) and are not shown in the summary tables. Detailed evaluation tables for alternative planning solutions 1 through 7 are included in Appendix K.




















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Exhibit 5-4: West Segment – Summary Evaluation Table

	5. Infrastructure Improvements for AT	6. Transit Priority Measures and AT	7. Infrastructure Improvements for All Modes
			
Transportation			
	Alternative 7 best improves the transportation network for all modes.		
Social Environment			
	These alternatives have similar benefits for the social environment.		
Natural Environment			
	Alternatives 5 and 6 have slightly fewer impacts to the natural environment, for example at Fourteen Mile Creek. Alternative 7 may have slightly more impacts which can be mitigated.		
Technical			
	Alternatives 5 and 6 require fewer utility relocations, less illumination requirements and provide opportunities to improve existing structures.		
Cost			
	Alternatives 5 and 6 provide less opportunity for infrastructure renewal but have lower capital costs than Alternative 7.		
Recommendation	Recommended as part of Alternative 7	Recommended as part of Alternative 7	




















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Exhibit 5-5: Middle Segment – Summary Evaluation Table

	5. Infrastructure Improvements for AT	6. Transit Priority Measures and AT	7. Infrastructure Improvements for All Modes
			
Transportation			
	Alternative 7 best improves the transportation network for all modes.		
Social Environment			
	Alternative 7 best supports existing and future land use. These alternatives have similar benefits.		
Natural Environment			
	There are few natural features in this segment.		
Technical			
	Alternatives 5 and 6 require fewer utility relocations, less illumination requirements and provide opportunities to improve existing structures.		
Cost			
	Alternative 7 has higher capital costs and provides most opportunity for infrastructure renewal.		
Recommendation	Recommended as part of Alternative 7	Recommended as part of Alternative 7	




















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Exhibit 5-6: East Segment – Summary Evaluation Table

	5. Infrastructure Improvements for AT	6. Transit Priority Measures and AT	7. Infrastructure Improvements for All Modes
			
Transportation			
	Alternative 7 best improves the transportation network for all modes.		
Social Environment			
	These alternatives have similar benefits for the social environment.		
Natural Environment			
	Alternatives 5 and 6 have slightly fewer impacts to the natural environment, for example at Taplow Creek and Glen Oaks Creek. Alternative 7 may have slightly more impacts which can be mitigated.		
Technical			
	Alternatives 5 and 6 require fewer utility relocations, lower illumination requirements and provide opportunities to improve existing structures.		
Cost			
	Alternative 7 has higher capital costs and provides most opportunity for infrastructure renewal.		
Recommendation	Recommended as part of Alternative 7	Recommended as part of Alternative 7	

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5.5 Recommended Alternative Planning Solution

Alternative planning solution 7, infrastructure improvements for all modes, was the recommended alternative for each of the corridor segments. Planning solution 7 incorporates the improvements included in planning alternatives 3 to 6, while providing additional capacity for vehicles to accommodate growth projected to 2041. Design alternatives to be considered may include widening at intersections and/or mid-block. The recommended alternative was presented at Public Information Centre (PIC) #1. A summary of PIC #1 is included in Section 8.2.

5.6 Preferred Planning Solution

Alternative planning solution 7 was confirmed as the preferred planning solution based on the results of the evaluation and the feedback received at PIC #1. The planning solution best addresses the Problem and Opportunity Statement. This planning solution will be carried forward into Phase 3 of the Environmental Assessment.

6 Development and Evaluation of the Design Alternatives

As part of Phase 3 of the Environmental Assessment, design alternatives were developed for the preferred planning solution: infrastructure improvements for all modes. For this corridor, all modes includes pedestrians, cyclists, transit, vehicles and trucks.

6.1 Development of Design Alternatives

Different design alternatives were developed for each of the three segments, based on existing and future land-use, traffic, and natural heritage features. The following sections detail the design alternatives, by segment.

6.1.1 Design Criteria

Exhibit 6-1 summarizes the design criteria used to develop the design alternatives. The design criteria generally follow the Transportation Association of Canada Geometric Design Guide for Canadian Roads or the Ontario Traffic Manual. The lane configuration for each segment is based on the traffic analysis described in Section 4.

Notable criteria include:

- A portion of South Service Road West currently has a posted speed limit of 60 km/h. To help mitigate speeding concerns, the posted speed limit for South Service Road West is proposed to be reduced to 50 km/h.
- The Livable Oakville Plan identifies a 35 metre right-of-way for Multi-purpose Arterial roads.
- Lane widths in the middle segment are 3.5 metres to facilitate truck turning movements.

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Exhibit 6-1: Design Criteria

Design Element	West	Middle	East
Road Classification	Urban Arterial Undivided	Semi-Urban/Rural Arterial Undivided	Urban Arterial Undivided
Posted Speed	50 km/h	50 km/h	50 km/h
Design Speed	60 km/h	60 km/h	60 km/h
ROW	35 m	35 m	35 m
Lane Width	2 x 3.30 m EB 2 x 3.30 m WB and 4 m TWLTL	3.50 m EB 3.50 m WB 3.30 LT at Progress	3.30 m EB 3.30 m WB and 4 m TWLTL

6.1.2 Evaluation Criteria

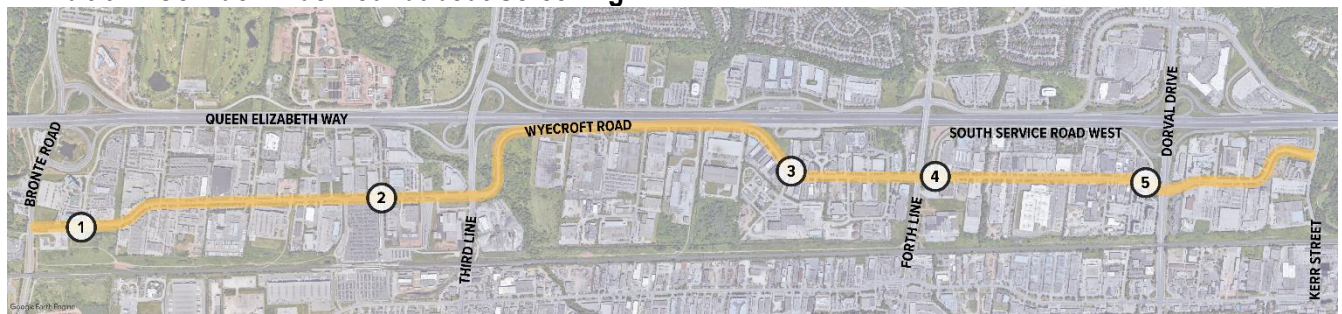
The design alternatives were evaluated against the same criteria used to evaluate the alternative planning solutions in Phase 2 of the Environmental Assessment (**Exhibit 5-2**). The criteria were grouped into five main themes: transportation, social environment, natural environment, technical, and cost.

The results of the evaluation are described in the following sections. This evaluation leads to the technically preferred design concept, as identified by the project team for each segment, summarized in Section 6.6. Detailed evaluation tables are included in Appendix L.

6.2 Corridor-wide Roundabout Screening

The corridor was screened to evaluate the potential feasibility of implementing roundabouts. Five areas were determined to be candidates for a roundabout, as illustrated in **Exhibit 6-2**. For the purposes of the evaluation, a 55 m inscribed circle diameter was assumed for a two-lane roundabout.

Exhibit 6-2: Corridor-wide Roundabout Screening



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Intersections were screened considering property, safety and operations. As shown in **Exhibit 6-3**, no intersections were carried forward for conversion to a roundabout.

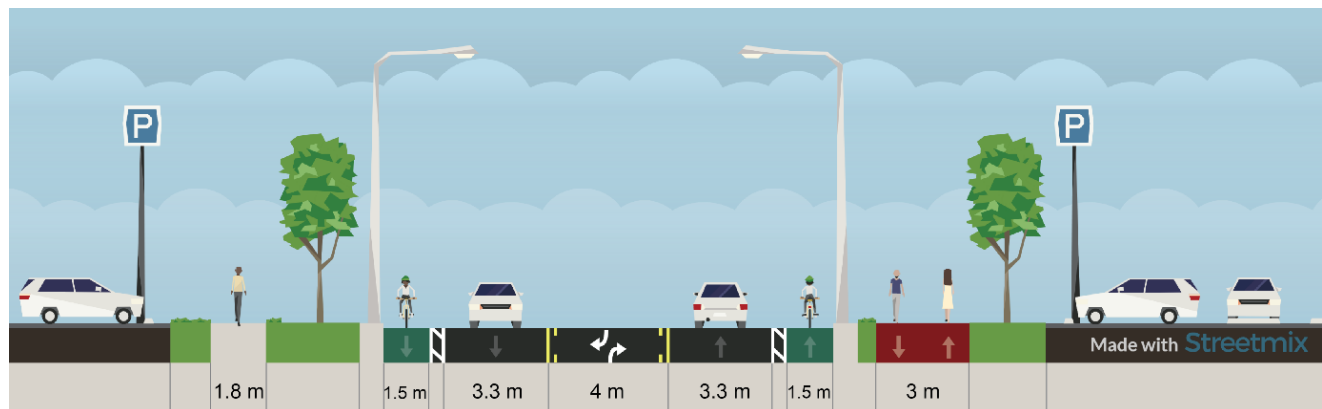
Exhibit 6-3: Roundabout Screening Results

Intersection		Key Findings	Carry Forward
1	South Service Road #1	<ul style="list-style-type: none"> Constrained by Hydro One transformer station Proximity to Bronte Road 	No
2	South Service Road #2 / GO Station Entrance	<ul style="list-style-type: none"> High proportion of turning traffic Property and driveway impacts 	No
3	1140 South Service Road (Central Operations Depot)	<ul style="list-style-type: none"> Critical access for fire and road maintenance vehicles Proximity of buildings 	No
4	South Service Road #3	<ul style="list-style-type: none"> Proximity to Fourth Line 	No
5	South Service Road #4	<ul style="list-style-type: none"> Proximity to Dorval Drive 	No

6.3 Active Transportation Design Alternatives

A variety of active transportation alternatives to implement on-road and off-road cycling facilities were developed. The various alternatives are illustrated in **Exhibit 6-4**, **Exhibit 6-5**, **Exhibit 6-6**, **Exhibit 6-7**, and **Exhibit 6-8** below.

Exhibit 6-4: Design Alternative #1 - Multi-use Trail and Buffered Bike Lanes and Sidewalks



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Exhibit 6-5: Design Alternative #2 - Multi-use Trail and Sidewalk

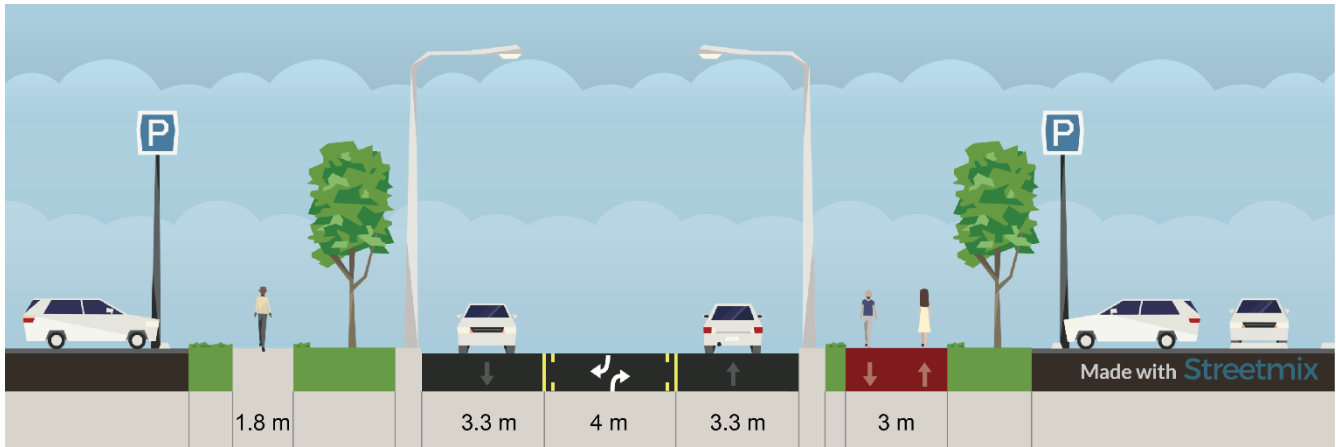


Exhibit 6-6: Design Alternative #3 - On-Road Buffered Bike Lanes and Sidewalks

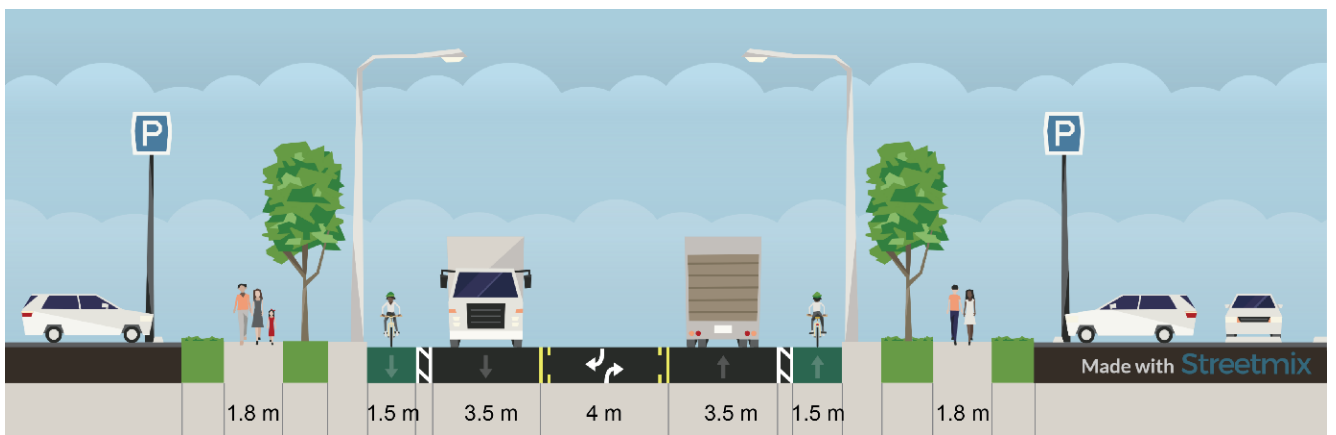
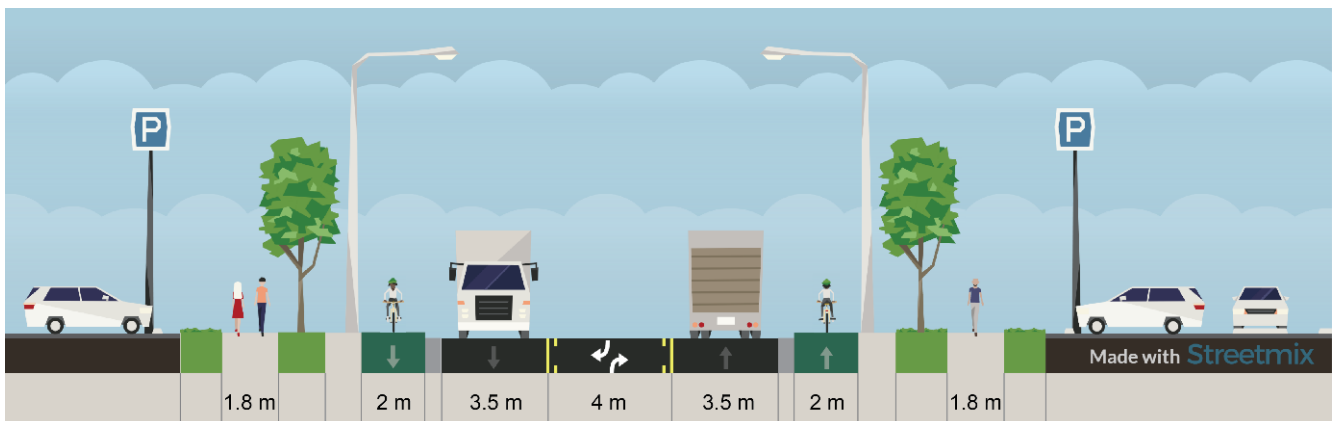


Exhibit 6-7: Design Alternative #4 - Raised Cycle Tracks and Sidewalks



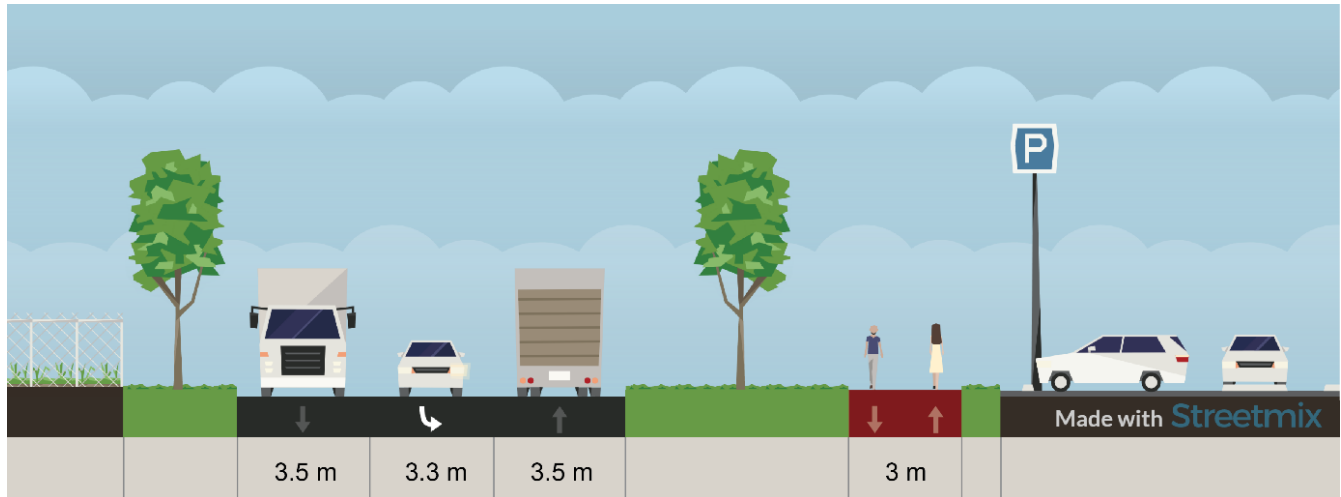
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Exhibit 6-8: Design Alternative #5 - Multi-use Trail



The results of the evaluation of active transportation alternatives are detailed below, by segment.

6.3.1 West Segment

In the west segment, two active transportation design alternatives were considered. The results of the evaluation are summarized in **Exhibit 6-9**. The technically preferred alternative (recommended alternative) is illustrated in **Exhibit 6-10**. The technically preferred design is further described in Section 6.6.

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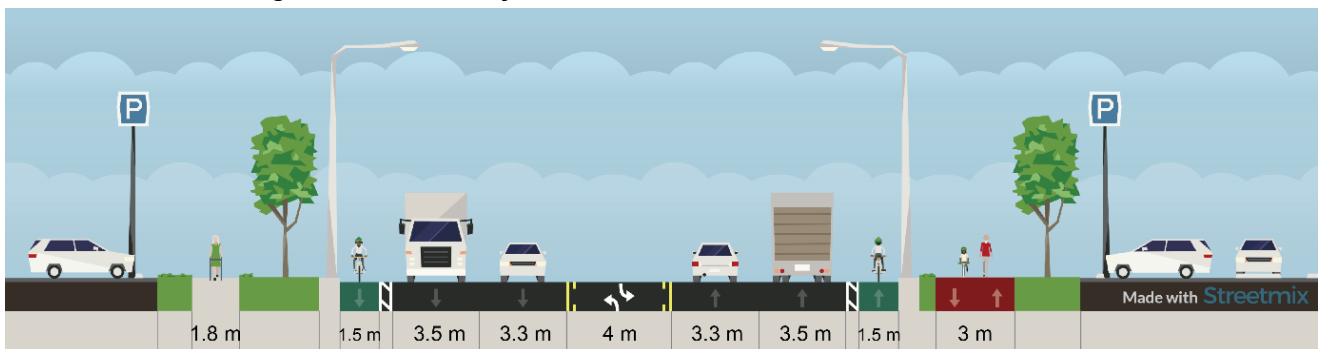
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Exhibit 6-9: West Segment - Active Transportation Summary Evaluation Table

Active Transportation Design Alternatives	
1. Multi-use Trail on south side, sidewalk on north side, no on road bike lanes	2. Multi-use Trail on south side, sidewalk on north side, buffered bike lanes in both directions
Not recommended	✓ Recommended
<ul style="list-style-type: none"> • Supports active transportation • Supports density proposed as part of Bronte GO Station MTSA • Accommodates street trees on both sides of Wycroft Road • Less property take required • Supports Town’s existing policy framework 	<ul style="list-style-type: none"> • Provides continuous cycling infrastructure from Bronte to Kerr • Supports active transportation by accommodating cyclists of various abilities • Better supports future density around the Bronte GO Station Major Transit Station Area • Accommodates street trees on both sides of Wycroft Road • Better visibility between modes • Supports Town’s existing policy framework

Exhibit 6-10: West Segment - Technically Preferred Alternative



6.3.2 Middle Segment

In the middle segment, three active transportation design alternatives were considered. The results of the evaluation are summarized in **Exhibit 6-11**. The technically preferred alternative (recommended alternative) is illustrated in **Exhibit 6-12**. The technically preferred design is further described in Section 6.6.

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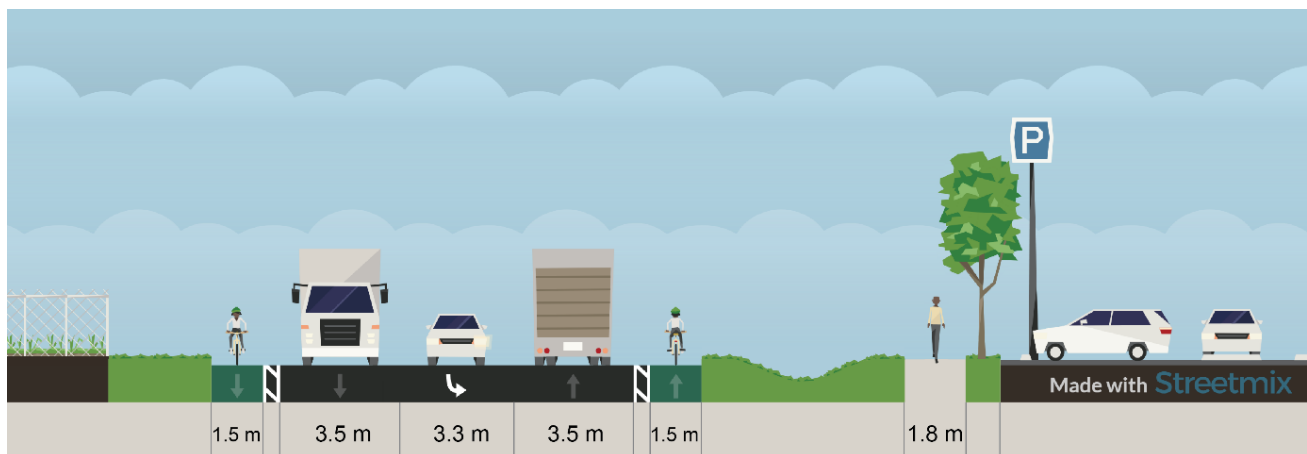
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Exhibit 6-11: Middle Segment - Active Transportation Summary Evaluation Table

Active Transportation Design Alternatives		
1. Buffered bike lanes on both sides and sidewalk on the south side	2. Cycle track on both sides and a sidewalk on the south side	3. Multi-use Trail on the south side, no on road bike lanes
✓ Recommended	Not Recommended	Not Recommended
<ul style="list-style-type: none"> • Supports active transportation • Continuous cycling infrastructure from Bronte to Kerr • Better visibility between modes • Provides separation between pedestrians and cyclists • Supports Town's existing policy framework 	<ul style="list-style-type: none"> • Supports active transportation • Continuous cycling infrastructure from Bronte to Kerr • Less visibility between modes • Provides separation between pedestrians and cyclists • Supports Town's existing policy framework 	<ul style="list-style-type: none"> • Supports active transportation • Does not provide continuous cycling infrastructure from Bronte to Kerr • Less visibility between modes • No separation between pedestrians and cyclists • Supports Town's existing policy framework

Exhibit 6-12: Middle Segment - Technically Preferred Alternative



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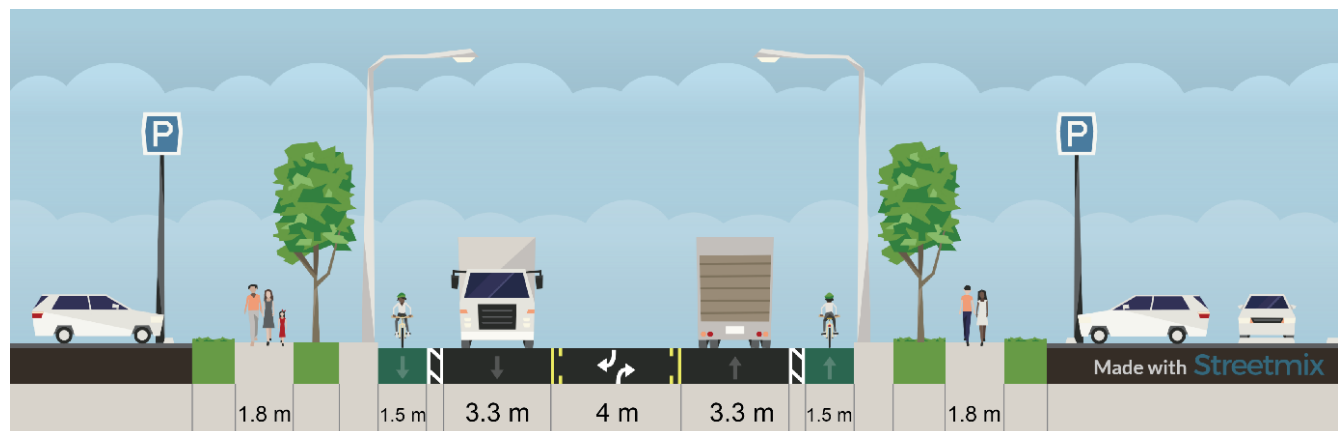
6.3.3 East Segment

In the east segment, two active transportation design alternatives were considered. The results of the evaluation are summarized in **Exhibit 6-13**. The technically preferred alternative (recommended alternative) is illustrated in **Exhibit 6-14**. The technically preferred design is further described in Section 6.6.

Exhibit 6-13: East Segment - Active Transportation Summary Evaluation Table

Active Transportation Design Alternatives	
1. Buffered bike lanes and sidewalk on both sides	2. Cycle track and sidewalks on both sides
✓ Recommended	Not Recommended
<ul style="list-style-type: none"> • Supports active transportation • Continuous cycling infrastructure from Bronte to Kerr • Better visibility between modes • Provides separation between pedestrians and cyclists • Supports Town’s existing policy framework 	<ul style="list-style-type: none"> • Supports active transportation • Continuous cycling infrastructure from Bronte to Kerr • Less visibility between modes • Provides separation between pedestrians and cyclists • Supports Town’s existing policy framework

Exhibit 6-14: East Segment - Technically Preferred Alternative



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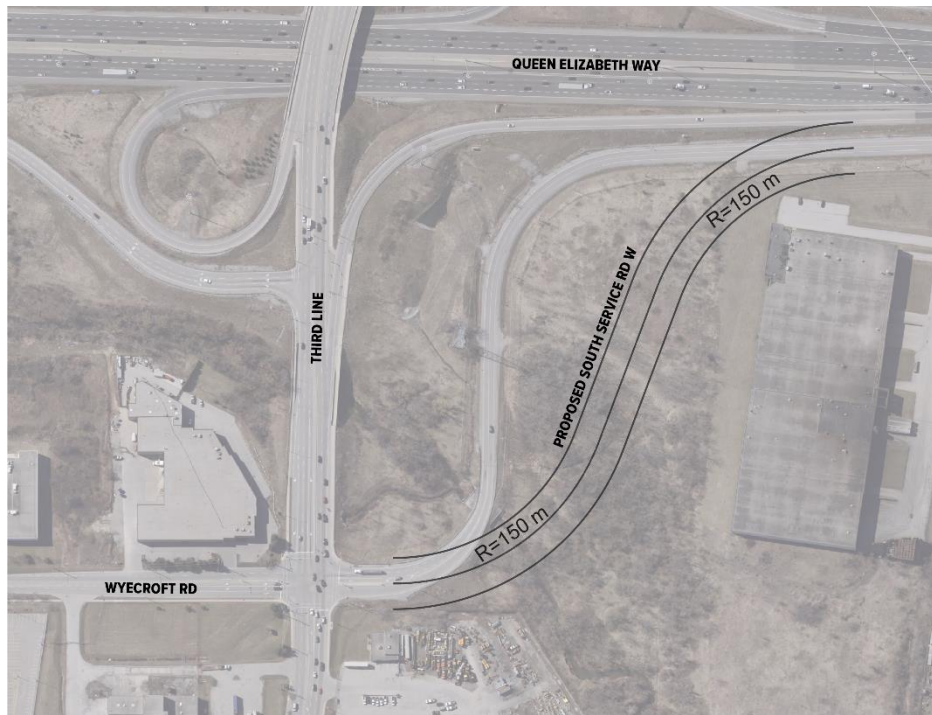
6.4 South Service Road West Realignment

In the middle segment, two design alternatives were considered for the alignment of South Service Road West, east of Third Line.

Design alternative #1 proposes to realign South Service Road West to increase the radius of the existing curves in response to road safety concerns, as shown in **Exhibit 6-15**. In this design alternative, the footprint of the former South Service Road West could be naturalized, where feasible. Access would be maintained to the existing utilities and stormwater management facilities in the area.

The results of the evaluation are summarized in **Exhibit 6-16**.

Exhibit 6-15: Middle Segment - South Service Road West Realignment



Design alternative #2 maintains the existing road alignment, which would be widened to accommodate turn lanes at the intersection of Third Line and active transportation facilities.

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Exhibit 6-16: Middle Segment - Alignment Summary Evaluation Table

South Service Road Alignment	
1. Straighten out the curves with road realignment	2. Keep existing alignment
✓ Recommended	Not Recommended
<ul style="list-style-type: none"> • Improves road safety through the curves and on approach to Third Line • Shorter duration and less impact to traffic during construction (can keep both lanes open during construction) • Higher construction cost • More impacts to natural environment, with opportunity for improvements after construction • More property take required, avoids existing building • More impact to potential future developable employment lands along QEW 	<ul style="list-style-type: none"> • Does not improve road safety • More challenges to construct while keeping traffic lanes open • Lower construction cost • Less impact to natural environment • Less property take required • Maintains Town's existing employment lands

6.5 South Service Road West #4 Design Alternatives

Five potential design alternatives were considered to improve traffic and road safety concerns at the intersection of South Service Road West #4. The general location of the five design alternatives is shown in **Exhibit 6-17**:

1. Convert the intersection to right-in right-out by extending the existing median by approximately 45 metres west.
2. Realign South Service Road West to align with Weller Court with cul-de-sac on South Service Road West to maintain driveway accesses.
3. New north-south road between Fourth Line and Dorval Drive, west of Weller Court with cul-de-sac at South Service Road West to maintain driveway accesses.
4. Convert the intersection to right-in right-out plus a roundabout at Oakville Transit to facilitate U-turns.
5. Close the intersection of South Service Road West #4 with a cul-de-sac.

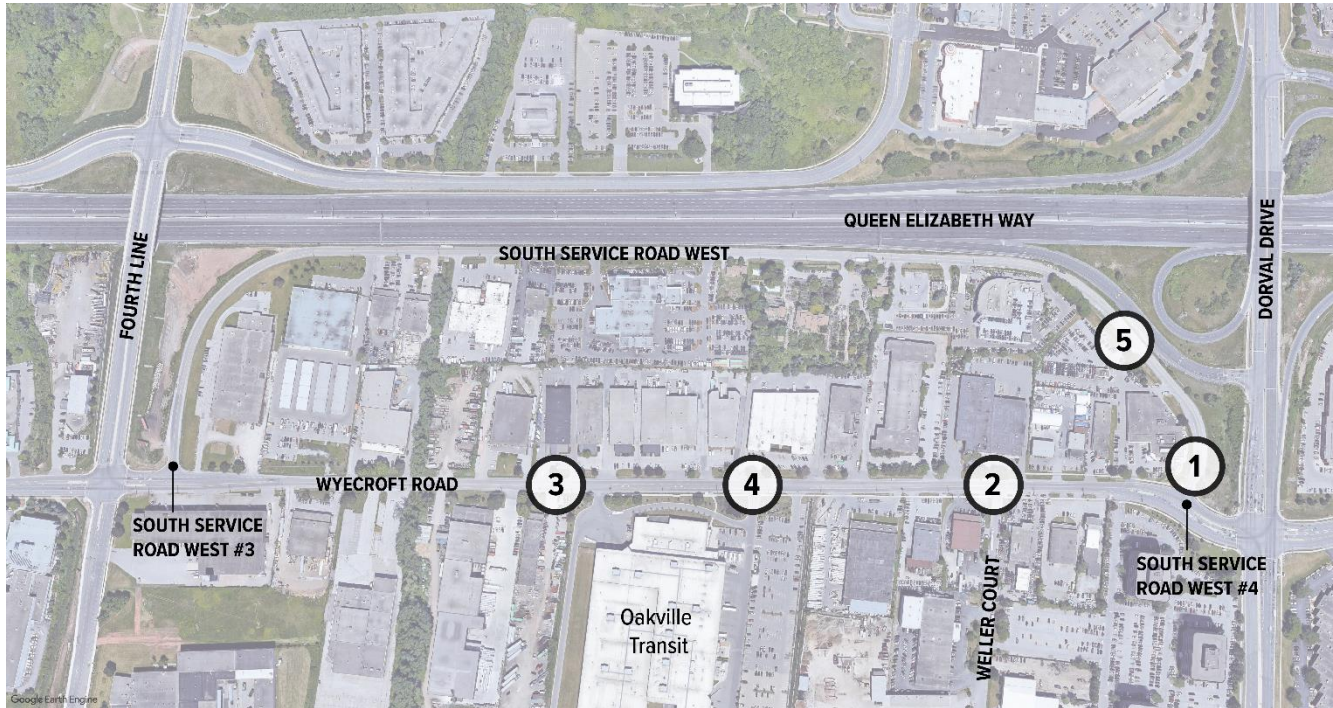
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Exhibit 6-17: East Segment - South Service Road West #4 Design Alternatives



The results of the evaluation are summarized in **Exhibit 6-18**. The technically preferred design recommends converting South Service Road West #4 to right-in right-out access. This can be achieved by extending the existing raised centre island on Wycroft Road west by approximately 45 metres.

Options 2 and 3, which propose a new north / south road between South Service Road West #3 and #4, are not part of the technically preferred design. However, the options are recommended for future study by the Town of Oakville.

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Exhibit 6-18: East Segment - South Service Road West #4 Summary Evaluation Table

South Service Road West #4 (SSR 4) Design Alternatives				
1. SSR (4) Right-in Right-out (RIRO)	2. Realign SSR (4) westerly to align with Weller Ct. Cul-de-sac at SSR (4)	3. New north south road between Fourth Line & Dorval Dr., west of Weller Ct. Cul-de-sac at SSR (4)	4. SSR (4) RIRO and roundabout at Oakville Transit	5. Cul-de-sac at SSR (4)
✓ Recommended	Recommended for Future Study		Not recommended	
<ul style="list-style-type: none"> • Lower construction cost • Less property take required • Improves road safety • Reduces connectivity 	<ul style="list-style-type: none"> • Higher construction cost • More property take required • Improves road safety • Reduces connectivity 	<ul style="list-style-type: none"> • Higher construction cost • More property take required • Improves road safety • Improves connectivity 	<ul style="list-style-type: none"> • Higher construction cost • More property take required • Improves road safety • Improves connectivity 	<ul style="list-style-type: none"> • Lower construction cost • Less property take required • Improves road safety • Reduces connectivity

6.6 Technically Preferred Design

The west segment extends from Bronte Road to Fourteen Mile Creek. As detailed in Section 4, the west segment requires widening to four lanes to accommodate expected traffic growth to 2041 with a two-way left-turn lane. Given the existing road alignment is centred in the right-of-way, widening about the centreline is the preferred horizontal alignment for this segment. Impacts to property, trees, and utilities are balanced by widening about the centreline.

The technically preferred design also includes the following active transportation facilities: a sidewalk on the north side, a Multi-use Trail on the south side, and buffered bike lanes on both sides. A future traffic signal is proposed at the Bronte GO Station bus loop for transit priority.

The middle segment extends from Fourteen Mile Creek to 1146 South Service Road West. As detailed in Section 4, no widening is required to accommodate expected traffic growth to 2041. The technically preferred design in the middle segment includes one through lane in each direction plus a westbound left-turn lane at Progress Court, a sidewalk on the south side and buffered bike lanes on

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both sides. The technically preferred design realigns South Service Road West, east of Third Line.

The east segment extends from 1146 South Service Road West to Kerr Street. As detailed in Section 4, no widening is required to accommodate expected traffic growth to 2041. The technically preferred design in the east includes one through lane in each direction, plus a two-way left-turn lane. The technically preferred design also includes sidewalks and buffered bike lanes on both sides of Wycroft Road.

The intersection of South Service Road West #4 and Wycroft Road, west of Dorval Drive, is converted to a right-in right-out access only by extending the raised centre island on Wycroft Road on the west side of Dorval Drive.

The technically preferred design, developed by the project team, was presented to a number of stakeholders, including the Business Owner Working Group and the Technical Agency Committee. The technically preferred design was then presented to the public at Public Information Centre #2. Meeting details are provided in Section 8 and Appendix A. Based on the feedback received from the stakeholders and the public, the technically preferred design was confirmed as the recommended design concept.

Based on stakeholder and public feedback, the following design refinements were made:

- Reduced width of the Multi-Use Trail in the west segment to fit street trees.
- Provided shared through right-turn lanes eastbound and westbound at Third Line to reduce pedestrian crossing times.
- Added a sidewalk on the north side of South Service Road West between the signal at 1146 South Service Road West and the westbound transit stop.
- Extended the raised centre island on Wycroft Road on the east side of Dorval Drive.
- Potential future traffic signal at the Bronte GO Station bus loop entrance for transit priority.

7 Recommended Design Concept

7.1 Preliminary Design Features

The preliminary design of Wycroft Road and a portion of South Service Road West strives to make the corridor safer for all modes by providing infrastructure improvements for all road users. The existing corridor prioritizes the automobile and lacks continuous active transportation facilities. The recommended design concept was developed with special attention to active transportation and transportation safety, as well as improvements for general vehicle traffic.

7.1.1 Active Transportation

One of the Livable Oakville Plan's guiding principles is to "provide choices for mobility by linking people and places with sustainable transportation network consisting of roads, transit, walking and cycling trails". The Town also completed an Active Transportation Master Plan update in 2017, as described in Section 1.3.9, which identified portions of the corridor as candidates for active transportation facilities.

To uphold the Town's policy direction on active transportation, sidewalks, bike lanes and/or Multi-use Trails are an integral design component in all three corridor segments:

- West
 - 1.8 metre sidewalk and 1.5 buffered bike lane on the north side
 - 3.0 metre Multi-use Trail and 1.5 buffered bike lane on the south side
- Middle
 - 1.8 metre sidewalk on the south side
 - 1.5 buffered bike lane on both sides
- East
 - 1.8 metre sidewalk on the both sides
 - 1.5 buffered bike lane on both sides

A 0.5 metre buffer separates the bike lanes from the vehicular lane. The 0.5 metre buffer could include a physical separation such as curbs or bollards, to be confirmed in detail design.

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7.1.2 Transportation Safety

In addition to improvements for active transportation modes, the following improvements for road safety are included in the recommended design concept:

- In the middle segment, from Third Line to Fourth Line, the posted speed limit is recommended to be reduced to from 60 to 50 km/h.
- South Service Road West east of Third Line will be realigned to address existing safety concerns.
- A pedestrian signal will be added at Progress Court to improve pedestrian access to transit, influence driver speed, and manage conflicts with turning traffic.
- Intersection medians east and west of Dorval Drive will be extended to discourage unsafe U-turns and left-turns.

7.1.3 Road Configuration

The recommended design concept includes the following lane configurations:

- West segment from Bronte Road to Third Line: Two through lanes in each direction plus a centre two-way left-turn lane;
- A future traffic signal is proposed at the Bronte GO Station bus loop for transit priority;
- Re-alignment of South Service Road West, east of Third Line over Fourteen Mile Creek, with a four-lane cross-section to accommodate westbound queues at Third Line;
- A dedicated westbound left-turn lane at Progress Court;
- East segment from 1146 South Service Road West to Kerr Street: One through lane in each direction plus a centre two-way left-turn lane;
- Extending the islands on the east and west legs of the Dorval Drive intersection. The intersection of South Service Road West #4 becomes right-in/right-out only; and
- A future traffic signal is proposed at the Kerr Street intersection, subject to traffic signal warrant and sightline review in detail design.

To encourage eastbound drivers to use the appropriate lane and manage queues at Dorval Drive, it is recommended to improve or add signage indicating the inside left-turn lane for Dorval Drive northbound / QEW westbound, and the outside left-turn lane for QEW eastbound.

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7.2 Streetscaping

A goal of the design was to encourage active modes of transportation by increasing the walkability of the area and providing an enhanced public realm. The recommended design concept will improve the streetscape for all road users.

Existing street trees will be impacted by the preferred design. To make the public realm more comfortable for active transportation users and to support the Town's objectives, which include increasing the tree canopy coverage, the design was refined to provide sufficient space for street trees. In addition, sidewalks are located away from the road to provide a more comfortable pedestrian experience.

7.3 Stormwater Management, Drainage and Structures

The roadway drainage was designed in accordance to applicable standards including TAC Geometric design of Canadian Roads. Snow storage was accounted for in the boulevard areas where there was sufficient space. To minimize the potential impacts of road salt on salt vulnerable areas, effective stormwater management measures and pavements that minimize spray should be implemented.

Under proposed conditions at urban sections along the study area, runoff resulting from major storm events will continue to be conveyed to existing watercourse crossings as roadway overland flow, while runoff from minor storm events will be conveyed by the proposed condition storm sewer system (comprising a combination of existing sewers, replacement sewers, and new sewers). At rural sections, both minor and major system flows will be conveyed by proposed flat bottom roadside ditches towards receiving watercourses.

Ditches provide water quality and quantity controls to Wycroft Road runoff before discharging to receiving systems. In the east segment, where ditches will be removed to create an urban cross-section, measures that will help provide quantity and quality control will be implemented, such as low impact development (LID) measures. Examples of LID that can be implemented within the corridor include:

- Permeable paving;
- Rain gardens;
- Street trees;
- Infiltration chambers underneath Multi-use Trail or sidewalks; and
- Stormwater Bioretention System.

The application of LID measures benefit the environment by:

- Improving and recharging groundwater;

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- Reducing use of potable water;
- Reducing pressure on sewer systems;
- Mitigating flooding; and
- Aiding in mitigating climate change and extreme weather events.

Proposed Structures and Culverts

To improve hydraulic capacity and the lifespans of the structures and culverts within the corridor (mapped in **Exhibit 3-7**), rehabilitation or replacement is recommended for five out of the seven structures, as outlined in **Exhibit 7-1**. Extensions at other culverts will be required to accommodate the proposed road widening. It is recommended that culverts are replaced at the time of the construction of the roadway improvements to provide appropriate capacity.

Exhibit 7-1: Structure and Culvert Recommendations

Culvert #	Location	Existing	Proposed	Notes
C1 Fourteen Mile Creek	Just east of Third Line	(2x)(H) 3.00 m x (W) 6.00 m x (L) 23.5 m	(H) 5.07 m (W) 20.00 m x (L) 24.78 m clear span bridge	Replacement
C2	175 m west of Progress Court	(D) 1.0 m x (L) 80.2 m circular pipe	(D) 1.00 m x (L) 87.7 m circular pipe	Extension in coordination with MTO
C3 Upper McCraney Creek	270 m east of Progress Court	(H) 1.70 m x (W) 3.06 m x (L) 97.3 m	(H) 1.70 m x (W) 3.06 m x (L) 109.75 m	Extension in coordination with MTO
C4	160 m west of Cranberry Court	(H) 1.83 m x (W) 2.44 m x (L) 42.7 m	(H) 1.83 m x (W) 2.44 m x (L) 48.0 m	Extension
C5	Just east of Cranberry Court	(H) 0.74 m x (W) 1.03 m x (L) 26.0 m	(H) 1.22 m x (W) 3.66 m x (L) 35.7 m	Replacement
C6 Taplow Creek	Just west of Fourth Line	(2x)(H)1.80 m x (W) 3.00 m x (L) 59 m	(2x) (H) 1.80 m x (W) 3.00 m x (L) 59 m	Rehabilitation
C7 Glen Oak Creek	310 m east of Fourth Line	(H) 1.47 m x (W) 6.10 m x (L) 16.9 m	(H) 1.50 m x (W) 6.10 m x (L) 29.5 m	Replacement

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The hydraulic capacity of the proposed culverts was assessed. All crossings meet hydraulic criteria, except C2 and C7, which do not meet the minimum 1.0 m freeboard requirement. C7 also overtops the roadway for the design flow. Since C2 was hydraulically deficient in the existing condition and upgrading the culvert will be determined by the MTO, C2 continues to be deficient in the proposed condition.

For C7, when maintaining the proposed rise of 1.5 m, increasing the bridge span beyond 6.1 m did not result in any change to the water surface elevation. At the size of 6.1 m x 1.5 m, C7 will continue to be hydraulically deficient in the proposed condition, as road profile restrictions prevent the rise from being increased beyond 1.5 m and increasing the span has no effect on the proposed hydraulics. However, the proposed HW/D ratio at C7 meets the MTO HDDS WC-7 design standard. Further opportunities to decrease flood risk/overtopping in this location should be considered during detail design

The general arrangement drawing for Crossing 1 (Fourteen Mile Creek, east of Third Line) is included in Appendix N. The structure was designed to accommodate the meander belt of Fourteen Mile Creek.

The Town of Oakville is undertaking a flood mitigation study for Fourteen Mile Creek. All improvements to Fourteen Mile Creek should be coordinated with the findings of the study and opportunities to reduce flood risk should be considered.

The structure was also designed to accommodate wildlife passage. Conservation Halton provided a copy of the Road Ecology Best Management Practices Quick Reference Guide, which states that the target openness ratio for large mammals, such as deer, is 0.6 – 1.0. The openness ratio for the proposed new structure is approximately 1.6, which is sufficient for large mammal crossings.

Proposed Storm Sewer System

Seven sewer legs that are deficient in capacity were proposed to be replaced and / or upsized. In addition to existing storm sewer replacements, new storm sewers have been proposed along Wycroft Road in locations where the rural corridor has been converted to an urban roadway. The storm sewer system in the proposed condition is comprised of a combination of existing sewers, replacement sewers, and new sewers. New storm sewers range from Third Line to east of Glen Oak Creek (Station 12+100 to 14+800) and from Dorval Drive to west of Kerr Street (Station 15+600 to 16+225).

The results of the hydraulic assessment for the proposed condition indicate that based on a 5-year design return period, all legs of the storm sewer system have been designed to sufficiently convey minor flows.

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7.4 Climate Change

Climate change was considered during each phase of the environmental assessment, beginning in Phase 1, with the development of the problem and opportunity statement, and was further considered in Phases 2 and 3 during the evaluation of planning solutions and design alternatives.

Planning solutions and design alternatives were evaluated against criteria within the following five themes: transportation, social environment, natural environment, technical and cost. Climate change was directly and indirectly considered in the natural environment criteria. The alternatives were evaluated based on their ability to minimize potential impacts to and risk from natural hazards. Potential impacts to treescape, creeks, floodplains and wetlands were also considered as part of the evaluation.

The preferred planning solution includes infrastructure improvements for all modes, including active transportation. The provision of a continuous sidewalk and cycling network will encourage more sustainable modes of transportation within the corridor, contributing to a reduction in greenhouse gas emissions.

Climate change mitigation was considered when developing the preferred design. As discussed in Section 7.2 and 7.3, street trees and LID measures have been recommended as part of the preferred design. Street trees and LID measures both benefit the natural environment and help to reduce the impacts of climate change. A summary of the benefits provided are included in the respective sections.

7.5 Traffic Noise

There are two sensitive noise receptors within the study area, based on Halton Region's guidelines, as described in Section 3.5. The noise levels at the two locations were modelled for both current and future traffic and roadway conditions. The existing noise levels are greater than 55 dBA at both locations.

The change in noise levels from traffic are predicted to be less than 5 dB at both locations, as shown in **Exhibit 7-2**. As such, according to Halton Region's guidelines for road widenings and the MTO/MECP Protocol, noise mitigation is not required and no noise mitigation measures are recommended.

Exhibit 7-2: Existing and Future Sound Levels at Noise Receptors

Point of Reception	Sound Level (dBA)				Difference	
	Existing (2018)		Future (2041)			
	Day	Night	Day	Night	Day	Night
2511 Wycroft Road	65.5	61.0	68.5	63.9	3.0	2.9
750 Redwood Square	65.2	58.6	66.9	60.4	1.7	1.8

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7.6 Utilities and Illumination

7.6.1 Utilities

Based on a preliminary review, relocation and/or protection of various utilities will be required, as summarized in **Exhibit 7-3**. Due to the road widening, above ground hydro lines and poles will require relocation. The Town will work with Oakville Hydro to develop the relocation plan during detail design.

A Hydro One transformer station is located on the south side of Wycroft Road in the west segment, east of Bronte Road. The recommended design avoids impacts to the property. Hydro One is currently updating the transformer station including a proposed access off Wycroft Road, across from the South Service Road West #1 intersection.

Coordination with Region of Halton will be required for relocation of above ground watermain appurtenances, such as fire hydrants, as well as any potential underground conflicts between the proposed storm sewer and existing watermain or sanitary sewer.

There is an existing watermain on South Service Road West, east of Third Line. Halton Region plans to replace the watermain in 2026. The Town will coordinate the timing of the roadway construction with Halton Region in an effort to complete both at the same time.

Utilities will continue to be consulted during subsequent phases of the project. Impacts will be confirmed and mitigated during detail design.

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Exhibit 7-3: Summary of Identified Utility Impacts

Utility	West	Middle	East
Watermain	Impacts to be confirmed during detail design.	Replacement planned by the Region. Opportunity to coordinate with Region to time replacement with construction of the middle segment.	Impacts to be confirmed during detail design.
Sanitary Sewer	Impacts to be confirmed during detail design.	Impacts to be confirmed during detail design.	Impacts to be confirmed during detail design.
Oakville Hydro	Hydro poles to be relocated in coordination with Oakville Hydro	Hydro poles to be relocated in coordination with Oakville Hydro	Hydro poles to be relocated in coordination with Oakville Hydro
Hydro One	No impacts	Not applicable	Not applicable
Rogers	Aerial plant to be relocated in coordination with Rogers	Aerial plant to be relocated in coordination with Rogers	Aerial plant to be relocated in coordination with Rogers
Enbridge	Not applicable	Not applicable	Not applicable
Bell	Impacts to be confirmed during detail design.	Impacts to be confirmed during detail design.	Impacts to be confirmed during detail design.
Cogeco Cable	Impacts to be confirmed during detail design.	Impacts to be confirmed during detail design.	Impacts to be confirmed during detail design.
Union Gas	Impacts to be confirmed during detail design.	Impacts to be confirmed during detail design.	Impacts to be confirmed during detail design.

7.6.2 Illumination

An illumination study of the recommended design concept was completed to develop an illumination plan. Lighting design considered the current location of hydro poles, which varies along the corridor. It was assumed that hydro poles located on the north side today will continue to be located on the north side in future. The Town should review this assumption and the lighting design in consultation with Oakville Hydro.

The illumination design for the recommended design concept proposes:

- In the west segment, street lights on the north side of Wycroft Road will be located on the relocated hydro poles. On the south side, street lights will be located on standalone direct buried concrete poles, as per the Town's standard.

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- In the middle segment, the street lights directly east of Third Line will be installed on hydro poles. East of the curve, street lights will be located on the south side only, on standalone direct buried concrete poles.
- In the east segment, lights will continue to be single-sided, to approximately Redwood Square. East of Redwood Square to Dorval Drive, street lights will be located on both sides. On the south side, the street lights will be located on existing hydro poles. On the north side, lights will be on standalone direct buried concrete poles. East of Dorval Drive to Kerr Street, street lights will be located on existing hydro poles.

Across the corridor, street lights should be located approximately 50 metres apart, and mounted at a height of 10.6 m with 2.4 m bracket arm. Exceptions include the hydro poles located on the south side in the west segment and between Fourth Line and Dorval Drive, where the mounting height will be approximately 8.7 m instead of 10.6 m. Fixtures will be 140 W, except between Fourth Line and Dorval Drive, where the street lights will be 120 W. Street lights will be setback 1.3 to 4.2 m from the back of curb.

7.7 Driveways and Access

The centre two-way left-turn lane in the west segment, the left-turn lane at Progress Court in the middle segment, and the centre two-way left-turn lane and dedicated left-turn lanes in the east segment will all help to improve access along the corridor.

East and west of Dorval Drive, the centre raised island will be extended to address existing safety concerns. As a result, South Service Road West #4 and the driveway access to 250 Wycroft Road will become right-in right-out only.

Driveways impacted by the road construction will be restored to a suitable grade. Minor grading beyond the property line may be required at some locations to maintain existing grade and avoid retaining walls or toe walls.

7.8 Property Requirements

As part of this study, a context sensitive design approach was used to minimize the extent of grading and the need to acquire additional property. Property acquisition will be required to achieve the designated right-of-way and implement the preferred design.

Wycroft Road and a portion of South Service Road West is designated as a Multi-Purpose Arterial on Schedule C of the Livable Oakville Plan. The Livable Oakville Plan specifies that the right-of-way for Multi-Purpose Arterial roads is to be 35 metres. Potential property requirements are illustrated on the design plates in Appendix M.

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For the west segment, property is required from properties on both the north and south side of Wycroft Road.

For the middle segment, the full 35 metres is not required to implement the recommended design for the middle segment.

The realignment of South Service Road West, east of Third Line, requires approximately 25,000 m² of property from 1450 South Service Road. Approximately 500 m² of property is also required from 1290 South Service Road given the property's irregular parcel fabric, which extends beyond the extent of the adjacent parcels.

For the east segment, the full 35 metres is not required to implement the recommended design. Property is required from properties on both the north and south side of Wycroft Road.

Property requirements will be reviewed and confirmed in detail design.

7.9 Preliminary Capital Cost Estimate

The estimated cost of the recommended design is provided by segment in the following sections. The preliminary cost estimate for the whole corridor is in the range of \$42 million. The cost estimate does not include property acquisition, utility relocation, engineering fees, or Harmonized Sales Tax. The cost estimate includes a 15% contingency. A detailed cost estimate should be completed in detail design.

8 Public, Agency and Stakeholder Consultation and Indigenous Community Engagement

Consultation was conducted over the duration of the EA in an effort to engage the public, agencies, stakeholders and Indigenous communities. Formal venues for consultation included PICs and groups such as the TAC and the Business Owner Working Group. Comments could be submitted at any point over the course of the study through email and by phone. This section summarizes the consultation completed over the course of the study. Details are included in Appendix A.

8.1 Notice of Study Commencement

The Notice of Commencement for the Wycroft Road Improvements Municipal Class Environmental Assessment (EA) was published in the Oakville Beaver on May 3, 2018 (see Appendix A). The notice was also posted on the Town of Oakville website at (https://www.oakville.ca/townhall/pn_18may03.html), which is accessible to members of the public.

Property owners within 300 metres of the study area were mailed a Notice of Commencement. A total of 262 notices were mailed.

Federal, provincial, regional and local agencies, utilities, conservation authorities, organizations and Indigenous communities with potential interest in the project were notified of this Environmental Assessment by email or mail sent on May 3, 2018.

8.2 Public Information Centre #1

The Notice of Public Information Centre (PIC) #1 was published in the Oakville Beaver on November 15, 2018. The Notice was also posted to the Town of Oakville website on November 15, 2018, at <https://www.oakville.ca/index.html> which is accessible to members of the public.

The Notice of PIC #1 was mailed to all property owners within 300 metres of the study area. Contacts on the project mailing list received the notice by email or mail.

Signs advertising PIC #1 were placed at select locations along the corridor to inform the public of the event.

The PIC #1 boards were posted on the project website on November 26, 2018 (<https://www.oakville.ca/residents/wycroft-road-ea.html>).

The event took place on November 28, 2018, from 4:30 to 6:30 p.m. at the Holiday Inn and Suites at 2525 Wycroft Road, Oakville. The PIC was held as an open house format with a presentation scheduled for 5:00 p.m. Members of the project team were available to answer questions and collect feedback from the public.

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A total of 13 people signed-in at the event. Four comment sheets and four emails were received during the two-week comment period. The comments that were received showed support for active transportation facilities and street trees, and concern for increasing traffic congestion in the corridor.

All of the comments received are summarized in the PIC #1 Summary Report, which is included in Appendix A. The Summary Report was posted to the project website after the two-week comment period closed.

8.3 Public Information Centre #2

The Notice of Public Information Centre (PIC) #2 was published in the Oakville Beaver on May 30, 2019. The Notice was also posted to the Town of Oakville website on May 28, 2019, at <https://www.oakville.ca/index.html> which is accessible to members of the public.

The Notice of PIC #2 was mailed to all property owners within 300 metres of the study area. Contacts on the project mailing list received the Notice by email or mail.

Signs advertising PIC #2 were placed at select locations along the corridor to inform the public of the event from June 3 to June 14, 2019.

The PIC #2 boards were posted on the project website on June 12, 2019 (<https://www.oakville.ca/residents/wycroft-road-ea.html>).

The event took place on June 13, 2019, from 4:30 to 6:30 p.m. at the Holiday Inn and Suites at 2525 Wycroft Road, Oakville. The PIC was held as an open house format with a presentation scheduled for 5:00 p.m. Members of the project team were available to answer questions and collect feedback from the public.

A total of 12 people signed-in at the event. Five comment sheets and 0 emails were received during the two-week comment period. The comments that were received showed support for the active transportation facilities, widening the west segment, intersection improvements and new traffic signals at the proposed locations. Comments suggested that a new access for 731 Third Line be constructed off of South Service Road West, east of Third Line, and that the Town consider truck operations on existing shoulders.

All of the comments received are summarized in the PIC #2 Summary Report, which is included in Appendix A.

8.4 Agency and Stakeholder Consultation

A Technical Agency Committee (TAC) was formed to effectively consult with agencies with approvals and/or a direct interest in the project. The TAC included members from provincial, regional and municipal levels of government, conservation authorities and utilities.

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The first TAC meeting took place on August 16, 2018. The purpose of the meeting was to provide an overview of the study and to obtain feedback from the attendees. The project team outlined the problem and opportunity statement and the alternative planning solutions, including the preliminary recommended alternative planning solutions. Generally, attendees were supportive of the recommended solution, which included infrastructure improvements for all modes. The presentation and minutes of the meeting are included in Appendix A.

The second TAC meeting took place on April 29, 2019. The purpose of the meeting was to obtain feedback on the technically preferred design. The project team provided an overview of the design criteria used to develop the technically preferred design and outlined the design proposed for the west, middle and east segments. Attendees provided comments on design elements. Discussion topics included:

- The need for street trees within the west segment;
- Environmental impacts of the potential re-alignment east of Third Line;
- Construction timing of other projects within, adjacent or parallel to the study area;
- Considerations for culvert rehabilitation and replacement; and
- Traffic concerns between Fourth Line and Dorval Drive.

The presentation and minutes of the meeting are included in Appendix A.

8.5 Business Owner Working Group

A Business Owner Working Group was established to help the project team better understand the needs of the businesses within the study area.

Businesses in proximity to the study area of Wycroft Road including South Service Road West from Bronte Road to Kerr Street were invited to join, including several who attended PIC #1 or who had previously contacted the project team.

The Business Owner Working Group meeting was held on April 8, 2019. Eight individuals representing eight businesses in the study area attended. Attendees were asked to share insights on issues and opportunities that exist in the corridor and were invited to comment on preliminary design concepts for the three segments. Members provided insights on traffic safety concerns, traffic congestion, and active transportation facilities, which helped shape the technically preferred design presented at PIC #2. Generally, attendees were supportive of the active transportation facilities, the two-way left-turn lane and the intersection improvements proposed. The presentation and minutes of the meeting are included in Appendix A.

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8.6 Indigenous Community Engagement

The Environmental Assessment and Permissions Branch of the Ministry of the Environment, Conservation and Parks was requested to identify which Indigenous communities might have an interest in the project.

The Indigenous communities that were identified as having potential interest were contacted by Town of Oakville at the project's commencement, through a letter accompanying the Notice of Commencement mailed on April 30, 2018. Indigenous communities were also informed of both Public Information Centres through mailed letters.

Details of all Indigenous engagement undertaken during the study is included in Appendix A.

Mississaugas of the New Credit First Nation expressed interest in the study and requested a copy of all environmental reports. The community also requested that Field Liaison Representatives be present for any environmental and archaeological assessments for the project. On September 6, 2018, Field Liaison Representatives from the Mississaugas of the New Credit First Nation accompanied LGL Limited on site for environmental fieldwork.

Chippewas of Rama First Nation requested a copy of the Environmental Study Report upon its completion.

9 Environmental Impacts and Mitigation Measures

Impact assessments were completed to identify the potential effects of the recommended design on the natural and cultural environment. Mitigation measures are proposed to minimize potential negative impacts and result in a net benefit to the environment. Impacts and mitigation measures are outlined in the following sections, by study.

9.1 Natural Heritage

The following section identifies the potential impacts of the proposed improvements on the natural heritage features within the study area. Mitigation measures to help minimize potential negative impacts are proposed.

9.1.1 Soils, Erosion and Sediment Control, and Surface Water

Impacts

The soil within the study area is susceptible to erosion and may be disturbed by construction activities. During construction, suspended soil particles and eroded materials could impact vegetation, wildlife habitat and surface water. Increased runoff may also promote downstream erosion which would affect water quality with sediments. Contamination from other sources, like spills from equipment during the construction phase, also have the potential to affect surface water. The following sections outline the potential impacts and proposed mitigation measures to protect surface water from soil disturbance/erosion and other contamination sources.

General Impacts

General impacts associated with the proposed structure and culvert works include the potential alteration of water quality through erosion of exposed materials and the subsequent impairment of water quality downstream with sediments and other contaminants.

Mitigation Measures

The following erosion and sedimentation control measures can be applied to limit potential impacts to surface water:

- Placing straw bale flow checks at regular intervals in roadside ditches down-gradient from areas of soil disturbance to trap suspended sediments and reduce the erosive force of runoff;
- Placing silt fence along watercourses, ditches, wetlands and forest/woodland edges in areas of soil disturbance;
- Limiting the extent and duration that soils are exposed to the elements to the minimum area and time necessary to perform the work;

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- Managing stormwater during construction to prevent contact with exposed soils;
- Applying seed and mulch, tackifier and/or erosion control blankets in areas of soil disturbance to provide adequate slope protection and long-term slope stabilization;
- Monitoring and maintenance of erosion and sedimentation control measures during construction to ensure their effectiveness; and,
- Directing dewatering discharge to a sediment containment system (sediment basin, sediment bag, etc.) prior to release to the watercourse.

Several mitigation measures can be applied to limit potential impacts to surface water from spills and contamination:

- Delineating storage, stockpiling and staging areas prior to construction and inspecting areas regularly;
- Storing construction related materials away from watercourses and watercourse banks to prevent their entry into the natural environment;
- Refueling, maintenance and washing activities can occur at a pre-determined site away from all watercourses and their banks to prevent the entry of harmful substances into the watercourses within the study area; and,
- Reporting all spills that could potentially cause damage to the environment to the Spills Action Centre of the MECP. In the event of a spill, containment and clean-up should be completed quickly and effectively.

The general construction impacts listed above can be mitigated through the following actions:

- Isolating work areas;
- Treating effluent from dewatering, where applicable, prior to its release back into the receiving watercourse;
- Deploying and maintaining erosion and sediment control measures (silt fencing, flow checks, etc.);
- Directing roadway runoff to stormwater management systems where technically feasible or adding options for on-site treatment; and,
- Re-planting exposed areas as quickly as possible post-construction.

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9.1.2 Aquatic Habitats and Communities

Impacts

The proposed replacement, rehabilitation or extension of the culverts at the four watercourse crossings have the potential to result in impacts to aquatic habitats and communities within the study area. A DFO screening should be conducted prior to construction to determine if a review is required. Specific impacts related to each watercourse crossing are below. Further details are provided in Appendix B.

Fourteen Mile Creek (Culvert #C1)

Impacts to this crossing are limited to the removal of riparian habitat associated with the South Service Road West realignment.

The proposed bridge design would be considered a benefit to fish habitat. The existing culvert does not span the bankfull width of the creek and supports a partial seasonal fish barrier.

The bridge design is proposed to span larger than bankfull and aims to reconnect the floodplain. Removing the partial seasonal fish barrier and spanning bankfull will benefit fish habitat. Further, increasing the structure height at this crossing would also benefit the system as Redside Dace is a species highly dependent upon the presence of overhanging streamside vegetation. The proposed design is also 2.5 metres shorter than the existing culvert, therefore it will enclose less stream length.

Upper McCraney Creek (Culvert #C3)

This culvert is owned by MTO, therefore culvert modifications are limited to the extension of the culvert to accommodate the width of the road improvements. The watercourse is highly modified within the vicinity of South Service Road West and is considered a permanent barrier to fish movement upstream. The plan to extend the culvert will enclose additional instream habitat. No barriers to fish passage are anticipated.

Taplow Creek (Culvert #C6)

The existing twin cell culvert is concrete lined and skewed on an angle to the road. As a culvert extension is not required, no additional instream habitat will be enclosed. No barriers to fish passage are anticipated.

Glen Oak Creek (Culvert #C7)

The existing culvert will be replaced with a culvert that will enclose an additional 13.3 m length of riffle/run habitat. However, the proposed culvert will be wider and higher than existing. No barriers to fish passage are anticipated.

Drainage Features (C2, C4, C5)

As part of the proposed improvements, existing drainage features will be upgraded, however, the drainage features within the study area do not support

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aquatic habitat, and thus, no direct impacts to aquatic habitat will occur. No barriers to fish passage are anticipated.

Mitigation Measures

An overall benefit permit will likely be required under the Endangered Species Act (2007) for works at Fourteen Mile Creek (C1).

The following environmental protection measures are proposed to reduce the number of potential adverse effects to aquatic habitats:

- Conducting in-water works during the specified timeframe (Appendix B) to avoid the period when spawning is occurring and low flow conditions are present within the study area;
- Delineating work areas with construction fencing to minimize the area of disturbance;
- Limiting riparian vegetation removals along watercourses to the extent possible and delaying removals until immediately prior to construction;
- Installing and maintaining appropriate sediment control structures prior to and during construction to prevent entry of sediments into watercourses and drainage features;
- Carrying out all in-water work “in the dry” using an appropriate stream by-pass system;
- Where cofferdams (if applicable) are to be employed, dewatering effluent should be treated prior to discharge to receiving watercourse;
- Capturing and safely releasing fish isolated by construction activities (if applicable) to the watercourse under a Fish Collection Permit. This will be conducted by qualified, experienced biologists;
- Implementing good housekeeping practices related to materials storage/stockpiling, equipment fueling/maintenance, etc. during construction; and,
- Vegetating and covering disturbed riparian areas with an erosion control blanket as quickly as possible to stabilize the banks and minimize the potential for erosion and sedimentation.

9.1.3 Vegetation and Vegetation Communities

Impacts

The improvements to the study area may result in displacement and disturbance to vegetation and vegetation communities. However, impacts are not expected to any designated natural areas/areas of environmental significance or any rare, threatened or endangered vegetation and vegetation communities.

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The proposed improvements will result in a total loss of 9.88 ha of vegetated communities, with the majority being Manicured/Planted areas and Cultural Meadows. Minimal removals of cultural thicket, cultural woodland, and deciduous forest are proposed as part of the road improvements.

Most of the vegetated communities within the study area are Manicured/Cultural communities and can tolerate and recover from disturbances. Greater diversity exists near Fourteen Mile Creek, however, overall species diversity within the right-of-way is limited due to the existing land uses nearby.

Overall, impacts resulting in the loss of vegetation near Fourteen Mile Creek are considered to be moderate, while removals associated with the remaining study area are considered to be minor.

Potential impacts to vegetation as a result of the proposed realignment were determined through air photo interpretation and from within the right-of-way, as permission to enter was not granted to conduct surveys. Detailed vegetation investigations should be undertaken during detail design to further understand vegetation impacts within this area.

Mitigation Measures

The following measures, further described in Appendix B, should be implemented during construction to protect vegetation and vegetation communities to the extent possible:

- Minimizing the removal of vegetation/vegetation communities;
- Preventing soil migration from the construction area and, where soil is exposed, stabilizing the area as soon as possible;
- Operating construction vehicles in a way that prohibits/limits impacts to sensitive wetland features and riparian habitats;
- Using native and non-invasive vegetation covers to protect any exposed surfaces;
- Placing old field seed mix and mulching or erosion control blankets in areas of soil disturbance to provide adequate slope protection and long-term slope stabilization in areas where sensitive features and watercourses are to be protected;
- Installing appropriate tree protection around trees to be retained to shelter them from construction operations, equipment and vehicles and repairing or replacing trees/shrubs identified to remain, if they become damaged by construction activities;
- Implementing restoration and edge management planning to mitigate impacts related to vegetation removals and/or impacts near to existing edges of natural areas; and,

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- Integrating landscape planning and planting to mitigate removals within landscaped/manicured areas, to beautify areas within the new right-of-way, provide shading, wildlife habitats and promote carbon capture.

9.1.4 Tree Resources

Impacts

The widening and realignment of Wycroft Road and portions of South Service Road West has the potential to result in impacts to tree resources within the corridor. A preliminary assessment was undertaken to determine how many trees would be removed, impacted, and retained. For this assessment, impacted trees refer to those which will likely require root and/or canopy pruning. The results identified a total of 266 trees to be removed, none to be impacted, and 48 to be retained.

The only identified SAR trees within the study area is the Kentucky coffee tree, which is protected by the Ontario Endangered Species Act (ESA, 2007). However, the trees within the study area are considered streetscape and planted Kentucky coffee trees, which are not protected under the ESA, 2007, due to their non-native origin. As such, no further consultation with the MNRF or MECP, is required for the Kentucky coffee trees.

Mitigation Measures

To offset the potential removal of up to 266 trees, new trees will be planted to avoid a net loss of trees.

Mitigation measures are recommended to minimize impacts to trees surrounding the work zone and those identified to be retained. Detailed recommendations are listed in Appendix B and summarized below:

- Installing tree protection fencing in accordance with the Town of Oakville specifications for the duration of all construction activity;
- Operating heavy machinery outside the Tree Protection Zone (TPZ);
- Storing construction materials, equipment, soil, construction waste or debris outside the TPZ or dripline of the trees identified for protection;
- Avoiding any movement or parking of vehicles, placement of equipment or pedestrian traffic within the TPZ;
- Restricting grading changes within the TPZ unless approved by the Tree Protection Plan, to be developed during detail design;
- Prohibiting the attachment or wrapping of rigging cables or hardware around trees, and prohibiting contaminants from being dumped within protected areas;

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- Felling all removals into the work zone to ensure that damage does not occur to trees within the TPZ;
- Consulting a qualified Arborist regarding additional, incidental or accidental tree injuries during construction, and to determine whether additional mitigation measures should be employed;
- Applying wood to the ground to a depth of 100 mm in areas where minimum tree protection zones will be encroached by construction traffic. Steel plates or ¾" plywood should be laid on top of the chips to dissipate compressive force of vehicles on the soil.
- Removing steel plates/plywood once the access route is decommissioned, and the wood chips spread around the tree using hand tools; and,
- Conducting tree clearing outside of the Migratory Bird Convention Act (MBCA) breeding season commonly considered May to August.

9.1.5 Wildlife and Wildlife Habitat

Impacts

The widening and realignment of Wycroft Road and portions of South Service Road West has the potential to result in impacts to wildlife and wildlife habitat. Impacts are categorized in the following sections.

Displacement and Disturbance of Wildlife and Wildlife Habitat

Within the study area, Manicured Grass areas are most likely to be disturbed or displaced by the proposed improvements, however these habitats typically support non-sensitive wildlife.

There are several small Cultural Meadow/Thicket communities along the right-of-way which may be disturbed or displaced. These areas support limited wildlife and provide habitat for other urban tolerant species, but the natural heritage function is considered to be minimal due to the small, fragmented nature of the communities documented.

The proposed realignment of South Service Road West, east of Third Line, may result in significant intrusion to the Meadow/Thicket/Woodland/Forest and disturb wildlife passage and functions temporarily along Fourteen Mile Creek. The realignment may also fragment the community through the proposed removals and disrupt the use of this semi-natural area permanently for wildlife.

However, the replacement of the existing culvert with a proposed 20 m single span bridge will ultimately improve wildlife mobility and habitat linkage surrounding Fourteen Mile Creek. The wildlife openness ratio at this crossing will significantly increase to accept all wildlife types.

Barrier Effects and Interruptions to Wildlife Passage

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The proposed extension of C4 would reduce the openness ratio of the culvert by .024, which may limit herpetofauna and mid-sized mammals. The openness ratio of the existing culvert is at the bottom of the acceptable range for herpetofauna and mid-sized mammal crossings, the proposed crossing is not expected to have a significant impact on wildlife movement.

Works at crossing C1 and C5 will significantly increase the openness ratios of the culverts, allowing for greater wildlife mobility for small to medium size wildlife.

At culvert crossings C2, C3, C6, and C7, there will be little to no impact on wildlife movement.

Wildlife from Noise, Light and Visual Intrusion

In the majority of the study area wildlife have become acclimatized to the noise, light and visual conditions associated with the presence of the highway and urban settings. Disturbance to wildlife from any increase in noise light and visual intrusion potentially caused by the improvements are not expected to have significant adverse effects.

Potential Impacts to Migratory Birds

A total of 24 bird species recorded in the study area are protected under the MBCA. Although no nests of migratory birds were documented within the study area, evidence of bird nesting behaviour was identified within the vicinity of the proposed construction activities. The removal of vegetation for the realignment of South Service Road West will very likely impact migratory breeding birds that have previously used the area for nesting, however the area was not surveyed due to access restrictions.

No rare species or significant wildlife habitat were documented within the study area, therefore; no impacts are anticipated to any SAR wildlife or habitat. Further examination to determine the presence of SAR should be conducted during the detail design phase and is subject to additional regulations.

Mitigation Measures

In order to mitigate potential impacts to wildlife and wildlife habitats, the following measures should be taken:

- Complying with the requirements of the MBCA by completing activities that may disturb, or require the clearing or disruption of vegetation where birds may be nesting between the April 1 to August 31 window;
- Undertaking nest screening surveys outside the April 1 to August 31 window. Surveys should be undertaken by a qualified avian biologist for all events; and,
- Ensuring the Contractor does not block or prohibit wildlife access to culverts and to the wildlife corridor during construction.

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Summary

Overall, the proposed improvements have the potential to result in impacts to vegetation, tree resources, and wildlife and wildlife habitat, however no significant or rare environmental features or SAR will be impacted by the improvements.

The study is largely urban and industrial in nature. It is likely that wildlife have become acclimatized to the noise, light and visual conditions associated with the presence of the highway and urban settings and only those that are tolerant of human activities tend to persist, therefore the proposed improvements are not anticipated to result in any long-term detriment to the natural environment.

Where negative impacts are unavoidable, mitigation measures have been proposed to limit and/or prevent adverse effects.

9.2 Geomorphology

There are four regulated watercourses within the study area. The proposed improvements, which include the replacement, rehabilitation, and extension of culverts, were analysed to determine potential impacts and mitigation measures for the regulated watercourses. Details are provided in Appendix C.

9.2.1 Fourteen Mile Creek

Impacts

The realignment of South Service Road West, east of Third Line will require a new crossing of Fourteen Mile Creek (C1). The proposed 20 m clear span bridge provides a more suitable and significantly improved replacement, with a span that is more than three times the bankfull channel width (6.53 m). This allows for the design of a bankfull channel through the clear span bridge.

The area of the existing crossing would be impacted through the removal of the existing culvert and will need to be restored.

Mitigation Measures

In order to mitigate potential impacts to fish and fish habitat, the following measures should be taken at C1:

- The channel under the proposed bridge should be designed based on principles of natural channel design while recognizing that there would be a lack of natural soil stabilization through vegetation establishment;
- The channel boundary material and the overbank area for the full bridge span should be comprised of riverstone that is hydraulically sized to resist entrainment;

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- The depth of riverstone relative to the top of the overbank elevation should be greater than the depth of pools to ensure that the bridge footings are protected;
- To provide habitat complexity through the bridge, the channel morphology should vary with the inclusion of riffles and pools; and,
 - The pools would ideally have a bankfull depth of 1 m or more, depending on the assessed stability of the channel cross-sectional geometry, as this depth would be suitable for Redside Dace.
- Install large woody debris or root wads along the channel banks, particularly along the outside bank of channel bends, to enhance Redside Dace habitat.

9.2.2 Other Crossings

Crossings C3 and C6 at the tributary of Fourteen Mile Creek and Taplow Creek, respectively, are proposed to be extended on the south side of the road, while C7 is proposed to be replaced with a new box culvert. At all areas, there is an opportunity to improve the crossing for fish and fish habitat over existing conditions.

At C3, there is currently an outlet that is in perched condition that could be addressed as part of the culvert extension and/or receiving channel restoration, in coordination with MTO.

For C6, there is an opportunity to improve conditions for fish, as currently both barrels of the twin box culvert have sediment accumulation. Culvert capacity may need to be restored by removing sediment, but a low-flow channel could still be installed through the east barrel for fish passage during baseflow conditions if the existing culvert is sufficiently embedded. If the existing culvert is not embedded, the installation of baffles or other means of reducing low-flow velocities can be explored.

The replacement of Crossing C7 at Glen Oak Creek with a larger span structure offers an opportunity to reinstate a low-flow channel across the road and improve fish habitat and passage. Natural channel design principles could be employed to develop a channel through the culvert.

A self-assessment will be undertaken during detail design to determine if a DFO screening is required (<http://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html>).

9.3 Cultural Heritage

9.3.1 Archaeology

A Stage 1 Archaeological Assessment was completed for the corridor in Summer 2018 (Appendix D). The lands surrounding Fourteen Mile Creek retain

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archaeological potential. A Stage 2 Archaeological Assessment by test pit survey at five metre intervals, is required during detail design.

Should the proposed work extend beyond the current study area, further Stage 1 Archaeological Assessment should be conducted to determine the archaeological potential of the surrounding lands.

9.3.2 Built Heritage

A Cultural Heritage Resource Assessment was completed for the corridor in Summer 2018 (Appendix E). The background research, data collection, and field review conducted for the study area determined that there are no cultural heritage resources located within or adjacent to the study area.

Should future work require an expansion of the study area, a qualified heritage consultant should be contacted in order to confirm the impacts of the proposed work on potential heritage resources.

9.4 Air Quality

There may be changes in local air quality from enhancing the capacity and operational capability of Wycroft Road and South Service Road West between Bronte Road and Kerr Street. The following sections outline potential impacts and propose mitigation measures to prevent adverse effects.

Impacts

Overall, the proposed improvements are expected to have negligible effect on local air quality, given the proximity to the QEW. Some intersections along the corridor currently operate at or near capacity during the peak hours, with significant delays and congestion resulting in poor operations with long delays. If no improvements occur along Wycroft Road, the forecasted increase in traffic demand will exacerbate the existing congestion. Reduction of congestion, for example in the form of stop-and-go traffic flows and excessive engine idling, has the potential to reduce common air quality contaminants produced by stagnated traffic.

Two types of construction emissions are likely: dust from various material handling operations, and combustion emissions from construction equipment, which is typically powered by diesel engines. Such emissions will be temporary in nature and the impact is expected to be localized.

Mitigation Measures

To mitigate the potential impacts described above, the following mitigation measures should be applied:

- Water to limit dust emissions from surfaces;
- Cover excavated materials or fill materials stored on site;
- Street clean to limit tracking of materials;

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- Cover all trucks hauling dirt, sand, soil, or other loose materials;
- Clean all adjacent streets if visible soil materials are present due to operations; and,
- Install wheel washers where vehicles enter and exit the work site onto public roads.

To minimize the potential impacts from diesel powered construction equipment, the following mitigation measures should be applied:

- Locate truck staging zones away from potential receptors; and,
- Minimize idling time for all diesel powered equipment operating on the site.

Air quality mitigation measures will be confirmed during detail design.

9.5 Noise and Vibration

Noise levels were simulated for the two sensitive receptions identified in the corridor for both existing and forecasted (2041) conditions to determine the impacts of the improvements. The results showed that the proposed improvements will result in an increase in noise levels that is less than 5 dBA (Section 7.4). Based on the Halton Region noise criteria for road widenings, as used by the Town of Oakville, mitigation measures are not required. Details are provided in Appendix F.

9.6 Stormwater Management

A stormwater assessment was undertaken to develop a stormwater management plan to convey external and internal runoff across Wycroft Road and South Service Road after the implementation of the proposed improvements to mitigate potential impacts on the receiving drainage systems.

The following sections describe the potential impacts of the proposed improvements on stormwater management and drainage. Mitigation measures are proposed to reduce potential negative impacts.

Impacts

The proposed improvements will result in a slight increase in pavement area. A pavement area analysis was conducted to determine the impervious surface area in the existing and proposed condition within the fourteen internal roadway drainage areas defined for the site. Peak flow rates were also determined.

The analysis found that the proposed improvements will slightly increase peak flows within 5 catchment areas:

- Catchment Area 1 - Wycroft Road and South Service Road West #1
- Catchment Area 2 - Wycroft Road and Westgate Road #2

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- Catchment Area 3 - Wycroft Road and South Service Road West #2
- Catchment Area 4 - South Service Road West at Fourteen Mile Creek
- Catchment Area 8 - South Service Road West and Cranberry Court

Mitigation Measures

A total of 709 m³ of storage is required to temporarily retain runoff at the five locations listed above.

At the first four locations, the required storage volume can be provided either by underground infiltration chambers beneath the proposed Multi-use Trail or by superpipes. In Catchment Area 8, the required storage volume will be provided by an underground infiltration chamber beneath the proposed sidewalk or by superpipes within the storm sewer system.

General Mitigation Measures

Mitigation measures related to water quality, water quantity and water balance are provided in the following sections.

Water Quality

Under proposed conditions, water quality control for the corridor will be provided within the proposed flat bottom roadside ditches through vegetation runoff velocity reduction and infiltration, as well by Oil/Grit Separator (OGS) units proposed upstream of the culverts. In total, twelve OGS units are proposed.

During detail design, it is recommended that permeable pavement be considered for sidewalks and the Multi-use Path to provide water quality control through infiltration.

Water Quantity

Post to pre-development quantity control can reduce peak flows within the five catchment areas listed above. As described earlier, storage is required to temporarily retain runoff at five outlet locations and discharge it at the existing flow rates.

Water Balance

For the proposed corridor, water balance control is achieved through infiltration of the proposed permeable pavement and vegetative areas. Water balance calculations yielded a required infiltration volume of 1104.58 m³ for the proposed site. Based on the permeable pavement and vegetative infiltration areas, the infiltration rate of the underlying soil, and a 24-hour detention time, the proposed Wycroft Road corridor will be capable of infiltrating 11,446.37 m³ of runoff which exceeds the MECP requirements.

Mitigation measures will be required due to culvert replacements at crossing locations within the study area. The following mitigation measures are recommended to offset negative impacts of the project on the terrestrial and aquatic features in the vicinity of the crossings:

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- Provide detailed staging drawings to minimize temporary effects to the watercourse during construction in the detailed design stage;
- Develop water management plans to facilitate completion of works “in the dry” through the use of by-pass pumping, dam and flume, partial coffer dams or timing of the works during dry conditions in the ephemeral channels;
- Implement an in-water construction timing restriction; based on the recommendations provided by CH;
- Prepare a detailed restoration plan for channel and bank areas associated with the culvert replacements. The restoration plans will include erosion and sediment control, vegetation strategies, and permanent stabilization measures;
- Design all culvert replacements to maintain or improve the current hydraulics of the crossings and maintain the current watercourse gradient with appropriate embedding to promote fish passage;
- Incorporate habitat diversity into the final structure design (i.e., bank diversity and substrate placement associated with any scour protection requirements);
- Operate and store all materials and equipment in such a manner that prevents any deleterious substance from entering watercourses, wetlands or other sensitive area;
- Delineate work areas with construction fencing to minimize the area of disturbance;
- Treat dewatering effluent prior to discharge to receiving watercourse. Dewatering must be discharged in a vegetated area 30 metres from the creek;
- Construct cofferdams using pea gravel bags to isolate the work area and maintain flow;
- Capture and safely release fish isolated by construction activities to the watercourse. Fish capture and release to be conducted by fisheries professionals;
- Apply standard sediment and erosion control measures (e.g., silt fence, flow checks, silt curtain, sedimentation basins) consistent with Ontario Provincial Standards and Specifications (OPSS) to ensure no effects to the surface waters. The control measures shall be implemented prior to construction of the work and be maintained during construction and until disturbed areas have been effectively stabilized with permanent vegetation cover;

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- Stabilize and re-vegetate all disturbed areas of the work site promptly. In riparian and aquatic habitats, all temporarily disturbed areas will be reinstated to original condition upon completion of works; and
- Store and stabilize any stockpiled materials away from the water.

10 Permits, Approvals and Commitments to Future Work

Throughout the Environmental Study Report, a number of commitments have been made to carry out work prior to, during and post construction.

Commitments have also been made to obtain the necessary permits and approvals to complete the proposed work. **Exhibit 10-1** is a comprehensive table of the required permits, approvals and commitments to future work.

Additional permits and approvals may be required due to changes in existing conditions or to relevant policies. Conditions should be monitored during detail design and prior to construction, and the list of permits and approvals should be updated as required.

Currently, approvals under the Canadian Environmental Assessment Act are not required for the proposed works. The proponent will continue to assess to determine if any approvals are applicable. Similarly, permits are likely not required under the Species at Risk Act. The status of species will continue to be monitored and permits will be obtained as necessary.

All commitments to future work should be reviewed during detail design and prior to project construction to confirm that the list of commitments is comprehensive.

Exhibit 10-1: Permits, Approvals and Commitments to Future Work

Matter	Phase	Commitment
Air Quality	Detail Design	Prepare an Air Quality Management Plan to be submitted to MECP for review prior to commencement of construction
Air Quality	Construction	Dust suppressant measures will be used and disturbed areas will be revegetated to mitigate potential impacts. Equipment will be washed and mud mats used where practical at construction site exits to limit the migration of soil and dust. Soil and other friable materials will be stockpiled in locations that are less exposed to wind and away from sensitive receptors, where possible. Dust-generating activities will be minimized during conditions of high wind.
Archaeology	Detail Design	Should the proposed work extend beyond the current study area, further Stage 1 Archaeological Assessment should be conducted to determine the archaeological potential of the surrounding lands.

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Matter	Phase	Commitment
Archaeology	Detail Design	Stage 2 Archaeological Assessments, and Stage 3 and 4 Archaeological Assessments as recommended by Stage 2 and 3, in advance of any activities that have the potential to disturb archaeological resources. Relevant Indigenous communities will be informed of Archaeological Assessment findings.
Construction Permit	Prior to construction	Obtain an Engineering Permit from the Town of Oakville for the proposed works.
Construction Permit	Prior to construction	Under by-law 2009-072, obtain a permit issued by the Town in accordance with the Use of Municipal Right of Ways and Municipal Parking Lots Policy for the proposed works.
Construction Permit	Prior to construction	Obtain a Highway Corridor Management Permit from MTO, as required.
Construction Permit	Prior to construction	Obtain a Permit to Take Water under the Ontario Water Resources Act for any water takings that exceed 50,000 L per day, unless exempt under O. Reg. 63/16.
Construction Permit	Prior to construction	Obtain permits and approvals for works in regulated areas from Conservation Halton under O. Reg. 162/06.
Cultural Heritage	Detail Design	Should future work require an expansion of the study area then a qualified cultural heritage consultant should be contacted in order to confirm the impacts of the proposed work on potential cultural heritage resources.
Design	Detail Design	Coordinate design and implementation with Kerr Street Grade Separation.
Design	Detail Design	Coordinate and consult with Halton Region on the alignment of Wycroft Road on approach to the Bronte Road intersection.
Design	Detail Design	Coordinate and consult with Halton Region regarding timing of Wycroft Road construction activities with Regional infrastructure work for a new watermain along Wycroft Road from Bronte Road to just east of Third Line.

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Matter	Phase	Commitment
Design	Detail Design	Coordinate and consult with Halton Region regarding timing of Wycroft Road construction activities with Regional infrastructure work for a new watermain along South Service Road West, east of Third Line.
Design	Detail Design	Coordinate design and implementation with MTO for two culverts (C2 and C3) including cost sharing.
Design	Detail Design	The feasibility of converting Progress Court to full signal control, and the advantages of the various mitigation measures, should be reviewed by the Town in consultation with the MTO during detail design.
Design	Detail Design	Property requirements will be refined and a property acquisition strategy will be developed. Property will be acquired through negotiations and/or expropriation, as necessary. Potential property requirements are shown in Appendix M.
Drainage and Stormwater Management	Detail Design	Further opportunities to decrease flood risk/overtopping at C7 should be considered during detail design.
Drainage and Stormwater Management	Prior to Construction	Develop an Erosion and Sediment Control plan. Best management practices should be implemented during construction.
Drainage and Stormwater Management	Prior to Construction	Obtain an Environmental Compliance Approval under the Ontario Water Resources Act for municipal stormwater management works.
Drainage and Stormwater Management	Construction	Low Impact Development measures will be implemented, where possible, to promote infiltration.
Excess Materials	Prior to Construction	Develop an excess materials management strategy in accordance with MECP “Management of Excess Soil – A Guide for Best Management Practices” (2014).
Geomorphology	Detail Design	Consult with regulatory agencies on proposed works at C3, as this tributary is currently considered to be a contributing Redside Dace reach, a designation that may change.

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Matter	Phase	Commitment
Geotechnical	Detail Design	Complete a geotechnical assessment, including boreholes at an appropriate spacing, to determine pavement composition and assess subsurface conditions within the study area.
Natural Heritage	Detail Design	Undertake a self-assessment to determine if a DFO screening is required (http://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html).
Natural Heritage	Detail Design	Detailed natural heritage investigations should be undertaken in the area surrounding the realignment of South Service Road West, east of Third Line, to further understand impacts.
Natural Heritage	Detail Design	Complete wildlife survey investigations where any data gaps exist.
Natural Heritage	Detail Design	Re-examine the presence of species at risk and continue consulting with MECP to confirm any general habitat protection measures that may be required.
Natural Heritage	Detail Design	Additional screening as required based on future changes to species' listings or habitat regulations of the ESA.
Natural Heritage	Detail Design	Overall benefit permits will be obtained under clause 17(2)(c) of the Endangered Species Act where required.
Natural Heritage	Detail Design	Develop an Erosion and Sedimentation Control plan to minimize construction-related impacts on water quality and fish habitats. The plan should cover the installation, maintenance, and removal of the temporary erosion and sediment control measures, and the removal of sediment accumulated by the control measures.
Natural Heritage	Detail Design	Identify site-specific erosion and sedimentation control measures using the <i>Erosion and Sediment Control Guidelines for Urban Construction (GGHA 2006)</i> .
Natural Heritage	Detail Design	Develop a tree removal, restoration and compensation plan.
Natural Heritage	Detail Design	Develop Tree Preservation Plan and complete a follow-up survey where any data gaps exist.

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Matter	Phase	Commitment
Natural Heritage	Detail Design	Update the recommendations for tree preservation, removal and mitigation measures included in the Natural Environment Impact Assessment Report, as required.
Natural Heritage	Detail Design	Develop an Invasive Species Management plan.
Natural Heritage	Prior to Construction	Obtain a Fish Collect Permit for the capturing and safely releasing of fish isolated by construction activities (if applicable) at the applicable watercourses.
Natural Heritage	Construction	Implement Erosion and Sedimentation Control plan to minimize construction-related impacts on water quality and fish habitats.
Natural Heritage	Construction	Implement best management/construction practices and control of all construction operations to reduce the potential for spills or other materials/equipment from entering the watercourses/pond within the study area.
Natural Heritage	Construction	Ensure appropriate provisions are taken by the Contractor as to not block or prohibit wildlife access to culverts and to the wildlife corridor.
Natural Heritage	Construction	Complete in-water works inside the appropriate timing windows.
Natural Heritage	Construction	Establish tree protection zones and install protective materials prior to construction to prevent damage including, but not limited to, root destruction and soil compaction.
Natural Heritage	Construction	Vegetation clearing will take place outside of the bird timing window. An ecologist will confirm that nests are no longer active, if encountered during clearing.

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Matter	Phase	Commitment
Natural Heritage	Post-construction	Compensation for the removal of trees within the study area should be in accordance with the requirements of the Conservation Halton Landscaping and Tree Protection Guidelines (2010). At a minimum, there should be a no net loss of trees within the study area to satisfy Livable Oakville Plan policy 10.12.1, "For every square metre of leaf area that is removed from Town property or from Town road rights-of-way, sufficient trees will be replanted to replace the lost square metres of leaf area."
Servicing	Prior to Construction	Obtain Environmental Compliance Approvals (ECA) from MECP for new/relocated sewers and stormwater management outfalls, sewer use for discharge of dewatering effluent (compliant with Section 53 of the Ontario Water Resources Act and relevant MECP guidelines), as appropriate. Should potable water lines be relocated, ECA will be sought from MECP prior to relocation.
Phase One ESA	Detail Design	Review existing land uses and assess possible sources of contamination, including aboveground and underground storage tanks, storage of any hazardous materials as defined by current Provincial regulations; and structures, appurtenances, or equipment that may require decommissioning or clean-up prior to redevelopment.
Traffic	Detail Design	Prepare a detailed traffic management plan that provides work zones, roadway lane closure extents, and times.