APPENDIX

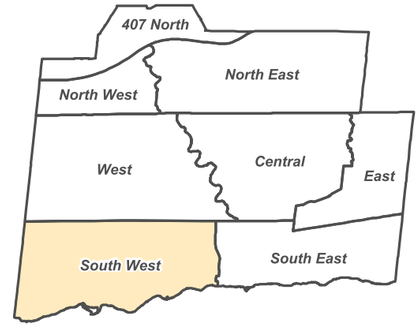
E

Natural Areas Inventory

APPENDIX

E-1 Natural Areas Mapping

SCHEDULE F
SOUTH WEST
LAND USE



- SCHEDULE AREA BOUNDARY
- LOW DENSITY RESIDENTIAL
- MEDIUM DENSITY RESIDENTIAL
- HIGH DENSITY RESIDENTIAL
- NEIGHBOURHOOD COMMERCIAL
- COMMUNITY COMMERCIAL
- CORE COMMERCIAL
- OFFICE EMPLOYMENT
- BUSINESS EMPLOYMENT
- INDUSTRIAL
- BUSINESS COMMERCIAL
- INSTITUTIONAL
- NATURAL AREA
- PARKWAY BELT
- PARKS AND OPEN SPACE
- WATERFRONT OPEN SPACE
- UTILITY
- GROWTH AREA*
- SPECIAL POLICY AREA
- RAILWAY
- MAJOR TRANSIT STATION

* Refer to Part E, Growth Area Policies

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May 10, 2011

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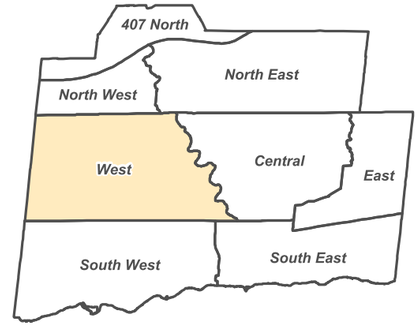
SCHEDULE H
WEST
LAND USE



- SCHEDULE AREA BOUNDARY
- LOW DENSITY RESIDENTIAL
- MEDIUM DENSITY RESIDENTIAL
- HIGH DENSITY RESIDENTIAL
- NEIGHBOURHOOD COMMERCIAL
- COMMUNITY COMMERCIAL
- CORE COMMERCIAL
- OFFICE EMPLOYMENT
- BUSINESS COMMERCIAL
- NATURAL AREA
- PARKWAY BELT
- PARKS AND OPEN SPACE
- PRIVATE OPEN SPACE
- UTILITY
- GROWTH AREA*
- GREENBELT
- RAILWAY

* Refer to Part E, Growth Area Policies

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May 10, 2011

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Halton Region
Environmentally Sensitive Areas
Consolidation Report

April 2005

This report consolidates the findings from two update studies done in 1995 and 2002. Thus the information contained herein is current only to 2002.

Consolidated Reports:
Environmentally Sensitive Area Study 1995, Geomatics International Inc.
Environmentally Sensitive Area Update Study 2002, Mirek Sharp & Associates Inc.

Prepared by:
Halton Region, Planning and Public Works Department
North - South Environmental Inc.

Citation: *Halton Region and North - South Environmental Inc. 2005. Halton Region Environmentally Sensitive Areas Consolidation Report. Unpublished report prepared by Halton Region Planning and Public Works Department in conjunction with North - South Environmental Inc. 222 pp. + app.*

ESA 12: Fourteen Mile Creek Valley

General Description

The Fourteen Mile Creek Valley contains a floodplain with wet meadows, hillsides with mature mixed forests and a strip of adjacent tableland. The floodplain is accentuated with large, vigorously growing willows and hawthorns (EEAC 1978).

The area is an important migratory staging and wintering area for saw-whet owl (*Aegolius acadius*) and long-eared owl (*Asio otus*). Species which breed in the area include red-tailed hawk (*Buteo jamaicensis*), great horned owl (*Bubo virginianus*), red fox (*Vulpes vulpes*), white-tailed deer (*Odocoileus virginianus*) (EEAC 1978) and long-eared owl (M.J. Sharp pers. obs. 1982). The Town of Oakville is developing a trail along the eastern rim of ESA 12 and there is a golf course located to the west.

Size:	68 hectares
Plant Species (total #):	256
Plant communities:	Cattail Marsh (3.1.1.1) Sedge Wet Meadow (3.2.0.3) Rich Sugar Maple-Mixed Hardwood Forest (4.1.2.15) Sugar Maple-American Beech Forest (4.1.2.17) Mixed Conifer-Broadleaf Forest (4.1.3) Hawthorn Thicket (4.2.0.4) Late Successional Old Field (6.1.0.1) Old Orchard (7.2) Conifer Plantation (7.3.1) Cultivated Field
Animal Species:	Herptiles: 10 Birds: 33 (B), 11 (P), 19 (O) Mammals: 10 Fish: 15
Earth Science Features:	No published information
Other Designations:	Parkway Belt West Area
Ownership:	Largely Public; small Private areas.

Criteria Fulfilled

Primary Criteria

3) Areas that contain a relatively high number of native plant communities in the context of Halton Region.

At least seven native plant communities have been identified to date.

6) Areas that contain plant and/or animal species that are rare provincially or nationally.

The following nationally or provincially rare plant species have been found in this ESA:

Slender Sedge (*Carex gracilescens*)
Hawthorn (*Crataegus conspecta*)
Sharp-leaved Goldenrod (*Solidago arguta var. arguta*)

This ESA contains the following nationally and provincially rare animal species:

Redside dace (*Clinostomus elongatus*)

9) Areas that are determined to be significant groundwater discharge areas.

A sand lens occurs upstream of the ESA and discharges water to the ESA (Axon pers. comm., 1992-93).

11) Areas that contribute significantly to maintaining surface water quality and quantity.

The wooded hillsides and the well-developed floodplain communities serve to maintain surface water quality in Fourteen Mile Creek.

Secondary Criteria

12) Areas that contain regionally rare plants.

This ESA contains the following regionally rare plants:

Slender Sedge (*Carex gracilescens*)
Sedge (*Carex lanuginosa*)
Round-leaved Hawthorn (*Crataegus chrysocarpa*)
Hawthorn (*Crataegus conspecta*)

Hawthorn (*Crataegus macrosperma*)
Hawthorn (*Crataegus schuettei*)
Fireweed (*Erechtites hieracifolia*)
Cow-parsnip (*Heracleum lanatum*)
Eastern Red Cedar (*Juniperus virginiana*)
Bristly Raspberry (*Rubus setosus*)
Black Willow (*Salix nigra*)
Sharp-leaved Goldenrod (*Solidago arguta var. arguta*)
Southern Arrow-wood (*Viburnum recognitum*)
Northern Blue Violet (*Viola septentrionalis*)

Sources of Information

Armour, E. et al. 1979.
Axon, B., G. Chuter, and R. Huizer. 1987.
Crins, W.J. 1986.
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Holm, E. and E. J. Crossman. 1986.
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Mandrak, N.E. and E.J. Crossman. 1992.
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Perkins, B. and B. Axon. 1991.
Regional Municipality of Halton. 1978, 1982.
Royal Botanical Gardens. 1977, 1981.
Smith-Hoffman Associates Ltd. 1983.
Triton Engineering Services Ltd. 1992.

Halton Region
Environmentally Sensitive Areas
Consolidation Report

April 2005

This report consolidates the findings from two update studies done in 1995 and 2002. Thus the information contained herein is current only to 2002.

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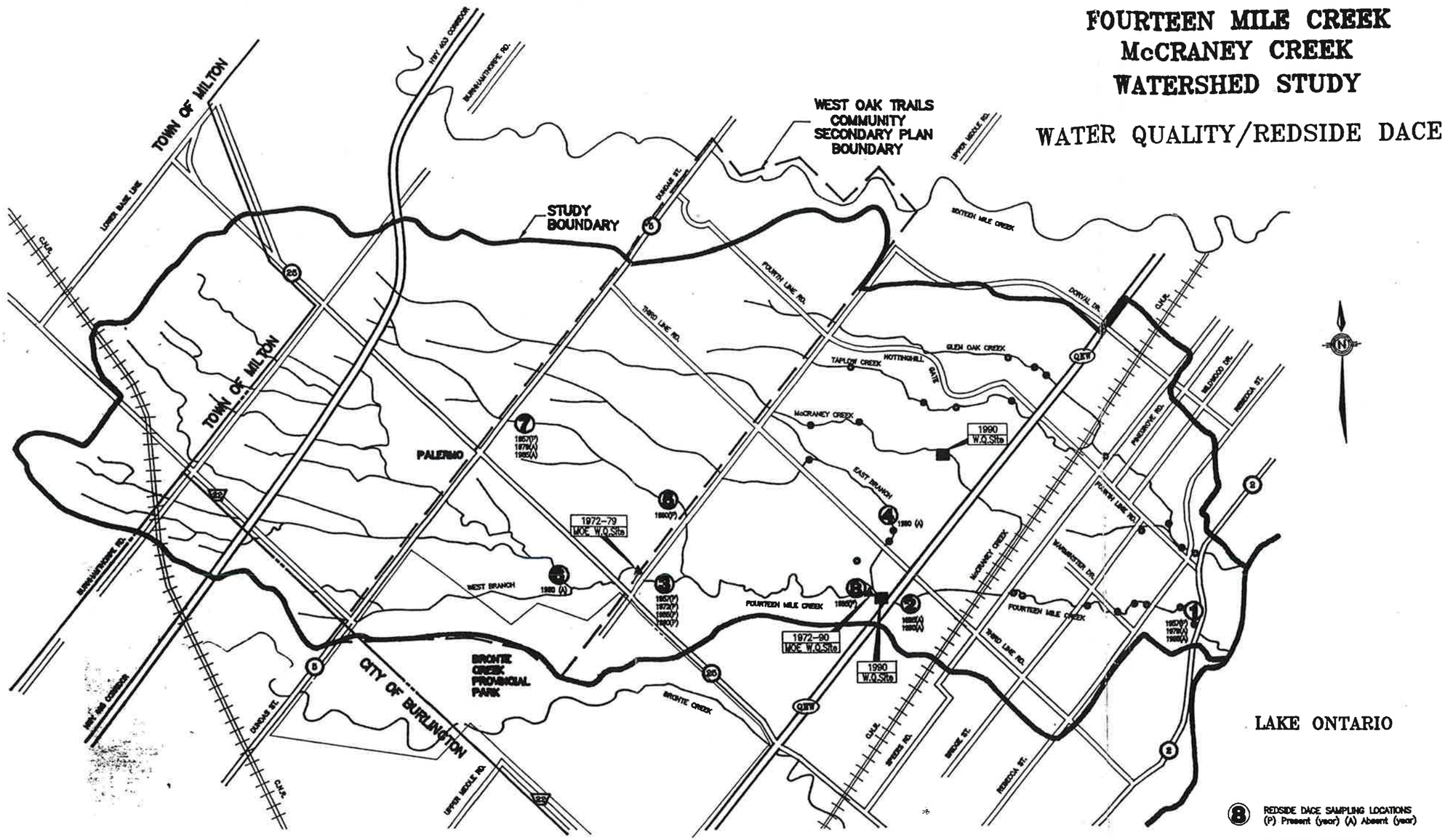
TOWN OF
OAKVILLE

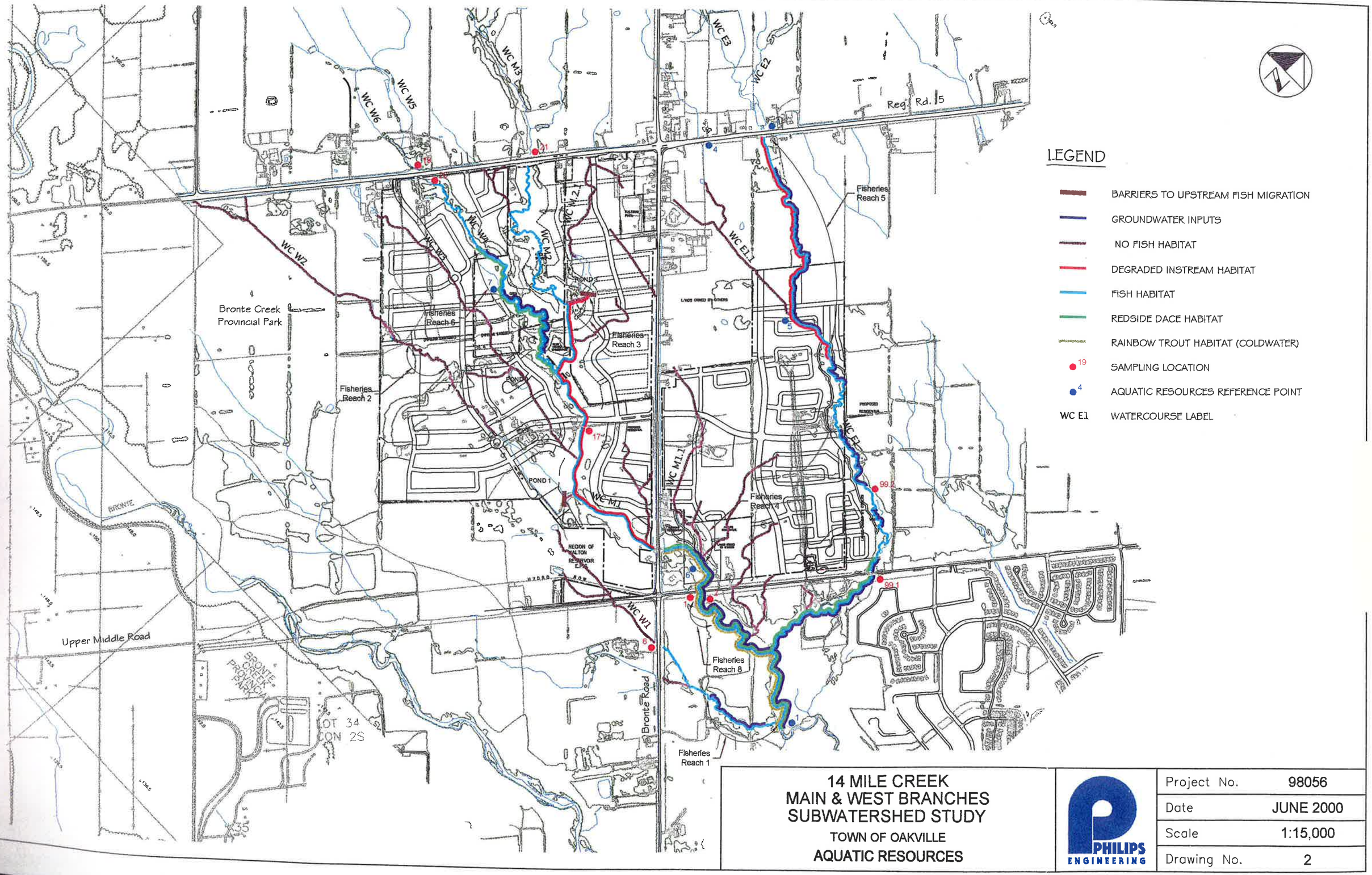
FOURTEEN MILE CREEK
McCRANEY CREEK
WATERSHED STUDY

WATER QUALITY/REDSIDE DACE



TRITON ENGINEERING SERVICES LIMITED
Consulting Engineers
Orangeville Fergus Gravenhurst Kitchener

MAP: 13
N.T.S.



14 MILE CREEK MAIN & WEST BRANCHES SUBWATERSHED STUDY

TOWN OF OAKVILLE

AQUATIC RESOURCES

PHILIPS ENGINEERING

Project No.	98056
Date	JUNE 2000
Scale	1:15,000
Drawing No.	2

Jan. 16/02 mbk

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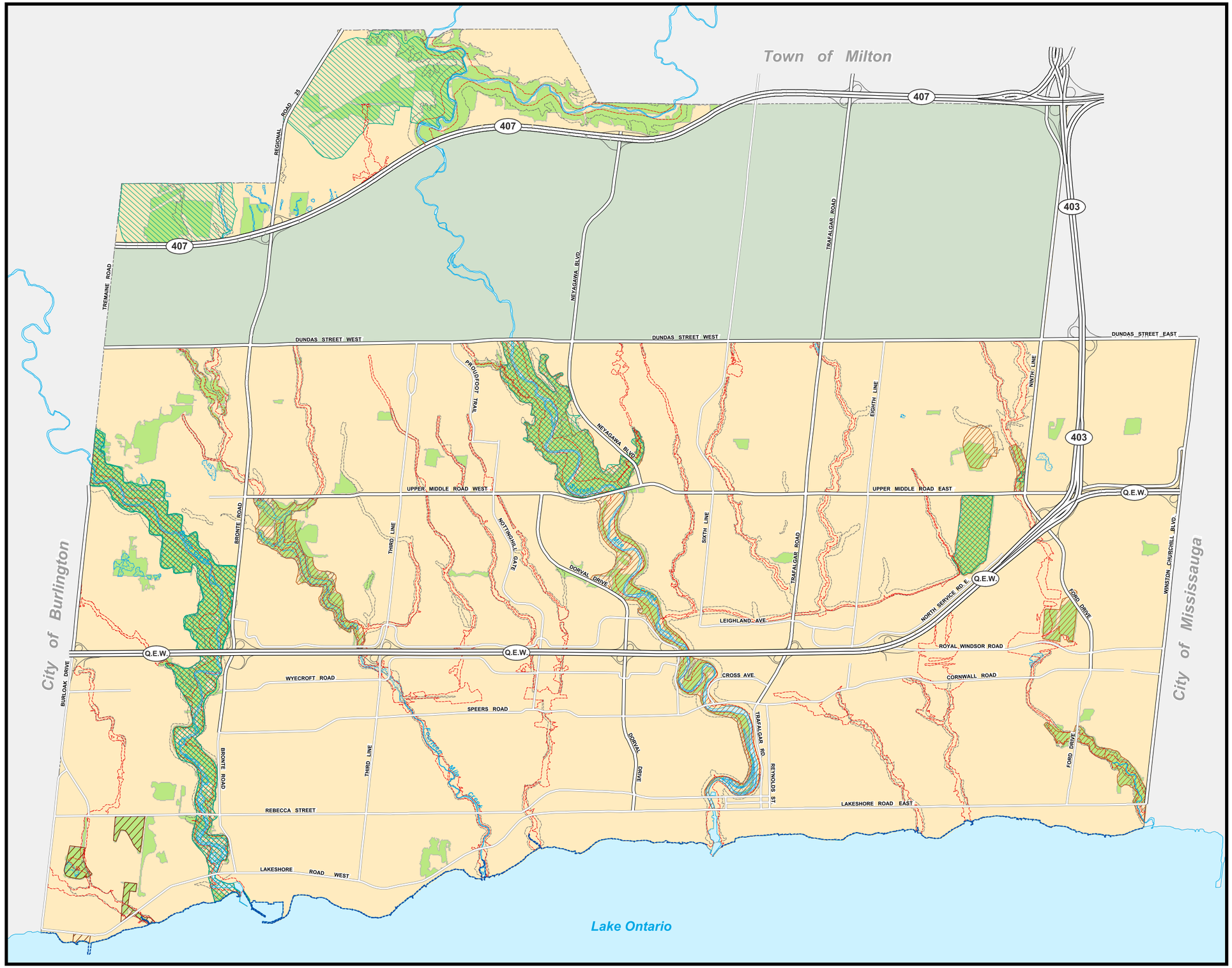
SCHEDULE B
NATURAL FEATURES
&
HAZARD LANDS



FLOODPLAIN

SHORELINE FLOOD LIMIT

VALLEYLANDS

SIGNIFICANT WILDLIFE HABITAT

AREA OF NATURAL AND SCIENTIFIC INTEREST

ENVIRONMENTALLY SENSITIVE AREAS

WETLANDS

WOODLANDS

LANDS NOT SUBJECT TO THE POLICIES OF THIS PLAN

NOTE: Natural features and hazard lands are shown conceptually and for reference purposes only.

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May 10, 2011

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APPENDIX

E-2 Terrestrial Ecology (Dougan & Associates)

OAKVILLE

Fourteen Mile Creek/McCraney Creek Natural Heritage System (NHS) Assessment

DOUGAN & ASSOCIATES
ECOLOGICAL CONSULTING & DESIGN

77 Wyndham Street South • Guelph ON N1E 5R3
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In association with:

Amec Foster-Wheeler

DECEMBER 2016

DOUGAN & ASSOCIATES
ECOLOGICAL CONSULTING & DESIGN

77 Wyndham Street South • Guelph ON N1E 5R3
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PREPARED BY:

Dougan & Associates
Ecological Consulting & Design
77 Wyndham Street South
Guelph Ontario N1E 5R3

Primary Author: Christina Myrdal

Contributing Author(s):
Wildlife: Ian Richards, Dougan & Associates

Reviewed By: Todd Fell, Dougan & Associates

PREPARED IN ASSOCIATION WITH:

AMEC Foster-Wheeler
3215 North Service Road
Burlington, ON
L7N 3G2

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1. INTRODUCTION

1.1. STUDY PURPOSE

Dougan & Associates (D&A) has been retained by Amec Foster Wheeler (AMECFW) to assist in addressing issues cited by MNRF & Conservation Halton in their review of the Fourteen Mile Creek Flood Mitigation Study (Draft) related to terrestrial ecology. It is currently the perspective of MNRF and Conservation Halton that core elements of the preliminary recommended solution, which involve a high water level diversion from McCraney Creek to the Fourteen Mile Creek with offsetting on-line flood storage on the main branch of Fourteen Mile Creek, to be non-supportable based on current policy. AMECFW has developed Options which would avoid the aforementioned policy positions while allowing for the management of flood risk in a strategic manner. While it is recognized by the Town and AMECFW, that a wide-spread ecological study would serve no particular benefit at this stage of the Master Plan, some study of potential areas of impact would contribute to the understanding of ecological value and associated mitigation opportunities in the context of the options currently being considered. As a result, D&A have engaged in a high level terrestrial screening for three areas affected by the proposed solutions to gain an understanding of terrestrial sensitivities and provide recommendations to avoid or reduce potential negative effects.

1.2. LOCATION & CONTEXT

There are three distinct study areas within this assessment, as shown in Figure 1:

A. A section of Bronte Creek just north of the QEW and west of Bronte Road *("Bronte Creek Valley")*,
B. A segment of Fourteen Mile Creek located north of the QEW east of Bronte Road (*"Fourteen Mile Creek Valley")*, and
C. A tributary of McCraney Creek located south of the QEW, north of Speers Road parallel to the CNR tracks (*"McCraney Creek and associated watercourse")*.

All three study areas are located within the Bronte-McCraney Creeks Watershed, consisting largely of natural heritage features.

1.3. BACKGROUND

As part of a Class EA Master Plan, the Town is proposing a flood mitigation strategy. AMEC Foster-Wheeler was retained by the Town and has determined recommendations which involve diversion of flow from Taplow (McCraney Creek) to Fourteen Mile Creek east to west along an existing channel north of the CNR/Metrolinx tracks. Conservation Halton (CH) and the Ministry of Natural Resources and Forestry (MNRF) require further background on the terrestrial and aquatic NHS before approving site alterations.

1.4 SITE DESCRIPTION

The study areas are located on the shale plains and the surficial geology is till with some Paleozoic bedrock and coarse-textured glaciolacustrine deposits (Chapman & Putnam, 1984). On a finer scale, the site consists of stream channels and floodplain/valley lands. The Greenbelt and Parkway Belt are active north of the QEW and west of Bronte Road, and the Parkway Belt continues between Bronte Road and Third Line north of the QEW, and follows the floodplain of Bronte creek south to Lake Ontario (Town of

Oakville Official Plan 2009, Schedule E). The land use within the study areas is mainly Parkway Belt, with business and commercial use designated along the QEW corridor and CN Rail Line (Town of Oakville Official Plan 2009, Schedule A1).

A large portion of the Fourteen Mile Creek valleylands is designated in the Town of Oakville's Official Plan as an Environmentally Sensitive Area accompanied by significant valleylands and woodlands. The Bronte Creek system is designated as an Area of Natural and Scientific Interest (ANSI) (Town of Oakville Official Plan 2009, Schedule B). There is a Provincially Significant Wetland complex located south of the CN Rail Line, just west of Bronte Road known as the Lower Bronte Creek Wetland Complex.

1.5 PROPOSED SITE ALTERATIONS

AMEC Foster-Wheeler has recommended that the Town of Oakville divert flow from Taplow Creek to Fourteen Mile creek via an existing channel that will require modification and extension towards Fourth Line, and flows diverted would be above the 25 year event. To offset the diverted flow and further reduce flows in Fourteen Mile Creek, online flood storage will be provided immediately upstream of the North Service Road and QEW culvert on Fourteen Mile Creek. Additionally, flow from Fourteen Mile Creek would be diverted to Bronte Creek, which is just over 1 km away.

Details of this public infrastructure project, including site alterations have not yet been determined, however the alterations are proposed to exist underground, so the construction process of the diversion pipe that will run from Fourteen Mile Creek to Bronte Creek, including the need for any access roads and vegetation removal will likely have the largest impact on the terrestrial ecosystem.

2 METHODS

2.1 BACKGROUND REVIEW

The background review consists of the identification of relevant legislation and policy followed by review and documentation of existing species inventory information, Species-at-Risk records, and other data. See Appendix A1 for full details.

2.2 FIELD STUDIES

2.2.1 VEGETATION RESOURCES

A vegetation screening was conducted on October 17th, 2016. As a high level screening over a large study area observations were focused on gaining an understanding of the community types, existing habitat potential and potential Species at Risk. Plant species lists were created for a few priority locations within the study areas to assess potential constraints and opportunities for site alterations. The overall landscape was assessed for sensitive features and species that may constrain alterations to the environment.

2.2.2 WILDLIFE RESOURCES

A wildlife screening was conducted on October 12th and 17th in 2016. Using the list of species generated through the background review field screening focused on identifying known habitats for these wildlife species within the three study areas. Observations assessed the suitability and likelihood of encountering these species within the areas of proposed works to gage the risk to SAR. All incidental sightings during the field screening have been recorded.

2.3 SPECIAL FEATURES & ECOLOGICAL FUNCTIONS

Ontario's Provincial Policy Statement (PPS) (OMMAH, 2005) provides clear direction on the protection of resources that have been identified as 'significant', including Significant Habitat of Endangered & Threatened Species, Significant Wetlands, Woodlands, Valleylands, Significant Wildlife Habitat, Significant Areas of Natural and Scientific Interest, and Fish Habitat.

The Town of Oakville Official Plan, Schedule B: Natural Features & Hazard Lands has been consulted to determine if thesesignificant features are present in the study areas, and the MNRF has been contacted to gain information on Significant Habitat of Endangered & Threatened Species.

2.4 LEGISLATION & POLICY FRAMEWORK

D&A reviewed the relevant legislation and policy documents applicable to the project. See Appendix A2 for details.

3 FINDINGS

The following inventory of existing conditions is based on a desktop review of database records of historic species occurrences supplemented with a field screening. See Appendix A1 for details of the background review findings.

3.1 FIELD STUDIES

3.1.1 VEGETATION RESOURCES

Two of the three areas identified were screened in the field for general vegetative characteristics. These were:

B. A segment of Fourteen Mile Creek located north of the QEW east of Bronte Road (*"Fourteen Mile Creek Valley"*), and
C. A tributary of McCraney Creek located south of the QEW, north of Speers Road parallel to the CNR tracks (*"McCraney Creek and associated watercourse"*).

Appendix H contains ELC vegetation community mapping for Fourteen Mile and Bronte Creeks, completed as part of the Halton Natural Areas Inventory (NAI) (Dwyer 2006). In general, vegetation findings for Area 'B' (Fourteen Mile Creek) were consistent with the NAI. The Bronte Valley was not screened due to the high quality of existing documentation and general understanding of the site's sensitivities.

3.1.1.1 AREA 'B'

Significant findings in this area included:

- Flood-tolerant groundcover, shrub, and tree species along the floodplain at Fourteen Mile Creek west of Langtry
- Many high quality native trees bordering the channel
- One noteworthy stand of clonal exotic trees, Black Locust (*Robinia pseudoacacia)*, that could be preferably cleared for site access

See Appendix A3 for a detailed characterization of Area B.

3.1.1.2 AREA 'C'

Significant findings in this area included:

- Mature high quality species located on the south side of the woodlot towards the access road
- The understory of the woodlot dominated by invasive exotic European Buckthorn (*Rhamnus cathartica)* that can, and should be removed
- Majority of the area is cultural meadow, consisting of disturbance-tolerant species and planted species

See Appendix A3 for a detailed characterization of Area C.

3.1.2 WILDLIFE RESOURCES

3.1.2.1 SPECIES AT RISK (SAR) SCREENING

Following a desktop SAR screening, the following species at risk have been recorded within the study areas:

<u>Bronte Creek Valley</u>

- Bank Swallow (Threatened)
- Chimney Swift (Threatened)
- Endangered bats (Eastern Small-footed Myotis, Little Brown Myotis, Northern Myotis and Tri-colored Bat)
- Snapping Turtle (Special Concern)
- Wood Thrush (Threatened – Federal; Special Concern – Provincial)

<u>Fourteen Mile Creek Valley</u>

- Barn Swallow (Threatened)
- Canada Warbler (Threatened – Federal; Special Concern – Provincial)
- Chimney Swift (Threatened)
- Eastern Wood-Pewee (Special Concern)
- Snapping Turtle (Special Concern)
- Wood Thrush (Threatened – Federal; Special Concern – Provincial)

McCraney Creek and Associated Watercourse

- Barn Swallow (Threatened)
- Chimney Swift (Threatened)
- Endangered bats (Eastern Small-footed Myotis, Little Brown Myotis, Northern Myotis and Tri-colored Bat)
- Eastern Wood-Pewee (Special Concern)
- Monarch (Endangered)
- Snapping Turtle (Special Concern)
- Wood Thrush (Threatened – Federal; Special Concern – Provincial)

A further summary is provided in Appendix A4, and the full screening is presented in Appendix E.

3.1.2.2 INCIDENTAL WILDLIFE SIGHTINGS

During the field visits on October 12 and 17, 2016, approximately 40 species of birds were observed and/or heard vocalizing. Of the 20 species assessed as potentially breeding on site, all but one are considered to be common and widespread in Halton Region. Northern Mockingbird is considered "uncommon" (Dwyer 2006). Nineteen species were considered to be likely migrants and non-breeders and of these, only one, Rusty Blackbird, is ranked as Special Concern.

Of the other incidental wildlife observations, including mammals, snakes and insects, all species were considered common and widespread in Halton Region, excluding Monarch butterfly that is listed as Endangered federally, and Special Concern provincially.

See Appendix A5 for a full summary of incidental wildlife observations.

3.2 SPECIAL FEATURES & ECOLOGICAL FUNCTIONS

The Town of Oakville Official Plan (2009) was used to identify significant features and functions present within or adjacent to the study areas, including:

- Significant Habitat for Endangered and Threatened Species
- Significant Wetlands
- Significant Woodlands
- Significant Valleylands
- Significant Wildlife Habitat
- Significant Areas of Natural and Scientific Interest
- Environmentally Sensitive Areas

A detailed analysis of these significant features is provided in Appendix A6.

3.3 LEGISLATION & POLICY FRAMEWORK

After reviewing legislation and policy, the following were considered to have site implications within one of more of the study areas:

- Migratory Birds Convention Act (1994)
- Provincial Policy Statement (2014)
- Endangered Species Act (2007)
- Greenbelt Plan (2005)
- Parkway Belt West Plan (1978)
- Conservation Authorities Act, O. Reg. 162/06 (2013)
- Town of Oakville OP (2009)
- Halton Regional OP (2006)

See Appendix A2 for a detailed analysis of the above legislation & policy as it relates to this project.

4 TERRESTRIAL SENSITIVITIES ANALYSIS

At the current stage of the project the proposed alternatives are conceptual only and detailed descriptions of potential activities associated with site alterations have yet to be developed. The potential impacts of the proposed activities cannot be fully assessed at this time. However, based on the desktop review of existing information and field screening, some of the likely activities can be surmised and associated with site sensitivities. This can be used to plan design and mitigation strategies to reduce or eliminate potential negative impacts.

4.1 ACTIVITIES

There are two main 'sets' activities that will have an effect on terrestrial resources.

- The first set ("Set 1" activities) relate to activities with a tangible footprint on the ground such as clearing and grading for access, staging and detention/diversion features.
- The second set of activities ("Set 2" activities) result from potential changes in the hydroperiod (the frequency, duration and extent of inundation) that may have an effect on plant community response or change habitat suitability characteristics for existing species.

Terrestrial sensitivities potentially affected by these activities are discussed below.

4.2 SENSITIVITIES OF SIGNIFICANT NATURAL HERITAGE FEATURES

4.2.1 PPS FEATURES

Sensitivity: The existing provincial legislation regulate activities within 120 m of significant natural heritage features as defined under the PPS. There are several designations that affect the area of proposed site alterations (*such as Significant Valleyland and Environmentally Sensitive Area*). Prior to work initiating, it must be demonstrated that there will be no net negative impacts on these features.

Mitigation Recommendation: It is impossible to direct all site alterations 120 m away from the identified natural heritage features, as the study areas are located within these features. Compensation options must be planned as part of the proposed activities that will result in a net gain in natural heritage function before an EIS can fully support the proposed site alterations.

4.2.2 PSW

Sensitivity: The Lower Bronte Creek Wetland Complex is a Provincially Significant Wetland that is protected under the Provincial Policy Statement from site alteration (MMAH, 2005). Because of this, any activities must take place a minimum of 30 m from the edge of the wetland.

Mitigation Recommendation: It is recommended that work takes place outside of the 120 m regulated area outside of the wetland boundary, if possible, to avoid having to complete further studies of the wetland feature. If this is unavoidable, a wetland setback of 30 m will have to be established once the boundary is delineated and an EIS will have to address the potential impacts.

4.3 SENSITIVITIES OF VEGETATION COMMUNITIES AND SPECIES

4.3.1 NATIVE BIODIVERSITY, SAR & CANOPY

Sensitivity: Significant vegetation including rare communities, potential presence of SAR and mature native trees such as Hickory, Oak, and Maple are prevalent along the valleys, stream channels and floodplains and subject to removal and/or disturbance from both footprint and hydroperiod activities. These should be preserved where possible.

Mitigation Recommendations: Once locations of footprint activities and extent of hydroperiod disturbances are known detailed vegetation inventories should be conducted to characterize the existing vegetative resources. Site alterations and construction should be preferentially constrained to areas on the site that have higher quantities of low quality/non-native/invasive species such as European Buckthorn and Black Locust. If vegetation will need to be removed in order to provide access routes for the construction of the detention and diversion structures then high quality species such as healthy, mature, native trees and shrubs should be avoided. A detailed strategy for vegetation removal and compensation will be required to confirm no negative impacts result from the implementation of the proposed site alterations.

4.4 SENSITIVITIES OF WILDLIFE RESOURCES

4.4.1 SIGNIFICANT WILDLIFE HABITAT

Sensitivity: Landbird Migratory Stopover Areas have been identified as candidate/confirmed significant wildlife habitat within the study areas.

Mitigation Recommendation: To be in compliance with the Migratory Bird Convention Act (MBCA 1994), any vegetation removal on the sites should be done outside of the breeding bird window, which for this site would be approximately May 1 to July 31. If any vegetation removal is to occur within this window, a qualified avian ecologist should first check the vegetation to be removed to ensure that there are no migratory birds covered by the Act nesting within it. If any birds are found nesting then, in consultation with Environment Canada, a suitable buffer should be established around the nest, and no activities will be permitted with this buffer until the birds have left.

4.4.2 WILDLIFE CONFLICTS DURING CONSTRUCTION

Sensitivity: Injury or death to wildlife that reside in the study areas while construction is occurring.

Mitigation Recommendations: Silt fencing should be maintained around the construction areas to ensure that no terrestrial wildlife, such as snakes or amphibians, can access the site and potentially be injured; a protocol should be in place to guide workers with regards to actions to take to minimize injury to wildlife and procedures to follow should they discover wildlife within restricted areas.

4.4.3 HABITAT DISTURBANCES

Sensitivity: Special Concern species are present within the study areas, such as Monarch butterflies which were spotted during the field screening by D&A.

Mitigation Recommendations: Do not remove Common Milkweed, which is the hostplant for Monarch (Special Concern); if this plant is to be removed, it must be replaced elsewhere on the sites.

5 CONCLUSIONS & RECOMMENDATIONS

While the details of the proposed flood mitigation works are still forthcoming, it is understood that the potential impacts to natural heritage resources are associated with the footprint caused by construction activities and potential changes to the hydrological regime. Given the flexibility in locating the proposed flood mitigation works and the opportunity for biodiversity enhancements it is anticipated this public infrastructure project can be implemented with negligible net impacts to the terrestrial resources through good design and the utilization of mitigation and compensation measures.

The recommendations for mitigation and compensation are based on assumed sets of activities that could impact the terrestrial natural heritage system. As outlined in section 4.1, there are two main sets of activities.

- Set 1 activities include activities with a tangible footprint on the ground
- Set 2 activities result from potential changes in the hydroperiod that may have an effect on plant community response or change habitat suitability characteristics for existing species.

Set 1 activities can be mitigated for during the design phase of the project. When determining design details activities such as clearing, grading or other disruptive processes should be concentrated in areas identified as having lower quality vegetation (i.e. stands of invasive exotics and minimal native vegetation).

It is difficult to mitigate for Set 2 activities in advance of construction. While it is unlikely that changes in the hydroperiod will have a significant negative impact on existing vegetation and wildlife communities, these activities can be mitigated for through developing an adaptive management strategy that incorporates a monitoring period following the completion of the project. Tables 3

through 5 provide a summary of the key sensitivities, mitigation and compensation measures for each of the three study areas.

Table 3. Mitigation and Compensation Recommendations for Study Area A

Study Area A: Bronte Creek Valley			
Key Sensitivities	**Mitigation**	**Compensation**	**Comments**
Native biodiversity	**Set 1:** avoid impacting native vegetation by directing activities toward low-quality, non-native stands **Set 2:** Following the completion of the project, monitor for changes in the vegetation communities resulting from changes to the extent, duration or frequency of the hydroperiod.	**Set 1**: Replant cleared areas with high quality native species **Set 2:** If negative changes are reported during monitoring, replanting and restoring these areas with flood-tolerant native vegetation is feasible.	Because Bronte Creek is the receiving body for the redirected flow, the need for site alterations to this study area should be minimal and therefore impacts resulting from Set 1 activities will likely be inconsequential.
Species at Risk	**Set 1:** Avoid these activities between May 1st and July 31st to ensure no interference with Landbird Migratory Stopover Areas (SWH) as identified in section 4.4.1 **Set 2:** Post-construction monitoring should be initiated to ensure no negative impacts on species at risk.	**Set 1:** Enhance floodplain and riparian habitat by planting native flood-tolerant species **Set 2**: If, through monitoring, it becomes clear that Species at Risk have been impacted negatively, a habitat restoration plan can address this.	**Set 1 & 2:** Because much of the anticipated alterations to the hydroperiod will be in-channel or underground, adverse impacts to many of the noted wildlife species at risk will be minor or even inconsequential. When detail designs are available, further field work may be required to fully determine what negative impacts may occur to particular SAR.

Table 4. Mitigation and Compensation Recommendations for Study Area B

Study Area B – Fourteen Mile Creek Valley			
Key Sensitivities	**Mitigation**	**Compensation**	**Comments**
Native Biodiversity	**Set 1:** Avoid interfering with native vegetation and direct activities toward low-quality stands of non-native, invasive species. **Set 2:** Following construction, monitor for negative changes in vegetation communities resulting from changes to the frequency, duration and extent of the hydroperiod.	**Set 1:** Replant and restore cleared areas with native vegetation **Set 2:** If negative changes are reported during monitoring, replanting and restoring these areas with native vegetation can be used to compensate.	**Set 1:** As explained in Appendix A3, Study Area B was identified as having at least one stand of *Robinia pseudoacacia*, a non-native clonal tree species, that could be cleared for use as an access point for construction
Species at Risk	**Set 1:** Avoid these activities between May 1st and July 31st to ensure no interference with Landbird Migratory Stopover Areas (SWH) as identified in section 4.4.1 **Set 2:** Post-construction monitoring should be initiated to ensure no negative impacts on species at risk.	**Set 1:** Enhance floodplain and riparian habitat by planting native flood-tolerant species **Set 2**: If, through monitoring, it becomes clear that Species at Risk have been impacted negatively, a habitat restoration plan can address this.	**Set 1 & 2:** Because much of the anticipated alterations to the hydroperiod will be in-channel or underground, adverse impacts to many of the noted wildlife species at risk will be minor or even inconsequential. When detail designs are available, further field work may be required to fully determine what negative impacts may occur to particular SAR.

Table 5. Mitigation and Compensation Recommendations for Study Area C

Study Area C – McCraney Creek & Associated Watercourse			
Key Sensitivities	**Mitigation**	**Compensation**	**Comments**
Native biodiversity	**Set 1:** Avoid interfering with native vegetation and direct activities toward low-quality stands of non-native, invasive species.	**Set 1:** Replant and restore cleared areas with native vegetation	**Set 1:** The understory of the woodlot straddling McCraney Creek is largely dominated by an invasive exotic, European Buckthorn that can and should be removed preferably to native species.
	Set 2: Following construction, monitor for negative changes in vegetation communities resulting from changes to the frequency, duration and extent of the hydroperiod.	**Set 2:** If negative changes are reported during monitoring, replanting and restoring these areas with native flood-tolerant vegetation can be used to compensate.	
Heritage trees	**Set 1:** Avoid damaging or destroying heritage trees.	**Set 1 & 2:** Heritage trees that are removed or damaged will need to be compensated for by replanting.	
	Set 2: Monitor the health of these trees post-construction to ensure no negative impacts		
Species at Risk	**Set 1:** Avoid removing Common Milkweed along the CNR access road as Monarch butterflies rely on this plant for food and as a place to lay eggs	**Set1:** Enhance meadow habitat by replanting with native species, including Common Milkweed	**Set 1 &2:** Because much of the anticipated alterations to the hydroperiod will be in-channel or underground, adverse impacts to many of the noted wildlife species at risk will be minor or even inconsequential. When detail designs are available, further field work may be required to fully determine what negative impacts may occur to particular SAR.
	Set 2: Post-construction monitoring should ensure these activities create no negative impacts to species at risk.	**Set 2:** If negative impacts are reported during monitoring, a habitat restoration plan can be created to compensate.	

Because the details of the proposed infrastructure project are conceptual in nature, the recommended mitigation and compensation methods are to be used as a guide when developing these details. In summary, recommendations are to avoid impacts on native species of high quality, direct disruptive

activities towards low-quality vegetation, and compensate for negative impacts on vegetation and wildlife communities through replanting, restoring, and monitoring.

Once the details of the proposed infrastructure project become finalized, it is likely that more detailed field surveys will be required to implement a design with no net negative impacts on the natural heritage features. This natural heritage assessment has provided a characterization of the landscape through desktop and field investigations, with suggestions for mitigating potential impacts on existing natural features. If these recommendations are applied it is anticipated that negate impacts can be avoided, mitigated or compensated for and the proposed flood control works can proceed without long term risk to the natural heritage resources.

6 FIGURES

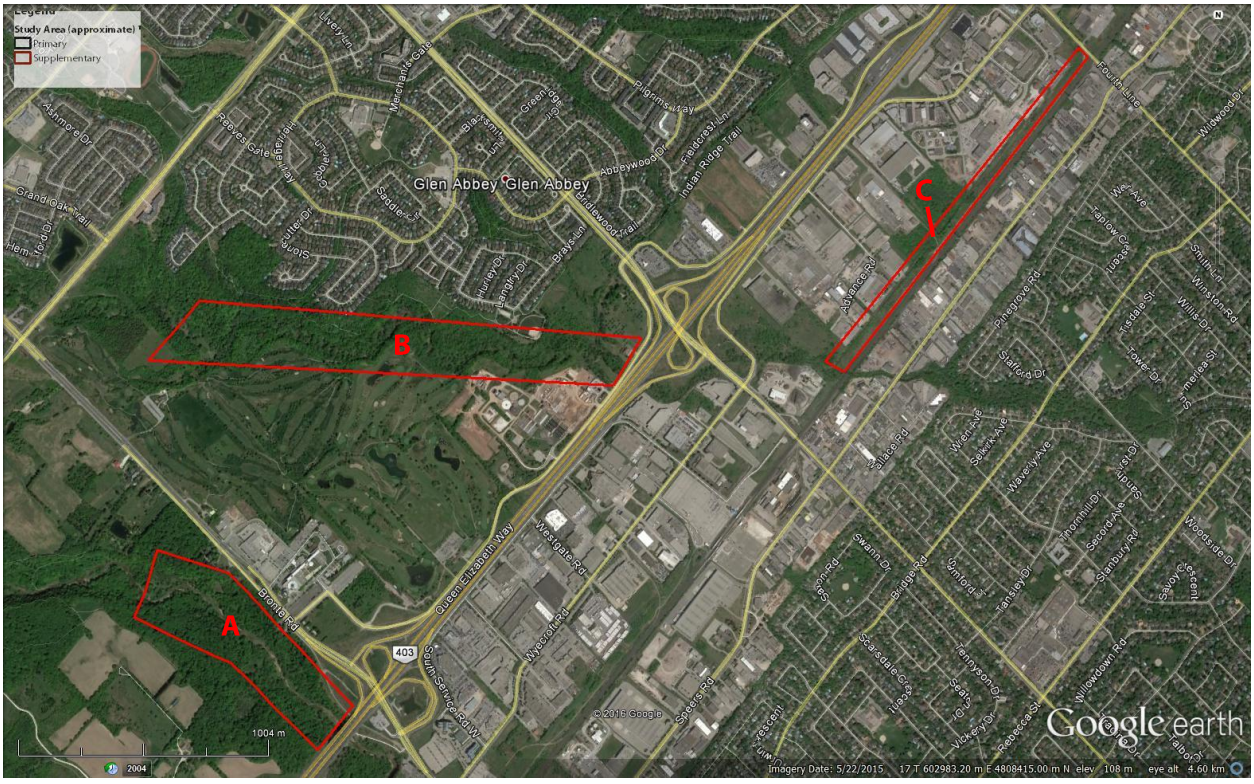

Figure 1. The approximate study areas, outlined in red: A) Bronte Creek Valley, B) Fourteen Mile Creek Valley, C) McCraney Creek Valley and associated watercourse.

Figure 2: A DeKay's brownsnake that was located on the pathway adjacent to the CNR tracks during a field screening on October 7, 2016.

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APPENDIX A1 – Background Review Summary

APPENDIX A2 – Legislation & Policy Framework

APPENDIX A3 – Characterization of Study Areas B & C Based on Field Investigations

APPENDIX A4 – Species at Risk Screening Summary

APPENDIX A5 – Incidental Wildlife Observations

Appendix A6 -Special Features & Ecological Functions

Appendix B – Consolidated NHIC Data

APPENDIX C – Work Plan

APPENDIX D – Vascular Plant & Status List

APPENDIX E – Species-At-Risk Screening

APPENDIX F – Significant Wildlife Habitat Screening

APPENDIX G – MNRF Information Request

APPENDIX H – Halton Natural Areas Inventory Areas 10 & 12 ELC Mapping (Dwyer 2006)

Appendix A1 – Background Review

Resources consulted throughout the Review of Background Information include:

- Planning documents including:
  - Town of Oakville Official Plan – "Livable Oakville" (2009);
- Existing inventories including:
  - Mapping resources (Town of Oakville, CH);
  - Natural Heritage Information Centre (NHIC) Biodiversity Explorer (NHIC 2012);
  - Bronte Creek ESA (Halton NAI);
  - Fourteen Mile Creek ESA (Halton NAI);
  - Bronte Green EIS (Beacon 2016);
- Agency liaison

A1.1 PLANNING DOCUMENTS

Town of Oakville Official Plan (2009)
This document designates the land use pattern within the Town, coordinates infrastructure requirements to ensure that future growth can be accommodated, and establishes "a framework and policy context for decision making that provides certainty for the planning process", all while conforming to provincial plans. This document was mainly consulted for its policies on the Natural Heritage System and other natural features.

According to Schedule F of the Official Plan (2009), the land use in the study areas is business commercial/industrial along the QEW and CN Rail Line, and Low Density Residential north of North Service Road. The Parkway Belt continues throughout the study areas, from Burloak Drive to Third Line north of the QEW, and follows Bronte Creek south to Lake Ontario. The Greenbelt is also active north of the QEW and west of Bronte Road, so this portion of the study area is subject to the Greenbelt Plan (MMAH, 2005).

The Official Plan also designates the Town's Natural Heritage System as "Natural Area", which includes significant natural heritage features such as woodlands, valleylands, wetlands, and significant wildlife habitat. This document was reviewed for policies regarding the natural heritage features present within the study areas, and a detailed assessment was completed for each under Section 4 of this report.

A1.2 EXISTING INVENTORIES

Methods to identify potentially significant species and/or natural heritage features included review of the following mapping and database resources:

A1.2.1 MAPPING RESOURCES

Mapping data obtained from Conservation Halton, the Town of Oakville and Ministry of Natural Resources and Forestry were reviewed for land use designation and natural heritage features.

A1.2.2 NATURAL HERITAGE INFORMATION CENTRE BIODIVERSITY EXPLORER QUERY (NHIC 2012)

As per the NHIC website (http://nhic.mnr.gov.on.ca/):

"The Natural Heritage Information Centre (NHIC) compiles, maintains and distributes information on natural species, plant communities and spaces of conservation concern in Ontario. This information is stored in a spatial database used for tracking this information. The Centre also has a library with conservation-related literature, reports, books, and maps, which are accessible for conservation applications, land use planning, and natural resource management. The NHIC website makes much of this information available through the internet."

The NHIC database was queried on August 22, 2016, to identify any records of wildlife Species At Risk (SAR) and/or provincially significant wildlife species (S-ranks of S1 to S3) in the site vicinity. A total of 30 1 km X 1 km squares, containing the three study areas as well as surrounding lands, were checked. A total of fourteen species were reported, as well as an additional five records for "restricted species". The results of the query and the corresponding grid squares assessed are displayed in Appendix B. Below is an assessment of the summarized NHIC data:

Flora

Table 1: NHIC query flora results

Scientific Name	Common Name	S_RANK	COSEWIC	COSSARO	Last Observed (MM/DD/YYYY)
Cornus florida	Eastern Flowering Dogwood	S2	END	END	00/00/1993
Crataegus coccinioides	Kansas Hawthorn	S2			08/30/1980
Crataegus pruinosa var. dissona	Northern Hawthorn	S3			05/26/1982
*Liatris spicata**	Dense Blazing Star	S2	THR	THR	00/00/1998
Linum viginianum	Woodland Flax	S2			09/08/1976
Mertensia virginica	Virginia Bluebells	S3			05/26/1982
Muhlenbergia tenuiflora	Slim-flowered Muhly	S2			10/24/1973

*found in surrounding grid squares, not within study areas

In the 1 x 1 km squares within the study areas, six flora records were found: Eastern Flowering Dogwood (*Cornus florida)*, Kansas Hawthorn (*Crataegus coccinioides*), Northern Hawthorn (*Crataegus pruinosa var. dissona*), Woodland Flax (*Linum virginianum*), Virginia Bluebells (*Mertensia virginica*), and Slim-flowered Muhly (*Muhlenbergia tenuiflora*). One species (Dense Blazing Star, *Liatris spicata*) was found in the 1 x1 km grid squares surrounding the study areas. Most of these species (Eastern Flowering Dogwood, Kansas Hawthorn, Dense Blazing Star, Woodland Flax, and Slim-Flowered Muhly) are ranked S2 in Ontario, which indicates a provincial population that is considered "imperiled", while Northern Hawthorn and Virginia Bluebells are ranked S3, indicating "vulnerable" provincial populations (NHIC, 2014).

Most of these records are considered historic, as they were reported over 25 years ago, with the exception of Eastern Flowering Dogwood and Dense Blazing Star. While suitable habitat is present within the study areas for Eastern Flowering Dogwood which prefers mid-age to mature deciduous and mixed forests, the study areas do not meet habitat requirements for Dense Blazing Star which grows in moist prairies, grassland savannahs, wet areas between sand dunes, and abandoned fields (MNRF, 2014).

Fauna

Table 2: NHIC query fauna results

Scientific Name	Common Name	S_RANK	COSEWIC	COSSARO	Last Observed (MM/DD/YYYY)
*Chelydra serpentine**	Snapping Turtle	S3	SC	SC	06/18/1993
Clinostomus elongates	Redside Dace	S2	END	END	10/10/2000
Colinus virginianus	Northern Bobwhite	S1	END	END	1904
Coregonus reighardi	Shortnose Cisco	SH	END	END	11/08/1915
Erynnis martialis	Mottled Duskywing	S2	END		07/03/2003
Lampropeltis triangulum	Eastern Milksnake	S3	---	---	04/16/1969
Sturnella magna	Eastern Meadowlark	S4B	THR	THR	00/00/2009

*found in surrounding grid squares, not within study areas

Six fauna species were recorded for the 1 x 1 km grid squares within the study areas, including Redside Dace (*Clinostomus elongates*), Northern Bobwhite (*Colinus virginianus*), Shortnose Cisco (*Voregonus reighardi),* Mottled Duskywing (*Erynnis martialis*), Eastern Milksnake (*Lampropeltis triangulum*), and Eastern Meadowlark (*Sturnella magna*). One record for Snapping Turtle (*Chelydra serpentine)* was recorded in the 1 x 1 km grid squares surrounding the study areas. Eastern Meadowlark is ranked S4B, meaning the Ontario breeding population is "apparently secure" although it is listed as a SAR (Threatened). Snapping Turtle and Eastern Milksnake are ranked S3 in Ontario, indicating provincial populations that are "vulnerable" (NHIC, 2014). The Redside Dace and Mottled Duskywing are ranked S2, indicating a provincial population that is "imperiled". The Northern Bobwhite is ranked S1, which indicates a "critically imperiled" provincial population, while the Shortnose Cisco is ranked SH which means "possibly extirpated".

From a wildlife perspective, two of the species' records found in the query are historic in nature (i.e., pre 1980): Northern Bobwhite and Eastern Milksnake. Northern Bobwhite has been extirpated from this area and is now only extant in Ontario on Walpole Island. It should also be noted that Eastern Milksnake was delisted by the MNRF in June 2016 and is no longer considered a Species at Risk; it is still ranked provincially as S3, however. Snapping Turtle (Special Concern) was also indicated by Aurora District MNRF as having records in the area (see below).

Of the three species extant in the region, only Snapping Turtle is likely to occur in all three of the study areas. Eastern Meadowlark is an open country species and, as such, is highly unlikely to occur in both the Bronte Creek and 14 Mile Creek valley systems. McCraney Creek and its associated channel has open habitat but it is not extensive enough for this area sensitive species; furthermore, the habitat is too shrubby and/or wooded, with disturbed habitats all around, for this species. Finally, Mottled Duskywing is associated with dry sandy open habitat in proximity to the Niagara Escarpment and along the Bronte Creek valley. As such, it would not occur at 14 Mile Creek and McCraney Creek as the habitat is unsuitable and its hostplant, New Jersey Tea, would not occur in sufficient quantities. Although present in the Bronte Creek valley, this species is found further north and in open areas adjacent to the valley; there are no records from the valley in the area of the proposed outfall.

A1.2.3 SIGNIFICANT WILDLIFE RECORDS – BRONTE CREEK & FOURTEEN MILE CREEK ESAS (FROM DWYER 2006) & SAW-WHET PROPERTY EIS (BEACON 2015)

Bronte Creek ESA (Halton NAI) & Fourteen Mile Creek ESA (Halton NAI) (Dwyer 2006)
These documents provide a site summary for the Bronte Creek and Fourteen Mile Creek ESAs, including physical descriptions, ELC designations, species richness, and land use which were used to supplement information in this report. See Appendix H for ELC vegetation community mapping for Fourteen Mile and Bronte Creeks.

Bronte Green EIS (Beacon 2016)
An EIS was completed for the Saw-Whet Golf Course property which is located adjacent to Fourteen Mile Creek Valley, east of Bronte Road. Some of the findings (e.g. wildlife and vegetation resources) were used to supplement information in this report.

Summary from the Bronte Creek Valley – Natural Areas Inventory #10

- 143 species of birds; 22 Interior Forest species
- Species at Risk (at present):
    - Birds – Canada Warbler, Common Nighthawk, Eastern Whip-poor-will, Golden-winged Warbler, Henslow's Sparrow, Loggerhead Shrike, Red-headed Woodpecker, Yellow-breasted Chat;
    - Insects – Monarch, Mottled Duskywing;
    - Reptiles – Eastern Hog-nosed Snake, Eastern Milksnake (no longer SAR), Eastern Ribbonsnake, Northern Map Turtle
    - Mammals – Eastern Small-footed Myotis
- 17 birds that are considered rare within Halton Region (most records are from pre-1993): Blackburnian Warbler, Black-throated Blue Warbler, Broad-winged Hawk, Carolina Wren, Dark-eyed Junco, Golden-crowned Kinglet, Hermit Thrush, Long-eared Owl, Magnolia Warbler, Nashville Warbler, Orchard Oriole, Osprey, Pine Siskin, Red-shouldered Hawk, Sedge Wren, Tufted Titmouse, Yellow-billed Cuckoo, Yellow-rumped Warbler, and Yellow-throated Vireo.

Summary from the 14 Mile Creek – Natural Areas Inventory #12

- 68 species of birds; 8 Interior Forest species

- Species at Risk: Canada Warbler
- Five birds that are considered rare within Halton Region: Dark-eyed Junco, Long-eared Owl, Magnolia Warbler, Nashville Warbler, and Orchard Oriole.

Summary from the 14 Mile Creek – 2012 and 2013 data from Saw-Whet Property EIS (Beacon 2015)

- 34 species of breeding birds;
- All breeding birds detected have provincial Sranks of S4/S5 (NHIC 2016);
- Orchard Oriole is considered rare within Halton Region;
- Species at Risk: Barn Swallow (Threatened) and Eastern Wood-Pewee (Special Concern);
- Area Sensitive species: Black-throated Green Warbler, Hairy Woodpecker, Pileated Woodpecker, Pine Warbler, Red-breasted Nuthatch, Savannah Sparrow, and White-breasted Nuthatch;
- Other notable species: Belted Kingfisher, Great Crested Flycatcher, Great Horned Owl, Green Heron, and Scarlet Tanager (likely migrant);
- Four species of amphibians were detected during surveys: American Toad, Gray Treefrog, Green Frog, and Spring Peeper. These species were associated with ponds found within the golf course and not with the 14 Mile Creek riparian corridor;
- Reptiles observed: DeKay's Brownsnake, Eastern Garter Snake, Milksnake (S3), Painted Turtle, and Red-bellied Snake;
- Mammals (incidental records) – Coyote, Eastern Chipmunk, Eastern Cottontail, Gray Squirrel, Raccoon, Red Squirrel, White-tailed Deer, and Woodchuck; all eight species are common and widespread within Halton Region and have provincial Sranks of S5, indicating their populations are secure.

McCraney Creek and associated watercourse
No background documents available.

A1.2.4 AGENCY LIAISON

On September 14, 2016, an Information Request was submitted to the Aurora District MNRF for any SAR records that are on file for the three study areas and immediate surroundings. A reply was received on September 16, 2016, from Aurora McAllister, OMNRF Management Biologist (see Appendix G). The Ministry has records of the following SAR on file for the study areas:

Bronte Creek Valley:
Confirmed: Silver Shiner (Threatened) and American Eel (Endangered), both with general habitat protection.
Potential to occur: Bank Swallow (Threatened), Butternut (Endangered), Eastern Small-footed Myotis (Endangered), Little Brown Myotis (Endangered), Northern Myotis (Endangered), Tri-colored Bat (Endangered); all species have existing policies regarding general habitat protection.

Fourteen Mile Creek valley:

Confirmed: Snapping Turtle (Special Concern), Bank Swallow (Threatened; with general habitat protection), Redside Dace (Endangered; with regulated habitat protection), and Eastern Flowering Dogwood (Endangered; with regulated habitat protection).
Potential to occur: Butternut (Endangered), Eastern Small-footed Myotis (Endangered), Little Brown Myotis (Endangered), Northern Myotis (Endangered), Tri-colored Bat (Endangered); all species have existing policies regarding general habitat protection.

McCraney Creek and associated watercourse:
Confirmed: Redside Dace (Endangered), with regulated habitat protection.
Potential to occur: Bank Swallow (Threatened) and Butternut (Endangered); both species have existing policies regarding general habitat protection.

Appendix A2 – Legislation & Policy Framework

D&A reviewed the environmental policy context for the study areas. Documents consulted include:

- Species at Risk Act (2002)
- Migratory Birds Convention Act (1994)
- Provincial Policy Statement (2014)
- Endangered Species Act (2007)
- The Greenbelt Plan (2005)
- The Parkway Belt West Plan (1978)
- Conservation Authorities Act (2006) & Ontario Reg. 162/06
- Town of Oakville Official Plan (2009)
- Halton Regional Official Plan (2006)

This is used as a context to evaluate the opportunities and constraints imposed by the existing natural heritage features present at the site. Current Federal, Provincial, CH, MNRF and the Town of Oakville land use policy and regulations relevant to the site were reviewed and are documented in this section. The biophysical findings of the study areas were cross-referenced with the applicable policies and legislation.

A2.1 FEDERAL LEGISLATION

A2.1.1 SPECIES AT RISK ACT (2002)

Enacted in 2002, the Species at Risk Act (SARA) provides legal protection for species at risk (Government of Canada, 2002). This act also helps to protect species identified as sensitive from becoming extinct and secure the actions for their recovery. This may include protecting critical habitat, and rehabilitation of impacted critical habitat. Note that this Act applies to Crown (federal) lands only.

Site Implications: Because several SAR, including endangered, threatened, and special concern species have been identified as potentially inhabiting the study areas, targeted field surveys are recommended once design details are finalized to ensure that endangered species and their habitats are protected throughout the course of the work. As noted above, this applies only to any lands within the three study areas that are owned by the Crown.

A2.1.2 MIGRATORY BIRDS CONVENTION ACT (1994)

This federal legislation protects the nests, eggs and offspring of listed migratory bird species from destruction or disturbance (Government of Canada, 1994a,b). In its application, it requires best management practices to detect and avoid disturbance to active nests during construction.

Incidental take of migratory birds, nests or eggs must be avoided by limiting activities during sensitive periods and mitigation measures to ensure appropriate nesting areas are reestablished in the site. Vegetation clearing should not take place within the active nesting season between May 1st and July 31st. If the areas proposed for site alterations are thoroughly checked during the active breeding season for bird nests by a qualified biologist during the construction phase, and no nests are found, then

construction may be permitted. However, it is possible to remove vegetation when fewer birds are breeding at the beginning and end of the timing window (i.e. August 1st and April 14th).

Site Implications: All three study areas have been identified as candidate or confirmed Landbird Migratory Stopover Areas. In order to comply with this Act (MBCA 1994), site alterations involving vegetation removal should not take place between May 1st and July 31st in order to avoid the active nesting season. If any vegetation removal is to occur within this window, a qualified avian ecologist should first check the vegetation to be removed to ensure that there are no migratory birds covered by the Act nesting within it. If any birds are found nesting then, in consultation with Environment Canada, a suitable buffer should be established around the nest, and no activities will be permitted with this buffer until the birds have left.

A2.2 PROVINCIAL POLICY & LEGISLATION

A2.2.1 PROVINCIAL POLICY STATEMENT (2014)

The Provincial Policy Statement (PPS) is issued under the authority of Section 3 of the Planning Act. Section 3 requires that decisions affecting planning matters "shall be consistent with" policy statements under the Act. It should also be noted that Section 4.3 of the PPS establishes that the PPS is to be read in its entirety and all relevant policies are to be applied to each situation.

Section 2.1 of the Provincial Policy Statement (2014), which relates specifically to natural heritage, establishes clear direction on the adoption of an ecosystem approach, and the protection of resources that have been identified as 'significant': wetlands, habitats of endangered or threatened species, fish habitat, woodlands, valleylands, wildlife habitat, and areas of natural and scientific interest.

Natural heritage systems are currently defined under the Provincial Policy Statement (PPS) as follows:

> *"…a system made up of natural heritage features and areas, linked by natural corridors which are necessary to maintain biological and geological diversity, natural functions, viable populations of indigenous species and ecosystems. These systems can include lands that have been restored and areas with the potential to be restored to a natural state."*

Furthermore the PPS states that:

> *"Planning authorities are encouraged to identify natural heritage features and areas that complement, link, or enhance natural systems."*

Relevant portions of Section 2.1 include the following:

Section 2.1.5 of the PPS states that site alteration in (a.) significant wetlands, (b.) significant woodlands, (c.) significant valleylands, (d.) significant wildlife habitat, and (e.) significant areas of natural and scientific interest, is not permitted unless it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions.

Section 2.1.8 of the PPS states that site alteration on adjacent lands to natural heritage features identified in Section 2.1.5 are not permitted unless there has been an evaluation of the ecological function of the adjacent lands and it has been demonstrated that there will be no negative impacts on the natural features or on their ecological functions (MMAH, 2014).

In March 2010, the Province released the finalized Second Edition of the Natural Reference Manual (NHRM), which is intended to guide the implementation of the PPS (MMAH, 2005). This update explicitly recognizes linkages "between & among natural heritage features & areas, surface water features & ground water features, & hydrological functions" which are necessary for the ecological and hydrological integrity of watersheds.

Site implications: The PPS (MMAH, 2014) legislates that site alterations may not occur within significant natural heritage features unless it is demonstrated that no negative impacts on the feature's form and function will occur. Because the majority of the study areas are located within the Town's NHS, a detailed EIS documenting the potential impacts and mitigation strategies of the proposed work will likely be required prior to construction. Impacts of site alterations within 120 m of these features must also demonstrate no net negative impacts on the features.

A2.2.2 ENDANGERED SPECIES ACT (2007) (O. REG. 242/08)

This legislation provides the provincial mandate for the protection of species identified as Endangered, Threatened or Special Concern at the provincial level. Significant habitats of provincially Endangered and Threatened species are specifically protected from alteration in the PPS, and habitats of provincial Special Concern species are recognized under the Province's Significant Wildlife Habitat categories.

Site Implications: Because several SAR, including endangered, threatened, and special concern species have been identified as potentially inhabiting the study areas, targeted field surveys are recommended once design details are finalized to ensure that these species and their habitats are protected throughout the course of work.

A2.2.3 GREENBELT PLAN (2005)

Because portions of the subject property fall within the Greenbelt Plan (north of the QEW and west of Bronte Road), the policies associated with this plan were reviewed. The Greenbelt Plan (MMAH, 2005) indicates that site alterations in the Natural Heritage System shall demonstrate that there will be no negative effects on key natural heritage or hydrologic features (i.e. significant valleylands, woodlands, or wetlands). It states that connectivity between features must be maintained, and removal of other features that are not key natural heritage features should be avoided (MMAH, 2005). In addition, "the disturbed area of any site does not exceed 25 percent, and the impervious surface does not exceed 10 percent, of the *total developable area.*"

<u>Under Section 3.2.4</u>

"[…] site alteration is not permitted in key hydrologic features and key natural heritage features within the Natural Heritage System, including any associated vegetation protection zone, with the exception of […] **Conservation and flood or erosion control projects, but only if they have been demonstrated to be necessary in the public interest and after all alternatives have been considered**." Any permitted activities within 120 m of a key natural heritage feature within the NHS or Protected Countryside requires a natural heritage and hydrological evaluation to identify a vegetation protection zone. The minimum vegetation protection zone, in the case of wetlands, significant woodlands and fish habitat, should be 30 m from the outside boundary of the feature. The purpose of this zone is to help protect the feature from damages before, during, and after construction, and is meant to be maintained as "natural, self-sustaining vegetation."

Site Implications: Because a portion of the study area is governed by the policies outlined in the Greenbelt Plan and there area existing key natural heritage features including woodlands, site alterations may not occur within the boundaries of the feature. Therefore, any site alterations on Greenbelt lands require a vegetation protection zone of at least 30 m to be established through a natural heritage and hydrological evaluation.

A2.2.4 PARKWAY BELT WEST PLAN (1978)

Most of the study areas fall within the Parkway Belt Lands, which follow the Bronte Creek corridor south to Lake Ontario and north to Dundas St W (Town of Oakville, 2009, Schedule B). The Fourteen Mile Creek corridor north of the QEW is also governed by policies outlined in the **Parkway Belt West Plan (MMAH, 1978),** and according to subsection 6.6.2, the specific objectives relevant to this project include preserving the Bronte Creek and Fourteen Mile Creek Valleys, and protecting tree stands that are significant or serve as buffers.

Site Implications: The majority of the study area is located within the Parkway Belt West, and as such, healthy, native, mature tree stands should be preserved throughout the course of work. The Bronte and Fourteen Mile Creek corridors are designated as Significant Woodlands, and as such, contain high quality vegetation that likely acts to buffer the stream against contaminants. Next steps may involve retaining a qualified arborist to complete a tree inventory to assess these constraints and opportunities for site alteration while ensuring significant tree stands or those which act as buffers are maintained.

A2.2.5 CONSERVATION AUTHORITIES ACT ONTARIO REGULATION 162/06 (2013)

Conservation Halton (CH) is authorized under Section 28 of the Conservation Authorities Act to implement and enforce the Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses (Ontario Regulation 42/06). Permits are required to identify potential interference in areas within the 100-year floodline, 15 metres of the shoreline, 15 metres within a valley's top of bank, hazard lands, 120 metres around all PSWs and ELC wetlands greater than 2 ha, and 30 metres around ELC wetlands greater than 0.5 ha.

Site Implications: Because the site alterations will involve altering the direction and flow of multiple watercourses within the Bronte-McCraney Watershed, as well as working within valleylands and in proximity to a PSW, permission is required from CH prior to construction occurring. There may also be further conditions upon receiving permission.

A2.3 LOCAL POLICY

A2.3.1 TOWN OF OAKVILLE OFFICIAL PLAN – LIVABLE OAKVILLE (2009)

The Livable Oakville plan aims to establish framework that directs decision making that conforms to provincial plans and is consistent with provincial policy statements. This document refers to Oakville's Natural Heritage System as "Natural Area", including: significant wildlife habitat, wetlands, woodlands, valleylands, environmentally sensitive areas (ESAs), habitat of endangered and threatened species, areas of natural and scientific interest (ANSI), fish habitat, and natural corridors.

Significant Wildlife Habitat (SWH)

According to section 16.1.10 of Oakville's Official Plan (2009) and in accordance with the PPS (MMAH 2014), site alteration shall not be permitted in significant wildlife habitat, and any activities proposed within 120 m of the feature requires an EIS to demonstrate no negative impacts on the feature or its functions, unless otherwise directed by the Conservation Authority.

Site Implications: Candidate and confirmed SWH has been identified for all study areas. As such, unless CH directs otherwise, the proposed work, if within 120 m of the feature, will need to be addressed by a full EIS in order to demonstrate no negative impacts will occur to the form or function of the habitat.

Wetlands

Section 16.1.7 of the Official Plan (Town of Oakville, 2009) states that "site alteration shall not be permitted within provincially, regionally or locally significant wetlands or within the required buffer width, which should be a minimum of 30 metres measured from the boundary of the wetland." It also states that the width of the buffer must be established through an EIS or approved subwatershed study. Any activities within 120 m of the wetland complex requires an EIS be completed to demonstrate no negative impacts if it has not been considered in a previous subwatershed study, or may require a site-specific EIS if a subwatershed has already been completed.

Site Implications: The Lower Bronte Creek Wetland Complex does not appear to have been specifically studied in a subwatershed study or otherwise. Therefore, it is likely that the Conservation Authority will require an EIS addressing impacts on the wetland if site alterations are proposed within the 120 m buffer zone. It is recommended that proposed work occurs well outside of this zone if possible.

Significant Woodlands

Section 16.1.8 of the Official Plan (2009) states that "site alteration shall not be permitted within regionally significant woodlands or within the required buffer width, which should be a minimum of 10 m measured from the drip line of the woodland." The final buffer width shall be established through an EIS or subwatershed study. Work proposed within 120 m of a significant woodland also requires an EIS demonstrating no negative impacts on the feature or its function.

Site Implications: The majority of the study areas are designated as significant woodland, and therefore activities should be directed away from these features if possible. While it is likely that site alterations will need to occur within 120 m of the feature, an EIS will be required to demonstrate no negative impacts.

Significant Valleylands

According to Section 16.1.9 of the Official Plan (Town of Oakville, 2009), valleylands include lands all lands within a valley, from stable top-of-bank to stable top-of-bank as determined through a geotechnical study satisfactory to the Town and Conservation Authority. Site alteration is not permitted within the valley or within 15 m from the stable top-of-bank of major valleys and tributaries, and 7.5 m from stable top-of-bank of minor valleys and tributaries, except for "essential public works" subject to the requirements of this Plan. When possible, the lands below stable top-of-bank should be maintained in a natural state. Unless permitted by CH, no filling or alterations to watercourses within the valleylands are permitted. "Unless otherwise directed by the Conservation Authority, all proposed work on lands within 120 metres of a major valley or directly abutting the top of bank of a minor valley must demonstrate through an EIS that erosion and any adverse impacts to water quality, slope stability, wildlife habitat, existing vegetation and drainage shall be minimized and existing valley slopes shall not be disturbed" (Town of Oakville, 2009). Geotechnical studies may also be required by the Town or

Conservation Authority to provide recommendations to ensure long term slope integrity, to the satisfaction of the Town and Conservation Authority.

Site Implications: All three study areas contain significant valleyland features, where Bronte Creek is considered a "Major Valley" and Fourteen Mile and McCraney Creeks are considered "Minor Valleys". Because flood mitigation can be considered "essential public works", the 15 m and 7.5 m setback from the stable top-of-bank is likely not relevant. An EIS and geotechnical study may, however, be required by CH to ensure no negative impacts on the valley slope, water quality, drainage or vegetation.

Environmentally Sensitive Areas (ESA)

According to Section 16.1.11 of Oakville's Official Plan (2009), ESAs are identified by the Region as lands that meet one or more of the ESA criteria set out in the Region's Official Plan. As such, activities and site alteration within or adjacent to and ESA is restricted by policies established in the Region's Official Plan and is discussed in further detail in Section 3.4.3.2 of this report.

Site Implications: See Section 3.4.3.2 of this report.

Areas of Natural and Scientific Interest (ANSI)

Section 16.1.12 of Oakville's Official Plan (2009) states that ANSIs are defined as areas with features related to" natural heritage protection, scientific study, or education and contain representative earth science and/or natural processes." An EIS must demonstrate no negative impacts on the feature or its function prior to site alteration within 120 m of a life science ANSI.

Site Implications: Bronte Creek Provincial Park Nature Reserve Zone is designated as a Provincial Life Science ANSI, so an EIS demonstrating no negative impacts to the structure and functioning of the site is necessary prior to any alterations within 120 m of the ANSI boundary.

A2.3.2 HALTON REGIONAL OFFICIAL PLAN (ROP) (2006)

Environmentally Sensitive Areas (ESA)

According to Section 119 of the Halton ROP (2006), the precise boundaries of an ESA are to be determined by an Environmental Impact Assessment prior to site alteration. The ROP does not provide specific rules and allowances on uses within an ESA, but the overall objectives are to preserve the existing landscape in its form and function.

Site Implications: An EIA/EIS may be required to establish the precise boundaries of the ESAs within the study areas. Through the EIA/EIS, it should also be demonstrated that there will be no negative impacts on the ESA's structure and function.

Appendix A3 – Characterization of Study Areas B and C Based on Field Investigations

A3.1 AREA 'B'

Plant Communities were observed to be organised along the slopes of the valley feature. Forested communities persisted along the steep slopes of the valley wall and directly adjacent to the channel. The floodplain contained a greater diversity of shrub thicket and open habitat. This is likely due to a history of human use for agriculture followed in recent times by recreational landuse.

The segment along Fourteen Mile Creek west of Langtry Park had the highest quality species of all the sites visited. The species along the floodplain were all flood-tolerant, including species such as Black Raspberry (*Rubus occidentalis*), New England Aster (*Symphyotrichum novae-angliae),* Lance-leaved Aster *(Symphyotrichum lanceolatum ssp. lanceolatum)*, Purple Loosestrife (*Lythrum salicaria*), Spotted Joe Pye Weed (*Eutrochium maculatum ssp. maculatum)* and Field Horsetail (*Equisetum arvense*). Tree species along the floodplain also seemed well-adapted to wet conditions, including Black Walnut (*Juglans* nigra) and Ash (*Fraxinus sp.*). Along the slopes bordering the channel were many high-quality large trees, including Black Walnut (*Juglans nigra*), Shagbark Hickory (*Carya ovata*), American Elm (*Ulmus americana),* Eastern White Pine (*Pinus strobus*), Sugar Maple (*Acer saccharum*), American Basswood (*Tilia americana),* and Red Oak (*Quercus rubra).* There is a small area where the two channels meet, behind an existing school that is dominated by Black Locust (*Robinia pseudoacacia),* which is a non-native tree that could be preferentially removed or damaged over other vegetation if required during the construction process.

A3.2 AREA 'C'

Vegetation Communities in this area are organized in a linear fashion along the CN Rail line and access road north of the rail. Canopy vegetation is highest on the northern limit of the Right of Way adjacent to the industrial landuses. One woodlot was present north of the Right of Way along McCraney Creek and east of the Municipal Offices at 1140 South Service Road West. Otherwise the vegetation communities are dominated by cultural meadows.

The understory of the woodlot straddling McCraney Creek is dominated by invasive European Buckthorn (*Rhamnus cathartica*). While the canopy consisted of abundant ash die-back, many mature, high quality species were observed on the south side of the woodlot towards the access road, including Shagbark Hickory (*Carya ovata*), Sugar Maple (*Acer saccharum*) and Bur Oak (*Quercus macrocarpa).* These individuals should be safeguarded during the work, while the Buckthorn can and should be removed.

The vegetation along the access road/CN Rail Line largely consisted of disturbance-tolerant species and some planted species. The vegetation was mainly meadow/thicket species of low quality, such as Lamb's quarters (*Chenopodium alba),* Chicory (*Cichorium intybus*), Tufted Vetch (*Vicia* cracca), Canada Goldenrod (*Solidago canadensis*), Poison Ivy (*Toxicodendron radicans*), Common Burdock (*Arctium minus),* Apple (*Malus sp.),* Hawthorn (*Crataegus sp.*), and Staghorn Sumac (*Rhus typhina)* and various grasses.

Appendix A4 – Species at Risk Screening Summary

A desktop list was generated by screening of all known wildlife Species at Risk (SAR) that have been known to occur in the Town of Oakville. The list was generated from the SAR list on the MNRF website, current through to June 20, 2016. The known habitats for these wildlife species were screened against the habitats contained within the three study areas, based on Google Earth imagery and 2016 field assessments. The full screening is presented in Appendix E, with a summary as follows:

A4.1 BRONTE CREEK VALLEY

The following SAR may be present along the forested slopes of the valley in the area of the proposed outfall (at creek level); therefore, although other SAR may be present elsewhere within the entire valley system, this screening is scoped down to the site-specific level. To determine more precisely what impacts may occur to potential SAR, design details are required.

- Bank Swallow, Chimney Swift, Endangered bats (four species; see below for details), Snapping Turtle, and Wood Thrush;

Four species of Endangered bats are known from the Town of Oakville: Eastern Small-footed Myotis (*Myotis leibii*), Little Brown Myotis (*Myotis lucifugus*), Northern Myotis (*Myotis septentrionalis*), and Tri-colored Bat (*Perimyotis subflavus*). As outlined in section 3.3.6, potential SWH (Bat Maternity Colonies) may occur in the area, although there is no suitable overwintering sites or buildings that could be utilized for roosting by any of the four species (especially Little Brown Myotis). These species may be present during migration as they are known to follow significant valley systems, especially in close proximity to Lake Ontario (less than 5 km).

A4.2 14 MILE CREEK VALLEY

The following SAR may be present along the forested slopes of the valley in the area of the proposed outlet to Bronte Creek as well as at the culvert at the south end (running under the Q.E.W.). Again, although other SAR may be present elsewhere within the entire valley system, this screening is scoped down to these two sites. Design details are required to determine more precisely what impacts may occur to potential SAR.

- Barn Swallow, Canada Warbler, Chimney Swift, Eastern Wood-Pewee, Snapping Turtle, and Wood Thrush;

A4.3 MCCRANEY CREEK AND ASSOCIATED WATERCOURSE

The following SAR may be found along the watercourse than runs west from McCraney Creek at Fourth Line, eventually entering 14 Mile Creek just east of Third Line (see Figure 1). A new channel will be built from the SWM at Fourth Line to approximately 175 metres westward; vegetation removal will be required in this stretch. The works on the channel west of this area will be in-channel only, mainly related to gradient improvements.

- Barn Swallow, Chimney Swift, Endangered bats (four species), Eastern Wood-Pewee, Monarch, Snapping Turtle, and Wood Thrush;

The full Species at Risk screening for all three sites is presented in Appendix E.

Appendix A5 – Incidental Wildlife Observations

A5.1 BIRDS

During the field visits on October 12 and 17, 2016, approximately 40 species of birds were observed and/or heard vocalizing. Based on the habitats present and their known breeding range in Ontario, some of these species represent potential breeders while others were known (or likely) migrants or non-breeding visitants.

Potential breeding species: Mallard, Rock Pigeon, Mourning Dove, Red-tailed Hawk, Downy Woodpecker, Northern Flicker, Blue Jay, Black-capped Chickadee, White-breasted Nuthatch, American Robin, Gray Catbird, Northern Mockingbird, European Starling, House Sparrow, American Goldfinch, Common Yellowthroat, Song Sparrow, Northern Cardinal, Common Grackle, and Red-winged Blackbird. All of these species are common and widespread in Halton Region, except for Northern Mockingbird, which is considered "uncommon" (Dwyer 2006).

Known or likely migrants and non-breeders: Ring-billed Gull, Turkey Vulture, Sharp-shinned Hawk, Eastern Phoebe, Blue-headed Vireo, Winter Wren, Golden-crowned Kinglet, Ruby-crowned Kinglet, Hermit Thrush, Orange-crowned Warbler, Nashville Warbler, Palm Warbler, Yellow-rumped Warbler, Field Sparrow, Lincoln's Sparrow, White-throated Sparrow, White-crowned Sparrow, Dark-eyed Junco, and Rusty Blackbird (Special Concern).

Note that the diversity of migrant species is quite high, demonstrating that even sites with limited habitat availability, such as along the watercourse associated with McCraney Creek, provide important stopover habitat for migratory landbirds.

A5.2 MAMMALS

An Eastern Cottontail (*Sylvilagus floridar*) was observed, as well as several deer beds (assumedly used by White-tailed Deer, *Odocoileus virginianus)* along the Fourteen Mile Creek floodplain. Coyote scat was also observed along the access road parallel to the CN Rail Line. These species are all ranked "Least Concern" by the IUCN (2012) and are S5 in Ontario, meaning their populations are secure, widespread and abundant (NHIC, 2014).

A5.3 SNAKES

A Dekay's Brownsnake (*Storeria dekayi*) was identified during the field visit on October 17th, 2016. This species has not been assessed by COSSARO or COSEWIC, and is listed as "Least Concern" by the International Union for Conservation of Nature (IUCN, 2012).

A5.4 INSECTS

Monarch butterfly (*Danaus plexippus*) and many bumble bees were observed during the field screening in October. Monarchs are a "Special Concern" species in Ontario. The bumble bees were not assessed to species level.

Appendix A6 – Special Features & Ecological Functions

A6.1 SOURCES IDENTIFYING SIGNIFICANT FEATURES AND FUNCTIONS

According to the Town of Oakville Official Plan (2009), Schedule B: Natural Features & Hazard Lands, significant natural features, including woodlands, valleylands, wetlands, and ANSIs exist along the Bronte Creek and Fourteen Mile Creek channels and as such, these areas are designated by the Town as "Natural Area". As per section 16.1.1 of the Town's Official Plan (2009), "essential public works including […] flood and erosion control facilities" may be permitted uses within the Natural Area, subject to policies as outlined by the Conservation Authority. When not subject to the *Environmental Assessment Act,* planning applications require that an Environmental Impact Statement (EIS) be completed to determine that the use will not negatively impact the form or function of the ecological feature (Town of Oakville, 2009).

The Town of Oakville Official Plan, Schedule B: Natural Features & Hazard Lands designates Bronte Creek and its associated floodplain as a Significant Area of Natural and Scientific Interest (ANSI) with surrounding Significant Woodlands. Fourteen Mile Creek and its surroundings are designated as an Environmentally Sensitive Area, with associated Significant Valleylands and Woodlands. The Lower Bronte Creek Wetland Complex is a Provincially Significant Wetland located south of the CN Rail Line just west of Bronte Road. While it is located outside of the study area boundaries, it is downstream of potential site alterations and should be considered prior to construction. According to a desktop review and previous field studies, there is candidate significant wildlife habitat, and significant habitat for endangered and threatened species associated with the study areas.

A6.2 SIGNIFICANT HABITAT FOR ENDANGERED & THREATENED SPECIES

There are a number of species potentially found within the three study areas that are designated as Endangered or Threatened within Ontario. As such, they are protected by the Endangered Species Act (ESA 2007), meaning it is illegal to harm them or their habitats. If adverse impacts to any Endangered or Threatened species and/or their habitats is slated to occur, then overall benefit permits (C-permits) may be required or streamlined Regulatory approval processes followed.

For details on what Endangered or Threatened species may occur in the study areas, along with any anticipated impacts and/or mitigation measures to apply, please refer to Appendix D (Species-at-Risk Screening).

A6.3 SIGNIFICANT WETLANDS

According to the NHIC biodiversity query (August 2016) and Schedule B of the Town of Oakville Official Plan (2009), the Lower Bronte Creek Wetland Complex is located downstream within 1 km of the study area, which is designated as a Provincially Significant Wetland. Adjacent lands that must be considered for potential negative impacts on a PSW is a 120 m radius from the boundary of the feature (MMAH, 2014). Therefore, the potential impacts on the wetland form and function must be considered prior to construction or site alteration, as PSWs are regulated by several Provincial Acts (i.e. The Planning Act, the Greenbelt Act, and Conservation Authorities Act) and are further enforced by local Official Plans and

Zoning By-laws. The legislation and policy associated with PSWs is further addressed below in Section 4 of this report.

A6.4 SIGNIFICANT WOODLANDS

According to Schedule B in the Town of Oakville's Official Plan (2009), significant woodlands exist throughout the Bronte Creek and Fourteen Mile Creek floodplain. Woodlands provide many benefits to an ecosystem, including soil erosion prevention, nutrient and hydrological cycling, flood and erosion reduction, carbon sequestration, and wildlife habitat. As with significant wetlands, the adjacent lands to be considered for potential impacts is a 120 m radius from the edge of the feature (MMAH, 2014). A further assessment of legislation and policy as it relates to significant woodlands is included in Section 4 of this report.

A6.5 SIGNIFICANT VALLEYLANDS

Schedule B in the Town of Oakville's Official Plan (2009) designates parts of Fourteen Mile Creek, Bronte Creek, McCraney Creek, Glen Oak Creek, and Taplow Creek valleylands as significant natural features. Valleylands provide essential natural drainage for watersheds and provide habitat and linkages for wildlife, while providing important cultural, recreational, social and economic benefit. The width of adjacent lands to be considered for potential impacts, again is 120 m from the edge of the feature (MMAH, 2014). A further assessment of legislation and policy as it relates to significant valleylands is included in Section 4 of this report.

A6.6 SIGNIFICANT WILDLIFE HABITAT

During the 2016 desktop and field assessments, habitats found within the three study areas were screened against the Significant Wildlife Habitat (SWH) categories contained within the *Significant Wildlife Habitat Technical Guide* (OMNR 2000) and the *Significant Wildlife Habitat Criteria Schedules for* Ecoregion 7E (OMNRF 2015). See Appendix E for a detailed analysis of the SWH criteria.

Bronte Creek Valley:
Of the 38 categories of SWH, the following categories have candidate or confirmed habitats present within or adjacent to the study area:

- Seasonal Concentration Areas of Animals: Bat Maternity Colonies; Reptile Hibernaculum; Colonially-Nesting Bird Breeding Habitat (Bank and Cliff); Landbird Migratory Stopover Areas;
- Rare Vegetation Communities: Old Growth Forest;
- Specialized Habitat for Wildlife: Bald Eagle and Osprey Nesting, Foraging and Perching Habitat; Woodland Raptor Nesting Habitat; Woodland Area-Sensitive Bird Breeding Habitat;
- Habitats for Species of Conservation Concern (not including Endangered and Threatened Species): Special Concern and Rare Wildlife Species;
- Animal Movement Corridors: Amphibian Movement Corridor.

Fourteen Mile Creek Valley:
Of the 38 categories of SWH, the following categories have candidate or confirmed habitats present within or adjacent to the study area:

- Seasonal Concentration Areas of Animals: Bat Maternity Colonies; Reptile Hibernaculum; Landbird Migratory Stopover Areas;

- Rare Vegetation Communities: Old Growth Forest;
- Specialized Habitat for Wildlife: Woodland Area-Sensitive Bird Breeding Habitat;
- Habitats for Species of Conservation Concern (not including Endangered and Threatened Species): Special Concern and Rare Wildlife Species.

It should be noted that these categories were also identified by the Bronte Green EIS (Beacon 2015) prepared for the lands adjacent to the 14 Mile Creek valley.

McCraney Creek Valley and associated watercourse:
Of the 38 categories of SWH, the following categories have candidate or confirmed habitats present within or adjacent to the study area:

- Seasonal Concentration of Animals: Bat Maternity Colonies; Landbird Migratory Stopover Areas;
- Specialized Habitat for Wildlife: Turtle Nesting Areas;
- Habitats for Species of Conservation Concern (not including Endangered and Threatened Species): Special Concern and Rare Wildlife Species;
- Animal Movement Corridors: Amphibian Movement Corridors.

A6.7 SIGNIFICANT AREAS OF NATURAL AND SCIENTIFIC INTEREST (ANSI)

The Bronte Creek Provincial Park Nature Reserve Zone is designated as a Provincial Life Science ANSI (NHIC, 2016). ANSIs are "areas of land and water containing natural landscapes or features that have been identified as having life science or earth science values related to protection, scientific study or education" (MMAH, 2014). The width of adjacent lands to a life science ANSI is once again 120 m from the edge of the feature (MMAH, 2014). A further assessment of legislation and policy as it relates to significant ANSIs is included in Section 4 of this report.

A6.8 ENVIRONMENTALLY SENSITIVE AREAS

Schedule B of the Official Plan (Town of Oakville, 2009) designates the Fourteen Mile Creek corridor north of the QEW as an Environmentally Sensitive Area (ESA). While ESA's are not addressed by the Provincial Policy Statement in terms of protection, the Town's Official Plan restricts site alterations to limitations as outlined in the Region of Halton's Official Plan. A further assessment of policy as it relates to ESAs is included in Section 4 of this report.

Appendix B: NHIC query for the 14 Mile Creek - McCraney Creek study area (MNRF Natural Heritage "Make-a-Map" Online Tool; August 22, 2016)

Species Scientific Name	Species Common Name	Srank	COSEWIC	COSSARO	Last Observation Date
Reptiles:					
Lampropeltis triangulum	Eastern Milksnake	S3	SC	SC	16/04/1969
Chelydra serpentina	Snapping Turtle	S3	SC	SC	18/06/1993
Birds:					
Colinus virginianus	Northern Bobwhite	S1	END	END	1904
Sturnella magna	Eastern Meadowlark	S4B	THR	THR	24/06/2001; 13/05/2006; 27/04/2007; 00-00-2009
Insects:					
Erynnis martialis	Mottled Duskywing	S2	END		03/07/2003
Plants:					
Cornus florida	Eastern Flowering Dogwood	S2?	END	END	1993-00-00
Crataegus coccinioides	Kansas Hawthorn	S2			30/08/1980
Crataegus pruinosa var. dissona	Northern Hawthorn	S3			26/05/1982
Liatris spicata	Dense Blazing Star	S2	THR	THR	1998
Linum virginianum	Woodland Flax	S2			08/09/1976
Mertensia virginica	Virginia Bluebells	S3			26/05/1982
Muhlenbergia tenuiflora	Slim-flowered Muhly	S2			24/10/1973
Fish:					
Clinostomus elongatus	Redside Dace	S2	END	END	25/08/1960; 02/09/1972; 01/06/1998; 10/10/2000
Coregonus reighardi	Shortnose Cisco	SH	END	END	08/11/1915
Miscellaneous:					
RESTRICTED SPECIES					1973
RESTRICTED SPECIES					25/09/1938
RESTRICTED SPECIES					28/02/1942
RESTRICTED SPECIES					24/09/2008
RESTRICTED SPECIES					1973-05

Natural Area	Natural Area Designation
BRONTE CREEK PROVINCIAL PARK	Earth Science Site
BRONTE CREEK PROVINCIAL PARK - NATURAL ZONES I,II,II,VII	International Biological Program site
BRONTE CREEK PROVINCIAL PARK (RECREATION CLASS)	Provincial Park - Recreational Class
Bronte Creek Provincial Park Nature Reserve Zone	Life Science ANSI, Provincial
FOURTEEN MILE CREEK VALLEY	Life Science site
Lower Bronte Creek Wetland Complex	Provincially Significant Wetland
West End of Lake Ontario	Important Bird Area

1 x 1 km grid squares queried include:

17PJ0007, 17PJ0106, 17PJ0108, 17PJ0208, 17PJ0308, 17PJ0408, 17PJ0409, 17NJ9906, 17NJ9907, 17NJ9908, 17NJ9909, 17PJ0005, 17PJ0006, 17PJ0009, 17PJ0109, 17PJ0205, 17PJ0207, 17PJ0209, 17PJ0307, 17PJ0309, 17PJ0310, 17PJ0407, 17PJ0410, 17PJ0507, 17PJ0508, 17PJ0509, 17PJ0510.

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May 10, 2016

Attn. Steve Chipps. P.Eng.
Associate

Amec Foster Wheeler , Environment & Infrastructure
3215 North Service Rd.,
Burlington, Ontario,
L7N 3G2

Re: 14 Mile Creek & McCraney Creek Class EA Master Plan

Dear Steve:

Thank you for inviting Dougan & Associates (D&A) to provide terrestrial Natural Heritage System screening for the above-referenced project. We have reviewed the correspondence from Conservation Halton (CH) and provide the following work plan and budget with the understanding that it is a high level terrestrial Natural Heritage System (NHS) screening that will not address all the requests from CH but will provide sufficient information to guide the next steps towards addressing these requests.

WORK PLAN

The following tasks are anticipated as part of the work plan:

Phase 1: Background Desktop Review
All background information housed by the Natural Heritage Information Centre (NHIC), Conservation Halton (CH), Ontario Ministry of Natural Resources and Forestry (OMNRF) and any other identified agencies with knowledge of the study sites will be accessed and reviewed. A desktop review of the study area will be completed using orthophotography and resource mapping. We will seek out existing species inventory information, Species-at-Risk records, and data. These sources include the following:

- Natural Heritage Information Centre (NHIC) Biodiversity Explorer query (NHIC 2012);
- Ontario Breeding Bird Atlas (OBBA), 2001 – 2005 (Cadman et al. 2007);
- Atlas of the Mammals of Ontario (Dobbyn 1994);
- Ontario Herpetofaunal Atlas (OMNR 2011b); and,
- the Ontbirds archives, which is the Ontario Field Ornithologists' electronic mailing listserv, providing bird sightings across Ontario.

When the potential effects of an activity may have an effect on a SAR the MNRF now requires the proponent to submit an Information Gathering Form to collect the information that proponent's need to submit to the MNR in order to determine:

- Whether any SAR or their habitats are present at or near the location of the proposed activity;

- The potential effects of the activity on the SAR, their habitats and the potential of the activity to contravene the Endangered Species Act (ESA);
- If it is advisable for the proponent to apply for an "Overall Benefit Permit" under the ESA prior to proceeding with the activity.

Should SAR be identified during the desktop screening D&A recommends the Town proceed with the preparation of an Information Gathering Form at this phase of the project as completing the form may involve iterative discussions with the MNR. Submitting the form as part of the planning and design will allow sufficient time for the MNR to identify all of their information needs and assess the potential effects on SAR and their habitats. Additionally, the Town will have time to apply for and obtain an "Overall Benefits" permit, if required, prior to engaging in site alterations.

During this work phase we will also review existing studies and the environmental policy context for the study sites. This will be used as a context to evaluate the opportunities and constraints imposed by the existing natural heritage features present at the site.

We will use these data to scope field screening site visits to ensure adequate documentation regarding significant issues (e.g. Species-at-Risk, locally rare species, significant natural heritage features, etc.).

Phase 2: Field Screening
One site visit targeting specific areas within the three study sites to fill data gaps and validate the results of the background desktop review. The screening will consist of a visual review to validate desktop findings and confirm potential information gaps.

Phase 3: Review of Proposed Alternatives
Results of background desktop review and field screening site visits will be used to evaluate the potential terrestrial natural heritage impacts of the proposed alternatives developed by AMEC. A meeting with AMEC to review alternatives will be scheduled during this Phase.

Phase 4: Brief Report: Natural Heritage Assessment Report
D&A will provide a brief report summarizing the results of background desktop review and field screening site visits, a review of alternatives in terms of terrestrial Natural heritage, and identification of study gaps and next steps.

Exclusions

The following tasks are not included in the scope of this work plan but may be required as next steps:

- Ecological Land Classification (ELC) and vascular plant species inventory;
- Arborist Assessment;
- Nocturnal amphibian call surveys;
- Snake surveys;
- Breeding bird surveys;
- Turtle surveys;
- Bat surveys;
- Species at Risk targeted surveys; and
- Butterfly and odonate surveys.

KEY STAFF

Todd Fell, BLA, OALA, CSLA –Ecological Landscape Design Manager

Todd has a unique background in both landscape architecture and ecological restoration, and since joining D&A in 1998 has been involved in numerous projects requiring expertise from both disciplines. Todd has managed the natural heritage components of numerous projects at the watershed and secondary plan level down to the site level and completed the terrestrial characterization and assessments for environmental impact assessments, landscape restoration and management plans, naturalization projects, and the design components of waterfront and creek rehabilitation / restoration projects in urbanized or urbanizing settings across southern Ontario.

Todd is a Full Member of the Ontario Association of Landscape Architects (OALA) as well as the Canadian Association of Landscape Architects (CSLA) and has experience in all aspects of landscape design including Master Plan concept development, preliminary and detailed design preparation, contract administration and site supervision. In Todd's time at D&A his ecological expertise has been applied to the assessment of the full range of natural habitats found in southern Ontario utilizing both primary (i.e. field survey methodologies) and secondary (i.e. desktop methods and research) sources. In combination Todd's design and ecological proficiency achieve a synergy that facilitates a special expertise in the provision of ecological landscape design and natural heritage planning that has been applied to municipal planning and policy development, master planning, infrastructure development, parks, recreation as well as conservation and restoration projects.

Todd is adept at the agency approval process and works to integrate innovative approaches to environmental issues, particularly in urbanizing settings. His experience in providing site assessment, agency liaison, and ecological restoration expertise in recent designs include the Red Hill Expressway Open Space & Mitigation Plans in the City of Hamilton and the Memorial Park Waterfront redevelopment, Lakeside Park and O'Connor Park in the City of Mississauga. He also has Master Plan experience with providing guidance on leading-edge sustainable landscape management at Parc Downsview Park and the Ashbridges Bay Waterfront Site in Toronto.

For this project Mr. Fell will fill the role of project manager. He will assist in providing agency liaison on natural heritage issues and report writing.

Ian Richards, B.Sc. (Hons), Cert. Env. Mgmt. & Assessmt. – Wildlife Ecologist

Ian has over three decades of experience in the identification of birds, amphibians, reptiles, mammals and insects across North America. Ian's expertise encompasses seasonal wildlife surveys, air photo interpretation, wildlife habitat assessments, wildlife monitoring, endangered species surveys, ecological education, and species database management. He has an excellent working knowledge of the various protocols used in wildlife inventory and monitoring programs (e.g., the Ontario Breeding Bird Atlas, Forest Bird Monitoring Program, and Marsh Monitoring Program), and has an academic background in physical geography, specializing in geomorphology. He is also an experienced bird-bander and interpretive naturalist, and a former member of the Ontario Bird Records Committee (OBRC).

In addition to his familiarity with Ontario's wildlife in the field, Ian has played a key supporting role over the past eight years in a number of D & A wildlife research projects related to natural heritage planning, as well as policy review for a number of Ontario Municipal Board (OMB) appeals. These projects include:

- Peel-Caledon Significant Woodlands and Significant Wildlife Habitat Study;
- Migratory Bird Activity in Lakeshore Cities and in the City of Toronto;
- Potential Impacts of Wind Turbines and Windfarms on Wildlife (in particular birds and bats) for the County of Essex and the City of Toronto;

- Sifton and Grandview properties (Hardy Road) OMB appeals to the City of Brantford Waterfront Master Plan – a planning and policy peer review;
- Long Point Causeway Ecopassages Environmental Assessment – a policy review;
- Waterloo Regional Official Plan OMB appeals – a policy review.

For this project Ian will provide technical support for review of existing studies and report production.

Kristen Beauchamp, B.Sc. – Ecological Technician
Kristen is a graduate from University of Guelph's Ecology program with an area of emphasis in Resource Conservation. Since joining the D&A team in 2013, Kristen has been involved with a variety of projects involving plant identification, aerial photo interpretation, Marsh Monitoring Program surveys, GIS mapping and the management of large natural heritage datasets. She recently obtained her OWES certification and has developed a knowledge base of herbaceous wetland species. She is a certified Butternut Health Assessor (BHA) as of July 2015. Over the past year Kristen has gained extensive experience in Ecological Land Classification and Arborist Assessments through assisting senior staff.

For this project Kristen will provide technical support for review of existing studies and report production.

Lynn Wardle, B.Sc., Cert. GIS – GIS Analyst
As GIS Analyst with D&A since June of 2007, Lynn possesses a unique combination of ecology background and GIS skills which she has applied in numerous natural heritage projects to date. Lynn is skilled at ELC assessments via remote sensing, and at synthesizing data from multiple sources to conduct criteria-based GIS analyses.

*Ms. Wardle, as the **GIS Analyst** for this project, will be managing all GIS work and producing the final mapping deliverables. She will also be involved with data management and analysis.*

FEES

Our estimated fee to complete the assignment is **$12,990.00** excluding disbursements & HST. Table 01: Time Task Breakdown, provides a detailed itemization of fees. Please review this proposal at your convenience; if everything is to your satisfaction we will forward a Work Authorization Form for you to sign and initiate our work.

I welcome your call with any further questions or concerns.

Sincerely,

Todd Fell, BLA, OALA, CSLA
DOUGAN & ASSOCIATES - Ecological Consulting & Design
77 Wyndham St. South - Guelph ON N1E 5R3
T 519.822.1609 ext. 23 - F 519.822.5389
www.dougan.ca

TABLE 01: TIME TASK BREAKDOWN

	Time Task Breakdown						
	Task Description	Project Director & Landscape Architect Todd Fell *TF*	Wildlife Ecologist Ian Richards *IR*	GIS Analyst Lynn Wardle *LW*	Ecological Technician Kristen Beauchamp *KB*	Sub-Totals (hours)	Sub-Totals (Fees)
1	**Phase 1: Background Desktop Review**						
2	Review of all documents available and attainable from CH and MNRF	3	6	2	16	27	$2,390.00
3	**Phase 2: Field Screening**						
4	One Visit to each of three study areas to confirm results of background desktop review and to fill in data gaps	6	12		12	30	$3,060.00
5	**Phase 3: Review of Proposed Alternatives**						
6	Review of proposed alternatives and identification of potential impacts and possible compensation and mitigation strategies	3	12	3	15	33	$3,060.00
7	Meeting with AMEC to discuss proposed alternatives	4			4	8	$880.00
8	**Phase 4: Brief Report: Natural Heritage Assessment Report**						
9	A brief report summarizing results of background desktop review and field screening, a review of proposed alternatives, and identification of next steps	4	12	7	16	39	$3,600.00
	Total Hours	20	42	12	63	137	*$12,990.00*
	Hourly Rates	$ 150.00	$ 110.00	$ 80.00	$ 70.00		
	Sub-Total Fees	$ 3,000.00	$ 4,620.00	$ 960.00	$ 4,410.00		$ 12,990.00
	Estimated Disbursements (7.5%)						$ 974.25
	Total before HST	$ 3,000.00	$ 4,620.00	$ 960.00	$ 4,410.00		**$ 13,964.25**
	HST (13%)						**$ 1,815.35**
	Total including HST						**$ 15,779.60**

Appendix D: Vascular Plant & Status List

Species	Current Common Name (NHIC 2011)	GRANK	SRANK	COSEWIC	MNR	RM_Halton	CC	CW	Native Status
Acer negundo	Manitoba Maple	G5	S5				0	-2	N
Acer platanoides	Norway Maple	GNR	SNA				0	5	I
Acer saccharum	Sugar Maple	G5	S5				4	3	N
Acer x freemanii	(Acer rubrum X Acer saccharinum)	GNA	SNA						I
Achillea millefolium	Common Yarrow	G5	SNA						N
Ambrosia artemisiifolia	Annual Ragweed	G5	S5				0	3	N
Arctium minus	Common Burdock	GNR	SNA				0	5	I
Asclepias syriaca	Common Milkweed	G5	S5				0	5	N
Asparagus officinalis	Garden Asparagus	G5?	SNA				0	3	I
Betula papyrifera	Paper Birch	G5	S5				2	2	N
Bidens frondosa	Devil's Beggarticks	G5	S5				3	-3	N
Bidens vulgata	Tall Beggarticks	G5	S5			U	5	-3	N
Bromus inermis	Awnless Brome	G5TNR	SNA				0	5	I
Carya ovata	Shagbark Hickory	G5	S5				6	3	N
Chenopodium album	White Goosefoot	G5	SNA				0	1	I
Cichorium intybus	Chicory	GNR	SNA				0	5	I
Cirsium arvense	Canada Thistle	GNR	SNA				0	3	I
Cirsium vulgare	Bull Thistle	GNR	SNA				0	4	I
Cornus racemosa	Gray Dogwood	G5?	S5				2	-2	N
Cornus stolonifera	Red-osier Dogwood	G5	S5				2	-3	N
Crataegus sp	Hawthorn Species								
Daucus carota	Wild Carrot	GNR	SNA				0	5	I
Dipsacus fullonum	Fuller's Teasel	GNR	SNA				0	5	I
Elaeagnus angustifolia	Russian Olive	GNR	SNA				0	4	I
Equisetum arvense	Field Horsetail	G5	S5				0	0	N
Erigeron philadelphicus	Philadelphia Fleabane	G5	S5				1	-3	N
Euphorbia sp	Spurge Species								
Eutrochium maculatum var. maculatum	Spotted Joe Pye Weed	G5T5	S5				3	-5	I
Festuca rubra ssp. rubra	Red Fescue	G5T5	SNA				0	1	I
Fragaria virginiana	Wild Strawberry	G5	S5				2	1	N
Fraxinus americana	White Ash	G5	S4				4	3	N
Gleditsia triacanthos	Honey-locust	G5	S2				3	0	N
Inula helenium	Elecampane	GNR	SNA				0	5	I
Juglans nigra	Black Walnut	G5	S4				5	3	N
Linaria vulgaris	Butter-and-eggs	GNR	SNA				0	5	I
Lonicera sp	Honeysuckle Species								
Lonicera tatarica	Tartarian Honeysuckle	GNR	SNA				0	3	I
Lotus corniculatus	Garden Bird's-foot Trefoil	GNR	SNA				0	1	I
Lythrum salicaria	Purple Loosestrife	G5	SNA				0	-5	I
Malus sp	Apple Species								

Species	Current Common Name (NHIC 2011)	GRANK	SRANK	COSEWIC	MNR	RM_Halton	CC	CW	Native Status
Melilotus albus	White Sweet-clover	G5	SNA				0	3	I
Morus sp	Mulberry Species								
Nasturtium officinale	Watercress	GNR	SNA				0	-5	I
Nepeta cataria	Catnip	GNR	SNA				0	1	I
Ostrya virginiana	Eastern Hop-hornbeam	G5	S5				4	4	N
Parthenocissus inserta	Thicket Creeper	G5	S5				3	3	N
Pastinaca sativa	Wild Parsnip	GNR	SNA				0	5	I
Persicaria virginiana	Virginia Smartweed	G5	S4			R4	6	0	N
Phalaris arundinacea	Reed Canary Grass	G5	S5				0	-4	N
Phragmites australis ssp. australis	European Reed	G5T5	SNA						I
Picea pungens	Blue Spruce	G5	SNA						I
Pinus strobus	Eastern White Pine	G5	S5				4	3	N
Plantago lanceolata	English Plantain	G5	SNA				0	0	I
Plantago major	Common Plantain	G5	S5				0	-1	N
Populus deltoides ssp. deltoides	Eastern Cottonwood	G5T5	S5			U	4	-1	I
Potentilla sp	Cinquefoil Species								
Prunus serotina	Wild Black Cherry	G5	S5				3	3	N
Quercus macrocarpa	Bur Oak	G5	S5				5	1	N
Quercus rubra	Northern Red Oak	G5	S5				6	3	N
Rhamnus cathartica	Common Buckthorn	GNR	SNA				0	3	I
Rhus typhina	Staghorn Sumac	G5	S5				1	5	N
Robinia pseudoacacia	Black Locust	G5	SNA				0	4	I
Rosa sp	Rose Species								
Rubus idaeus ssp. idaeus	Common Red Raspberry	G5T5	SNA						I
Rubus occidentalis	Black Raspberry	G5	S5				2	5	N
Rumex crispus	Curly Dock	GNR	SNA				0	-1	I
Salix eriocephala	Heart-leaved Willow	G5	S5				4	-3	N
Salix sp	Willow Species								
Securigera varia	Common Crown-vetch	GNR	SNA				0	5	I
Solidago altissima ssp. altissima	Eastern Late Goldenrod	GNR	S5				1	3	N
Solidago canadensis var. canadensis	Canada Goldenrod	G5T5	S5				1	3	N
Symphyotrichum lanceolatum ssp. lanceolatum	Panicled Aster	G5T5	S5				3	-3	N
Symphyotrichum lateriflorum	Starved Aster	G5	S5				3	-2	N
Symphyotrichum novae-angliae	New England Aster	G5	S5				2	-3	N
Taraxacum officinale	Common Dandelion	G5	SNA				0	3	I
Tilia americana	American Basswood	G5	S5				4	3	N
Toxicodendron radicans	Climbing Poison Ivy	G5	S5				5	-1	N
Trifolium pratense	Red Clover	GNR	SNA				0	2	I
Tussilago farfara	Colt's-foot	GNR	SNA				0	3	I
Ulmus americana	American Elm	G5?	S5				3	-2	N

Species	Current Common Name (NHIC 2011)	GRANK	SRANK	COSEWIC	MNR	RM_Halton	CC	CW	Native Status
Vicia cracca	Tufted Vetch	GNR	SNA				0	5	I
Vitis riparia	Riverbank Grape	G5	S5				0	-2	N

Appendix E - Species at Risk Screening for Bronte Creek, 14 Mile Creek, and McCraney Creek, Town of Oakville

SPECIES	SAR Designation	Status in Town of Oakville & Surrounding Areas (June 30, 2016)	Key Habitats Used By Species	Potential status at three study areas: A. Bronte Creek; B. 14 Mile Creek; C. McCraney Creek and associated watercourse
AMPHIBIANS				
Jefferson Salamander (*Ambystoma jeffersonianum*)	Endangered	Known to Occur	Inhabits deciduous and mixed deciduous forests with suitable breeding areas which generally consist of ephemeral (temporary) bodies of water that are fed by spring runoff, groundwater, or springs.	**ALL: no suitable habitat present on site or on adjacent lands. No records from MNRF and NHIC databases; no records in ESA summaries (Halton NAI #10 and #12).**
BIRDS				
Acadian Flycatcher (*Empidonax virescens*)	Endangered	Known to Occur	Generally requires large areas of mature, undisturbed forest; avoids the forest edge; often found in well wooded swamps and ravines.	**Potential habitat in A; however, no records from MNRF and NHIC databases; no records in ESA summaries (Halton NAI #10 and #12).**
Bald Eagle (*Haliaeetus leucocephalus*)	Special Concern	Known to Occur	Prefers deciduous and mixed-deciduous forest; and habitat close to water bodies such as lakes and rivers; they roost in super canopy trees such as pine.	**May forage or overwinter along Bronte Creek (A); no nesting records for all three areas.**
Bank Swallow (*Riparia riparia*)	Threatened (federal only)	Known to Occur	Low areas along rivers, streams, coasts or reservoirs; nest in natural bluffs and eroding streamside banks, also sand and gravel quarries and road cuts	**MNRF records for B; may occur along A; no suitable habitat at C. Although potential present at A and B, species would be foraging only as no suitable nesting sites exist in the areas where activities are proposed.**
Barn Owl (*Tyto alba*)	Endangered	Known to Occur	Generally prefers low-elevation, open country; often associated with agricultural lands, especially pasture. Nests are located in buildings, hollow trees and cavities in cliffs.	**ALL: no suitable habitat present on site or on adjacent lands; extremely rare in southern Ontario.**
Barn Swallow (*Hirundo rustica*)	Threatened	Known to Occur	Prefers farmland, lake/river shorelines, wooded clearings, urban populated areas, rocky cliffs, and wetlands. They nest inside or outside buildings; under bridges and in road culverts; on rock faces and in caves, etc.	**No suitable habitat at A and B; may occur in open areas of C. However, proposed works will be confined to the watercourse so no nesting structures or foraging habitat will be impacted.**
Black Tern (*Childonias niger*)	Special Concern	Known to Occur	Generally prefers freshwater marshes and wetlands; nests either on floating material in a marsh or on the ground very close to water.	**ALL: no suitable habitat present on site or on adjacent lands.**
Bobolink (*Dolichonyx oryzivorus*)	Threatened	Known to Occur	Generally prefers open grasslands and hay fields. In migration and in winter uses freshwater marshes and grasslands.	**ALL: no suitable habitat present on site or on adjacent lands.**
Canada Warbler (*Wilsonia canadensis*)	Threatened (federal) / Special Concern (provincial)	Suspected to Occur	Generally prefers wet coniferous, deciduous and mixed forest types, with a dense shrub layer. Nests on the ground, on logs or hummocks, and uses dense shrub layer to conceal the nest.	**Historic records in A and B (from NAI data); no recent records. Not found during 2013 and 2014 field investigations by Beacon (2015) at B. No suitable habitat at C.**
Cerulean Warbler (*Dendroica cerulea*)	Endangered (federal) / Threatened (provincial)	Historically Known to Occur	Generally found in mature deciduous forests with an open understorey; also nests in older, second-growth deciduous forests.	**Potential habitat at Bronte Creek; no records in any of the databases, including for NAI #10. No suitable habitat present at B and C.**
Chimney Swift (*Chaetura pelagica*)	Threatened	Known to Occur	Historically found in deciduous and coniferous, usually wet forest types, all with a well developed, dense shrub layer; now most are found in urban areas in large uncapped chimneys.	**No records in any databases. Potential nesting habitat occurs at A and B. Further site-specific assessments required once detail designs are available.**
Common Nighthawk (*Chordeiles minor*)	Threatened (federal) / Special Concern (provincial)	Known to Occur	Generally prefers open, vegetation-free habitats, including dunes, beaches, recently harvested forests, burnt-over areas, logged areas, rocky outcrops, rocky barrens, grasslands, pastures, peat bogs, marshes, lakeshores, and river banks. This species also inhabits mixed and coniferous forests. Can also be found in urban areas (nests on flat roof-tops).	**ALL: no suitable habitat present on site or on adjacent lands.**
Eastern Meadowlark (*Sturnella Magna*)	Threatened	Known to Occur	Generally prefers grassy pastures, meadows and hay fields. Nests are always on the ground and usually hidden in or under grass clumps.	**ALL: no suitable habitat present on site or on adjacent lands.**

Eastern Whip-poor-will *(Caprimlugus vociferus)*	Threatened	Known to Occur	Generally prefers semi-open deciduous forests or patchy forests with clearings; areas with little ground cover are also preferred. In winter they occupy primarily mixed woods near open areas.	**Potential habitat occurs at A, with records from NAI #10. No recent nesting in region so unlikely to occur at all three sites.**
Eastern Wood-Pewee (*Contopus virens*)	Special Concern (federal only)	Known to Occur	Found in deciduous, mixed woods, or pine plantations; also found in mature woodlands, urban shade trees, roadsides, and orchards; usually found in clearings and forest edges.	**Suitable habitat found in all three sites; at C, would only occur along woodland feature further west of where vegetation removal will be taking place; in-channel works in the woodland feature will not negatively impact this species. Further detail design at A and B are required to fully assess impacts.**
Golden-winged Warbler (*Vermivora chrysoptera*)	Special Concern	Known to Occur	Generally prefers areas of early successional vegetation, found primarily on field edges, hydro or utility right-of-ways, or recently logged areas.	**ALL: no suitable habitat present on site or on adjacent lands.**
Grasshopper Sparrow (*Ammodramus savannarum*)	Special Concern (federal only)	Known to Occur	Open grasslands and prairie with patches of bare ground.	**ALL: no suitable habitat present on site or on adjacent lands.**
Henslow's Sparrow *(Ammodramus henslowii)*	Endangered	Historically Known to Occur	Generally found in old fields, pastures and wet meadows. They prefer areas with dense, tall grasses, and thatch, or decaying plant material.	**ALL: no suitable habitat present on site or on adjacent lands. Extirpated from region.**
King Rail (*Rallus elegans*)	Endangered	Historically Known to Occur	Freshwater and brackish marshes and rice fields.	**ALL: no suitable habitat present on site or on adjacent lands.**
Least Bittern *(Ixobrychus exilis)*	Threatened	Known to Occur	Generally located near pools of open water in relatively large marshes and swamps that are dominated by cattail and other robust emergent plants.	**ALL: no suitable habitat present on site or on adjacent lands.**
Loggerhead Shrike (*Lanius ludovicianus*)	Endangered	Historically Known to Occur	Generally prefers a combination of pasture or other grassland with scattered low trees and shrubs. They build their nests in small trees or shrubs.	**ALL: no suitable habitat present on site or on adjacent lands Extirpated from region.**
Louisiana Waterthrush *(Seiurus motacilla)*	Special Concern	Known to Occur	Generally inhabits mature forests along steeply sloped ravines adjacent to running water. Prefers clear, cold streams and densely wooded swamps.	**Potential habitat at A; no records for area in any databases. No suitable habitat present at B and C.**
Northern Bobwhite (*Colinus virginianus*)	Endangered	Historically Known to Occur	Generally inhabits a variety of edge and grassland type - habitats including non-intensively farmed agricultural lands.	**Historic records for region in NHIC database; no suitable habitat present on all three sites or on adjacent lands; extirpated from this area early in previous century.**
Peregrine Falcon (*Falco peregrinus*)	Special Concern	Known to Occur	Mountain ranges, coastlines, river valleys, and increasingly in cities.	**ALL: no suitable habitat present on site or on adjacent lands.**
Prothonotary Warbler (*Protonotaria citrea*)	Endangered	Known to Occur	Generally found in the dead trees of flooded woodlands or deciduous swamp forests; Carolinia Zone	**ALL: no suitable habitat present on site or on adjacent lands.**
Red-Headed Woodpecker *(Melanerpes erythrocephalus)*	Threatened (federal) / Special Concern (provincial)	Known to Occur	Generally prefers open oak and beech forests, grasslands, forest edges, orchards, pastures, riparian forests, roadsides, urban parks, golf courses, cemeteries, as well as along beaver ponds and brooks.	**Historic records from A (NAI #10); potential habitat exists in B. No recent records from both areas and species not detected during field investigations along 14 Mile Creek by Beacon (2015). No suitable habitat present at C.**
Short-eared Owl *(Asio flammeus)*	Special Concern	Known to Occur	Generally prefers a wide variety of open habitats, including grasslands, peat bogs, marshes, sand-sage concentrations, old pastures and agricultural fields.	**ALL: no suitable habitat present on site or on adjacent lands.**
Wood Thrush (*Hylocichla mustelina*)	Special Concern (federal only)	Known to Occur	Breeds in mature deciduous and mixed forests, most commonly those with American beech, sweet gum, red maple, black gum, eastern hemlock, flowering dogwood, American hornbeam, oaks, or pines; nests less successfully in fragmented forests and suburban parks with enough large trees for a territory; ideal habitat includes trees over 50 feet tall, a moderate understory of saplings/shrubs, an open floor with moist soil and decaying leaf litter, and water nearby.	**Potential habitat exists at all three sites; no records in any databases or NAI summaries. Proposed works in A and B may impact species so further assessments are recommended once detailed designs are available. At C, will only potentially occur at woodlands west of where vegetation removal will occur; in-channel works within woodland will not likely impact species if present (however, timing restrictions may be warranted to avoid disturbing birds during breeding season).**
Yellow-breasted Chat *(Icteria virens)*	Endangered	Historically Known to Occur	Generally prefers dense thickets around wood edges, riparian areas, and in overgrown clearings.	**ALL: no suitable habitat present on site or on adjacent lands.**

FISH				
American Eel (*Anguilla rostrata*)	Endangered	Known to Occur	All fresh water, estuaries and coastal marine waters that are accessible to the Atlantic Ocean; 12-mile Creek watershed and Lake Ontario	**Records for Bronte Creek only. Proposed works will not negatively impact this species or its habitat. See report for futher details.**
Grass Pickerel (*Esox americanus vermiculatus*)	Special Concern	Known to Occur	Generally occur in wetlands with warm, shallow water and an abundance of aquatic plants; occur in the St. Lawrence River, Lake Ontario, Lake Erie, and Lake Huron	**ALL: no suitable habitat present on site or on adjacent lands.**
Redside Dace *(Clinostomus elongatus)*	Endangered	Known to Occur	Generally found in pools and slow-moving areas of small headwater streams with a moderate to high gradient.	**Records for 14 Mile Creek and McCraney Creeks. Proposed works will not negatively impact this species or its habitat. See report for further details.**
Silver Shiner *(Notropis photogenis)*	Threatened	Known to Occur	Generally prefer moderate to large, deep, relatively clear streams with swift currents, and moderate to high gradients.	**Records for Bronte Creek only. Proposed works will not negatively impact this species or its habitat. See report for futher details.**
INSECTS				
Monarch *(Danaus plexippus)*	Special Concern	Known to Occur	Exist primarily wherever milkweed and wildflowers exist, such as abandoned farmland, along roadsides, and other open spaces.	**No suitable open habitats for breeding or migrating occurs at A and B. Suitable open habitats with nectar plants and hostplant (Common Milkweed) available at C; however, unlikely to occur during migration in significant numbers. Vegetation clearing may remove hostplant.**
Mottled Duskywing (*Erynnis martialis*)	Endangered (federal only)	Known to Occur	Open woodland, barrens, prairie hills, open brushy fields, chaparral; larvae feed on New Jersey tea (*Ceanothus americanus*) and redroot (*Ceanothus herbaceus*)	**Records for Bronte Creek only, further upstream from study area. See report for futher details.**
West Virginia White (*Pieris virginiensis*)	Special Concern	Known to Occur	Generally prefer moist, deciduous woodlands; the larvae feed only on the leaves of the two-leaved toothwort (Cardamine diphylla), which is a small, spring-blooming plant of the forest floor.	**ALL: no suitable habitat present on site or in adjacent lands.**
MAMMALS				
American Badger (*Taxidea taxus*)	Endangered	Known to Occur	Occurs primarily in grasslands and open areas with grasslands, which can include parklands, farms, and treeless areas; also found in forest glades and meadows, marshes, brushy areas, hot deserts, and mountain meadows	**ALL: no suitable habitat present on site or on adjacent lands.**
Eastern Small-footed Myotis (*Myotis leibii*)	Endangered	Known to Occur	Overwintering habitat: caves and mines that remain above 0 degrees Celsuis; Maternal roosts: primarily under loose rocks on exposed rock outcrops, crevices and cliffs, and occasionally in buildings, under bridges and highway overpasses, and under tree bark.	**No suitable overwintering habitat occurs at all three sites; potential roost trees are present at all three sites. At A and B, detail designs are required to fully assess impacts (e.g. if potential roost trees are being removed). At C, the main woodlot has potential habitat but no trees are slated for removal as proposed works are in-channel only along this section of the watercourse.**
Little Brown Myotis (*Myotis lucifugus*)	Endangered	Known to Occur	Overwintering habitat: caves and mines that remain above 0 C; Maternal roosts: Often associated with buildings (attics, barns, etc.). Occasionally found in trees (25-44 cm dbh).	**No suitable overwintering habitat occurs at all three sites; potential roost trees are present at all three sites. At A and B, detail designs are required to fully assess impacts (e.g. if potential roost trees are being removed). At C, the main woodlot has potential habitat but no trees are slated for removal as proposed works are in-channel only along this section of the watercourse.**
Northern Myotis (*Myotis septentrionalis)*	Endangered	Known to Occur	Overwintering habitat: caves and mines that remain above 0 C; Maternal roosts: often asssociated with cavities of large diameter trees (25-44 cm dbh). Occasionally found in structures (attics, barns, etc.)	**No suitable overwintering habitat occurs at all three sites; potential roost trees are present at all three sites. At A and B, detail designs are required to fully assess impacts (e.g. if potential roost trees are being removed). At C, the main woodlot has potential habitat but no trees are slated for removal as proposed works are in-channel only along this section of the watercourse.**

Tri-coloured Bat (*Perimyotis subflavus*)	Endangered	Known to Occur	Overwintering habitat: caves and mines that remain above 0 degrees Celsius; Maternal roosts: can be in trees or dead clusters of leaves or arboreal lichens on trees. May also use barns or similar structures.	**No suitable overwintering habitat occurs at all three sites; potential roost trees are present at all three sites. At A and B, detail designs are required to fully assess impacts (e.g. if potential roost trees are being removed). At C, the main woodlot has potential habitat but no trees are slated for removal as proposed works are in-channel only along this section of the watercourse.**
Woodland Vole (*Microtus pinetorum*)	Special Concern	Known to Occur	Occurs in deciduous forests, dry fields, and apple orchards, preferring wooded areas with high vertical vegetative stratification, also evergreen shrubs, ground cover, and old fallen logs. Voles are most abundant in deciduous forests with moist, friable soils suitable for burrowing.	**ALL: no suitable habitat present on site or on adjacent lands.**
REPTILES				
Blanding's Turtle *(Emydonidea blandingii)*	Threatened	Known to Occur	Generally occurs in freshwater lakes, permanent or temporary pools, slow-flowing streams, marshes and swamps. Prefers shallow water that is rich in nutrients, organic soil and dense vegetation. Adults are generally found in open or partially vegetated sites, and juveniles prefer areas that contain thick aquatic vegetation including sphagnum, water lilies and algae. They dig their nest in a variety of loose substrates, including sand, organic soil, gravel and cobblestone. Overwintering occurs in permanent pools that average about one metre in depth, or in slow-flowing streams.	**ALL: no suitable nesting or overwintering areas on site or in adjacent lands. No records found for all three sites in any of the databases (including NAI summaries).**
Eastern Hog-nosed Snake (*Heterodon platirhinos*)	Threatened	Known to Occur	Generally prefer habitats with sandy, well-drained soil and open vegetative cover, such as open woods, brushland, fields, forest edges and disturbed sites. The species is often found near water.	**Historically present in A; habitat of low quality at B and C; recent field investigations at B by Beacon (2015), which included dedicated snake surveys, did not detect this species. Proposed works at all three sites will not be within suitable habitat; as such, no negative impacts to this species, if present, are anticipated.**
Eastern Ribbonsnake *(Thamnophis sauritus)*	Special Concern	Known to Occur	Generally occurs along the edges of shallow ponds, streams, marshes, swamps, or bogs bordered by dense vegetation that provides cover. Abundant exposure to sunlight is also required, and adjacent upland areas may be used for nesting.	**Historic records at A; no suitable habitat present in vicinity of proposed works. No suitable habitat at B and C.**
Eastern Spiny Softshell (*Apalone spinifera*)	Threatened	Known to Occur	Found in rivers with soft bottoms, aquatic vegetation and sandbars or mudflats; occasionally found in lakes or impoundments.	**ALL: no suitable nesting or overwintering areas on site or in adjacent lands. No records in any databases.**
Northern Map Turtle (*Graptemys geographica*)	Special Concern	Known to Occur	Found in large rivers and lakes with slow-moving currents and soft bottoms	**Historic records for A; may occur but proposed work will not negatively impact this species or its habitats. No suitable nesting or overwintering areas at B and C.**
Snapping Turtle *(Chelydra serpentina)*	Special Concern	Known to Occur	Generally inhabit shallow waters where they can hide under the soft mud and leaf litter. Nesting sites usually occur on gravely or sandy areas along streams. Snapping Turtles often take advantage of man-made structures for nest sites, including roads (especially gravel shoulders), dams and aggregate pits.	**MNRF records for 14 Mile Creek only; NHIC records for general vicinity. Likely occurs at all three sites. See report for details.**
Vascular Plants				
American Chestnut (*Castanea dentata*)	Endangered	Known to Occur	Found in deciduous forest communities; this tree prefers arid forests with acid and sandy soils.	**ALL: no suitable soil conditions on site or in adjacent lands.**
American Columbo (*Frasera caroliniensis*)	Endangered	Known to Occur	Most commonly associated with open deciduous forested slopes, thickets and clearings; grows in a variety of relatively stable habitats as well as on a wide variety of soils.	**Potential habitat exists in A & B. No suitable habitat in C. Vegetation removal in A or B should consider this plant.**
American Ginseng (*Panax quinquefolius*)	Endangered	Known to Occur	Grows in rich, moist, undisturbed and relatively mature deciduous woods in areas of neutral soil (such as over limestone or marble bedrock).	**Potential habitat exists in A & B. No suitable habitat in C. Vegetation removal in A or B should consider this plant.**

Broad Beech Fern (*Phegopteris hexagonoptera*)	Special Concern	Known to Occur	Generally inhabits shady areas of beech and maple forests where the soil is moist or wet.	**ALL: No suitable habitat exists on site or in adjacent lands.**
Butternut (*Juglans cinerea*)	Endangered	Known to Occur	Generally grows in rich, moist, and well-drained soils often found along streams. It may also be found on well-drained gravel sites, especially those made up of limestone. It is also found, though seldomly, on dry, rocky and sterile soils. In Ontario, the Butternut generally grows alone or in small groups in deciduous forests as well as in hedgerows.	**Potential habitat exists in A & B. No suitable habitat in C. Vegetation removal in A or B should consider this plant.**
Eastern Flowering Dogwood (*Cornus florida*)	Endangered	Known to Occur	Generally grows in deciduous and mixed forests, in the drier areas of its habitat, although it is occasionally found in slightly moist environments; also grows around edges and hedgerows.	**ALL: Potential habitat exists. Vegetation removal in all sites should consider this plant.**
Few-flowered Club-rush (*Trichophorum planifolium*)	Endangered	Known to Occur	Generally found in Dry Fresh Oak deciduous forests and Dry Fresh Oak-Maple-Hickory deciduous forests (only found on RBG property).	**ALL: No suitable habitat on site or in adjacent lands.**
Green Dragon (*Arisaema dracontium*)	Special Concern	Known to Occur	Generally grows in damp deciduous forests and along streams.	**Potential habitat exists in A & B. No suitable habitat in C. Vegetation removal in A or B should consider this plant.**
Hoary Mountain-Mint (*Pycnanthemum incanum*)	Endangered	Known to Occur	Oak savannas and prairies, dry sites.	**ALL: No suitable habitat exists on site or in adjacent lands.**
Red Mulberry (*Morus rubra*)	Endangered	Known to Occur	Generally grows in moist forest habitats. In Ontario, these include slopes and ravines of the Niagara Escarpment, and sand spits and bottom lands; can grow in open areas such as hydro corridors.	**ALL: Potential habitat exists. Vegetation removal in all sites should consider this plant.**
Spotted Wintergreen (*Chimaphila maculata*)	Endangered	Historically Known to Occur	Generally grow in sandy habitats in dry-mesic oak-pine woods.	**ALL: No suitable habitat exists on site or in adjacent lands.**
White Wood Aster (*Eurybia divaricata*)	Threatened	Known to Occur	Generally grows in open, dry, deciduous forests. It has been suggested that it may benefit from some disturbance, as it often grows along trails.	**Potential habitat exists in A & B. No suitable habitat in C. Vegetation removal in A or B should consider this plant.**

Appendix F – Screening for Known/Candidate SWH at Bronte Creek, Fourteen Mile Creek, and McCraney Creek (per Ecoregion 7E Criteria Schedule, final version: OMNRF, January 2015)

Significant Wildlife Habitat (SWH) Type	ELC Categories indicated for SWH Type	SWH present on site or within 120 m? A: Bronte Creek B: Fourteen Mile Creek C: McCraney Creek & associated watercourse	Rationale (Habitat Presence or Absence)	Additional field studies required?
Seasonal Concentration Areas of Animals				
Waterfowl Stopover and Staging Areas (Terrestrial)	CUM1; CUT1; plus evidence of spring (Mar – May) flooding; does not include AGR	No	No suitable habitats were detected on sites or in adjacent lands during background review or field visits.	No
Waterfowl Stopover and Staging Areas (Aquatic)	MAS1; MAS2; MAS3; SAS1; SAM1; SAF1; SWD1; SWD2; SWD3; SWD4; SWD5; SWD6; SWD7	No	No suitable habitats were detected on sites or in adjacent lands during background review or field visits.	No
Shorebird Migratory Stopover Area	BB01; BB02; BBS1; BBS3; BBT1; BBT2; SDO1; SDS2; SDT1; MAM1; MAM2; MAM3; MAM4; MAM5	No	No suitable habitats were detected on sites or in adjacent lands during background review or field visits.	No
Raptor Wintering Area	One of FOD, FOM, FOC and one of CUM, CUT, CUS, CUW (20+ ha); least disturbed sites 15+ ha with adjacent woodlands; BAEA: FOD, FOM, FOC, SWD or SWC on shoreline areas adjacent to large rivers or adjacent to lakes with open water	No	No suitable habitats were detected on sites or in adjacent lands during background review or field visits.	No
Bat Hibernacula	BBBA/TRBA only; CCR1; CCR2; CCA1; CCA2; does not include buildings	No	No suitable habitats were found on sites or in adjacent lands.	No
Bat Maternity Colonies	BBBA/SHBA only; all FOD, FOM, SWD, SWM; 10+ ha AND 25+ cm dbh	All: Candidate	FOD and FOM ecosites are present in all sites, which may contain >10/ha large diameter (>25cm dbh) wildlife trees; this includes the woodlot adjacent (north) to McCraney Creek watercourse which has an abundance of canopy	Yes

Significant Wildlife Habitat (SWH) Type	ELC Categories indicated for SWH Type	SWH present on site or within 120 m? A: Bronte Creek B: Fourteen Mile Creek C: McCraney Creek & associated watercourse	Rationale (Habitat Presence or Absence)	Additional field studies required?
			die-off including many large ash trees.	
Bat Migratory Stopover Area	No specific ELC types	No	No landforms present to concentrate migrant bats but proximity to Lake Ontario may do so; note that MNRF has not yet determined thresholds/criteria for this category.	No
Turtle Wintering Areas	SNTU/PATU: SW, MA, OA, SA; FEO and BOO; NMTU: open water areas (e.g. deeper rivers, streams) and lakes with current can also be used as over-wintering habitat.	No	No suitable habitats were detected on sites or in adjacent lands.	No
Reptile Hibernaculum	Snakes: any ecosite except very wet ones; talus, rock barren, crevice, cave, and alvar site may be directly related; FLSK: FOD, FOM and FOC1/FOC3	A & B: Candidate C: No	A & B contain FOD ecosites with potential hibernacula. No suitable habitat is present in C.	Yes
Colonially - Nesting Bird Breeding Habitat (Bank and Cliff)	CUM1, CUS1, BLS1, CLO1, CLT1; CUT1; BLO1; BLT1; CLS1	A & B: Candidate	Suitable ecosites with potential features are present in A & B. MNRF records for Bank Swallows in B. No indicator species found at B during 2012 and 2013 field investigations (Beacon 2015).	Yes
Colonially - Nesting Bird Breeding Habitat (Tree/Shrubs)	SWM2; SWM3; SWM5; SWM6; SWD1; SWD2; SWD3; SWD4; SWD5; SWD6; SWD7; FET1	No	No suitable habitats were detected on sites or in adjacent lands.	No
Colonially - Nesting Bird Breeding Habitat (Ground)	MAM1 – 6; MAS1 – 3; CUM; CUS; CUT	No	No suitable habitats were detected on sites or in adjacent lands.	No
Migratory Butterfly Stopover Areas	Field: CUM, CUS, CUT; Forest: FOC, FOD, FOM, CUT; 10+ ha, within 5 km of Lake Ontario	No	No combination of field and forest of sufficient size were found within sites and adjacent lands.	No
Landbird Migratory Stopover Areas	FOC, FOM, FOD, SWC, SWM, SWD; 10+ ha, within 5 km of Lake Ontario	A & B: Candidate	A & B have forested areas that meet size requirements and are within 5 km of Lake Ontario; they are also linear valleys that tend to	No

Significant Wildlife Habitat (SWH) Type	ELC Categories indicated for SWH Type	SWH present on site or within 120 m? A: Bronte Creek B: Fourteen Mile Creek C: McCraney Creek & associated watercourse	Rationale (Habitat Presence or Absence)	Additional field studies required?
			concentrate landbird migrants.	
Deer Yarding Areas	FOM, FOC, SWM, SWC; CUP2, CUP3, FOD3, CUT; identified by MNRF	No	No suitable habitats were detected on sites or in adjacent lands. None have been identified in area by MNRF.	No
Deer Winter Congregation Areas	FOC; FOM; FOD; SWC; SWM; SWD; typically 100+ ha; identified by MNRF	No	No suitable habitats were detected on sites or in adjacent lands. None have been identified in area by MNRF.	No
Rare Vegetation Communities				
Cliffs and Talus Slopes	TAO; TAS; TAT; CLO; CLS; CLT	No	None identified on sites or in adjacent lands.	No
Sand Barren	SBO1; SBS1; SBT1	No	None identified on sites or in adjacent lands.	No
Alvar	ALO1; ALS1; ALT1; FOC1; FOC2; CUM2; CUS2; CUT2-1; CUW2; 0.5+ ha	No	None identified on sites or in adjacent lands.	No
Old Growth Forest	FOD; FOC; FOM; SWC; SWD; SWM; 0.5+ ha	A & B: Candidate C: No	Bronte and Fourteen Mile Creeks meet the size requirements and ELC ecosites.	Yes
Savannah	TPS1; TPS2; TPW1; TPW2; CUS2	No	None identified on sites or in adjacent lands.	No
Tallgrass Prairie	TPO1; TPO2	No	None identified on sites or in adjacent lands.	No
Other Rare Vegetation Communities	S1, S2, or S3 vegetation communities	No	None identified on sites or in adjacent lands.	No
Specialized Habitat for Wildlife				
Waterfowl Nesting Area	MAS1; MAS2; MAS3; SAS1; SAM1; SAF1; MAM1; MAM2; MAM3; MAM4; MAM5; MAM6; SWT1; SWT2; SWD1; SWD2; SWD3; SWD4	No	No suitable habitats were detected on sites or in adjacent lands.	No
Bald Eagle and Osprey Nesting, Foraging, and Perching Habitat	FOD; FOM; FOC; SWD; SWM; SWC; adjacent to riparian areas (rivers, lakes, ponds and wetlands)	A: Candidate B & C: No	Bronte Creek contains riparian areas adjacent to FOD; both species may occur.	Yes
Woodland Raptor Nesting Habitat	All forested ELC ecosites; also SWC, SWM, SWD, CUP3; 30+ ha with 10+ ha	No	Suitable woodlands exist at Bronte Creek and 14 Mile Creek but they do not meet the size	No

Significant Wildlife Habitat (SWH) Type	ELC Categories indicated for SWH Type	SWH present on site or within 120 m? A: Bronte Creek B: Fourteen Mile Creek C: McCraney Creek & associated watercourse	Rationale (Habitat Presence or Absence)	Additional field studies required?
	Interior Forest (200m buffer)		requirements for Interior Forest.	
Turtle Nesting Areas	MAM1; MAM2; MAM3; MAM4; MAM5; MAM6; SAS1; SAM1; SAF1; BOO1; FEO1	A & B: No C: Candidate	McCraney Creek has suitable ELC ecosites that may be used as turtle nesting areas.	Yes
Seeps and Springs	Any forested ecosite within headwater area of stream	No	None identified on sites or in adjacent lands.	No
Amphibian Breeding Habitat (Woodland)	FOC; FOM; FOD; SWC; SWM; SWD	C: Candidate	Potential habitat occurs along McCraney Creek and within the adjacent woodlot. However, abundance and diversity levels likely do not meet minimum thresholds.	Yes
Amphibian Breeding Habitat (Wetlands)	SW, MA, FE, BO, OA, SA; typically 120+ from woodlands (except AMBU)	No	No suitable habitats were detected on sites or in adjacent lands.	No
Woodland Area-Sensitive Bird Breeding Habitat	FOC, FOM, FOD, SWC, SWM, SWD; mature (60+ years), 30+ ha; IF 200+ m from edge	No	Bronte and Fourteen Mile Creeks meet the size and age requirements but there is insufficient Interior Forest habitat.	No
Habitats for Species of Conservation Concern (not including END or THR species)				
Marsh Breeding Bird Habitat	MAM1; MAM2; MAM3; MAM4; MAM5; MAM6; SAS1; SAM1; SAF1; FEO1; BOO1; GRHE – all SW, MA, CUM1 sites	No	No suitable habitats were detected on sites or in adjacent lands.	No
Open Country Bird Breeding Habitat	CUM1; CUM2; 30+ ha; not Class 1 or 2 AGR or actively used for farming in last 5 years	No	No CUM1 or CUM2 habitat of greater than 30 hectares in size found in study area or adjacent lands.	No
Shrub/Early Successional Bird Breeding Habitat	CUT1; CUT2; CUS1; CUS2; CUW1; CUW2; 10+ ha; not Class 1 or 2 AGR or actively used for farming in last 5 years	No	No suitable ELC categories of sufficient size exist within the study area and adjacent lands.	No
Terrestrial Crayfish	MAM1; MAM2; MAM3; MAM4; MAM5; MAM6; MAS1; MAS2; MAS3;	No	No suitable habitats were detected on sites or in adjacent lands.	No

Significant Wildlife Habitat (SWH) Type	ELC Categories indicated for SWH Type	SWH present on site or within 120 m? A: Bronte Creek B: Fourteen Mile Creek C: McCraney Creek & associated watercourse	Rationale (Habitat Presence or Absence)	Additional field studies required?
	SWT; SWD; SWM; CUM1 with inclusions of above MAM or swamp ecosites can be used by crayfish			
Special Concern and Rare Wildlife Species	SC and S1, S2, S3, and SH species	ALL: Candidate	MNRF and NHIC records (recent and historic) for Special Concern and S1 to S3 species, such as Snapping Turtle, Monarch, Eastern Wood-Pewee, and Wood Thrush, have been reported in all study areas.	Yes
Animal Movement Corridors				
Amphibian Movement Corridors	All ecosites associated with water	A & C: Candidate B: No	There is suitable habitat (i.e. streams, floodplain, and forest) throughout the Bronte and McCraney Creek study areas. Beacon (2015) did not identify Fourteen Mile Creek as a candidate amphibian movement corridor in the Saw-Whet Property EIS.	Yes
Deer Movement Corridors	All forested ecosites; Stratum II Deer Wintering Areas have potential to contain corridors.	No	Such corridors are within Stratum II yarding areas, typically following riparian zones, woodlots, and ravines/ridges, and are unbroken by roads and residential areas. Therefore, no deer movement corridors occur on the sites or in adjacent lands.	No

Ministry of
Natural Resources
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Richesses naturelles
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Ontario

September 16, 2016

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Dear Mr. Richards,

Re: Fourteen Mile Creek and McCraney Creeks Natural Heritage Assessment
Town of Oakville Flood Mitigation Opportunities Study

You have requested information on natural heritage features and element occurrences occurring on or adjacent to the above noted property. There are Species at Risk recorded adjacent to your study area.

The Ministry of Natural Resources and Forestry (MNRF) has records of the following species within and adjacent to your study area within Fourteen Mile Creek:

- **Snapping Turtle (Special Concern)**
- **Bank Swallow (Threatened),** with general habitat protection
- **Redside Dace (Endangered),** with regulated habitat protection
- **Eastern Flowering Dogwood (Endangered),** with regulated habitat protection

In addition, the species listed below have the potential to occur within or adjacent the study area and therefore further assessment or field studies may be required to determine presence:

- **Butternut (Endangered),** with general habitat protection
- **Northern Myotis (Endangered)**, with general habitat protection
- **Little Brown Myotis Myotis (Endangered)**, with general habitat protection
- **Tri-colored Bat (Endangered)**, with general habitat protection
- **Eastern Small-footed Myotis (Endangered)**, with general habitat protection

MNRF has records of the following species within and adjacent to your study area within McCraney Creek:

- **Redside Dace (Endangered),** with regulated habitat protection

In addition, the species listed below have the potential to occur within or adjacent the study area and therefore further assessment or field studies may be required to determine presence:

- **Bank Swallow (Threatened),** with general habitat protection
- **Butternut (Endangered),** with general habitat protection

MNRF has records of the following species within and adjacent to your study area within Bronte Creek:

- **Silver Shiner (Threatened)**, with general habitat protection
- **American Eel (Endangered),** with general habitat protection

In addition, the species listed below have the potential to occur within or adjacent the study area and therefore further assessment or field studies may be required to determine presence:

- **Bank Swallow (Threatened),** with general habitat protection
- **Butternut (Endangered),** with general habitat protection
- **Northern Myotis (Endangered)**, with general habitat protection
- **Little Brown Myotis Myotis (Endangered)**, with general habitat protection
- **Tri-colored Bat (Endangered)**, with general habitat protection
- **Eastern Small-footed Myotis (Endangered)**, with general habitat protection

These species may receive protection under the *Endangered Species Act, 2007* (ESA) and thus, an approval from MNRF may be required if the work you are proposing could cause harm to these species or their habitats. If the Species at Risk in Ontario List is amended, additional species may be listed and protected under the ESA or the status and protection levels of currently listed species may change.

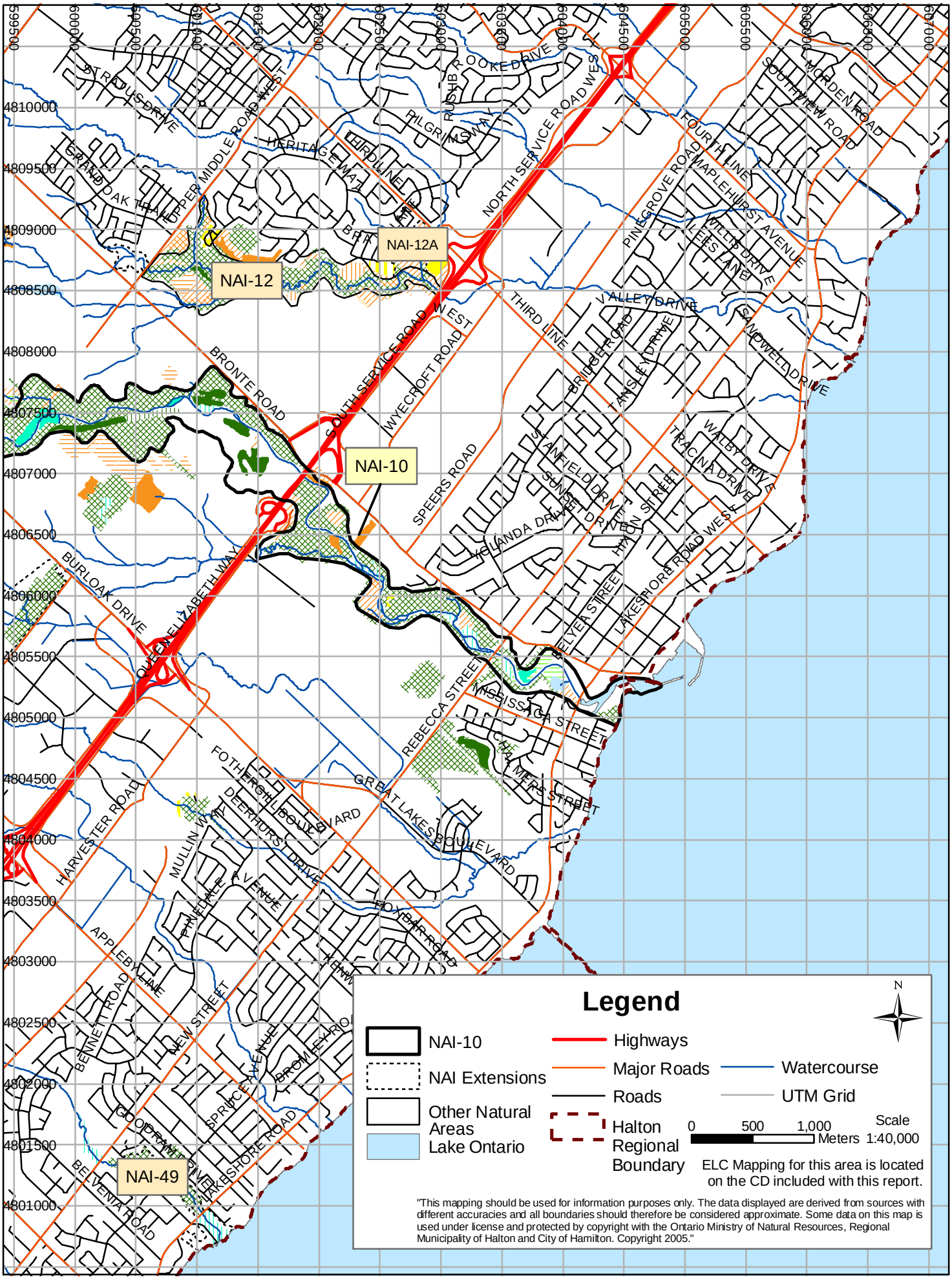
Please note that absence of information for a given geographic area, or lack of current information for a given area or element, does not categorically mean the absence of sensitive species or features. Many areas in Ontario have never been surveyed and new plant and animal species records are still being discovered for many localities. If development or site alternation is proposed, surveys by a qualified professional may need to be undertaken in the future to confirm presence or absence of sensitive species or features.

This species at risk information is highly sensitive and is not intended for any person or project unrelated to this undertaking. Please do not include any specific information in reports that will be available for public record. As you complete your fieldwork in these areas, please report all information related to any species at risk to our office. This will assist with updating our database and facilitate early consultation regarding your project.

If you have any questions or comments, please do not hesitate to contact me at 905-713-7732 or at aurora.mcallister@ontario.ca.

Sincerely,

Aurora McAllister
Management Biologist
Ontario Ministry of Natural Resources and Forestry, Aurora District


NAI-12A
NAI-12
NAI-10
NAI-49
NORTH SERVICE ROAD WEST
SOUTH SERVICE ROAD WEST
QUEEN ELIZABETH WAY
BRONTE ROAD
SPEERS ROAD
IWYECROFT ROAD
THIRD LINE
FOURTH LINE
PINE GROVE ROAD
MAPLEHURST AVENUE
WILLIS DRIVE
LEES LANE
VALLEY DRIVE
BRIDGER ROAD
TANSLEY DRIVE
SANDWELL DRIVE
STANFIELD DRIVE
SUNSET DRIVE
HOLLAND DRIVE
HYDE PARK STREET
WALBY DRIVE
TRACINA DRIVE
LAKESHORE ROAD WEST
BELYEA STREET
BURLOAK DRIVE
HARVESTER ROAD
REBECCA STREET
MISSISSAGA STREET
CHALMERS STREET
GREAT LAKES BOULEVARD
FOTHERGILL BOULEVARD
DEERHURST DRIVE
MULLIN WAY
FINEDALE AVENUE
ROYDAR ROAD
APPLEBY LINE
BENNETT ROAD
NEW STREET
SPRUCE AVENUE
BROMLEY ROAD
GOODRAM DRIVE
LAKESHORE ROAD
BELVENITA ROAD
RUSH BROOKE DRIVE
PILGRIMS WAY
HERITAGE WAY
THIRD LINE
GRAND OAK TRAIL
UPPER MIDDLE ROAD WEST
ST RADIUS DRIVE
SOUTHVIEW ROAD
MORDEN ROAD
Legend
NAI-10
NAI Extensions
Other Natural Areas
Lake Ontario
Highways
Major Roads
Roads
Halton Regional Boundary
Watercourse
UTM Grid
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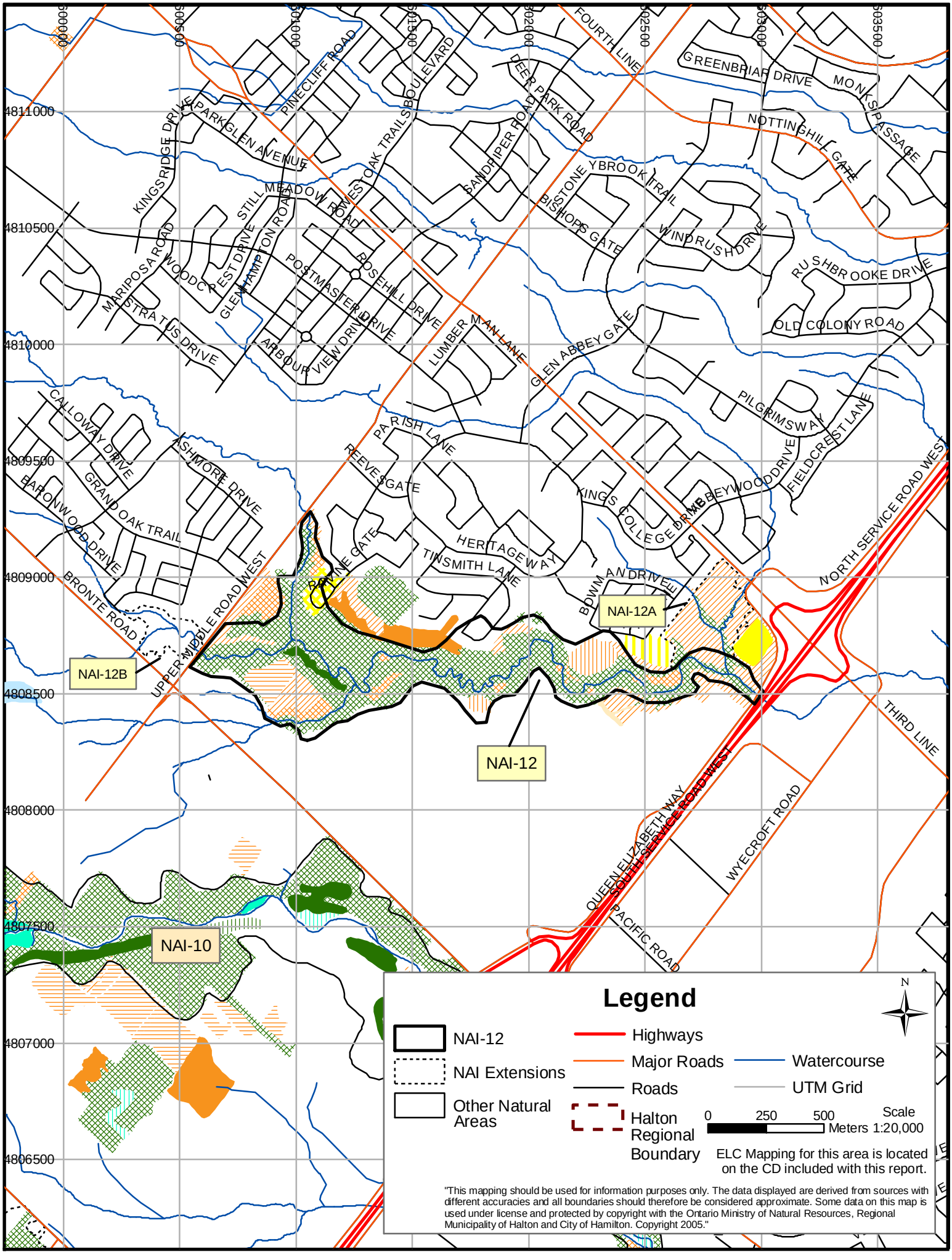
0 500 1,000
Meters
Scale 1:40,000
ELC Mapping for this area is located on the CD included with this report.
"This mapping should be used for information purposes only. The data displayed are derived from sources with different accuracies and all boundaries should therefore be considered approximate. Some data on this map is used under license and protected by copyright with the Ontario Ministry of Natural Resources, Regional Municipality of Halton and City of Hamilton. Copyright 2005."

Appendix H: Halton NAI Areas 10 & 12 ELC Mapping (Dwyer 2006)



Halton Natural Areas Inventory
Ecological Land Classification

Aquatic

- OAO - Open Aquatic
- SAF - Floating-Leaved Shallow Aquatic
- SAM - Mixed Shallow Aquatic
- SAS - Submerged Shallow Aquatic

Beach/Bar

- BBO - Open Beach/Bar
- BBT - Treed Beach/Bar

Bluff

- BLO - Open Bluff
- BLS - Shrub Bluff

Bog

- BOS - Shrub Bog
- BOT - Treed Bog

Cave/Crevice

- CCA - Cave
- CCR - Crevice

Cliff

- CLO - Open Cliff
- CLT - Treed Cliff

Cultural

- CUM - Cultural Meadow
- CUP - Plantation
- CUS - Cultural Savannah
- CUT - Cultural Thicket
- CUW - Cultural Woodland

Forest

- FOC - Coniferous Forest
- FOD - Deciduous Forest
- FOM - Mixed Forest

Marsh

- MAM - Meadow Marsh
- MAS - Shallow Marsh

Quarry

- QUA - Active Quarry
- QUO - Old Quarry

Swamp

- SWC - Coniferous Swamp
- SWD - Deciduous Swamp
- SWM - Mixed Swamp
- SWT - Thicket Swamp

Talus

- TAO - Open Talus
- TAS - Shrub Talus
- TAT - Treed Talus

Tallgrass/Prarie

- TPO - Open Tallgrass Prarie
- TPS - Tallgrass Savannah
- TPW - Tallgrass Woodland

Other

- AGR - Agriculture
- IND - Industrial
- REC - Recreational
- RES - Residential
- UNC - Unclassified

APPENDIX

E-3 Aquatic Ecology (C. Portt and Associates)

SCOPED FISH HABITAT ASSESSMENT: FOURTEEN MILE CREEK AND MCCRANEY CREEK FLOOD MITIGATION STUDY

Submitted to:

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1 Introduction

The Fourteen Mile and McCraney Creeks Flood Mitigation Study (Master Plan) is currently in the process of evaluating a number of mitigation strategies. Of the numerous components of the various strategies under consideration, three components will result in impacts to fish habitat, and at this time require a high-level aquatic habitat assessment to inform the evaluation of the various mitigation strategies. The three components are:

- An on-line flood storage facility, just upstream from the QEW in Fourteen Mile Creek, to control the 25-50 year flood event.

- A diversion pipe to convey Fourteen Mile Creek flow in excess of the 25-50 year flood event, from a location in Fourteen Mile Creek approximately 2.4 km upstream of the QEW, to a location in Bronte Creek approximately 800 m upstream from the QEW

- A diversion channel to convey McCraney Creek flow in excess of the 25-50 year flood event to Fourteen Mile Creek, along an existing ditch/watercourse that runs along the north side of the CNR tracks, south of the QEW.

2 Methods

To conduct the high-level assessment of aquatic resources, relative to the requirements of this project, the following locations were examined in the field.

i. Fourteen Mile Creek upstream of North Service Road to beyond the point of the potential diversion to the Bronte Creek to Upper Middle Road (would cover both on-line storage location and water intake to Bronte Creek diversion)
ii. Receiving reach in Bronte Creek where flows may potentially be diverted (approximately 1.2 km of Bronte Creek, upstream of the QEW was examined, which includes the potential outlet location)
iii. Diversion alignment from McCraney Creek to Fourteen Mile Creek

Field investigations were conducted by C. Portt and Associates staff, George Coker, on October 24-26 and 28, 2016, supplemented with additional information from field work conducted December 6, 2015, and April 21, 2005. A Garmin GPS 76CSx Global Positioning System (GPS) unit was used to record the locations of all observations and digital photographs. Photograph locations are presented in Figure 3-1, and all referenced photographs are provided in Appendix A. Fish community information was extracted from the Conservation Halton Bronte Creek, Urban Creeks and Supplemental Monitoring Reports for 2010 and 2012 (Conservation Halton, 2013a and b), and species-at-risk information, specific to the study area, was provided by the Ministry of Natural Resources and Forestry (Aurora McAllister, Management Biologist, MNRF. Pers. Comm. to Ian Richards, Dougan & Associates. September 16, 2016).

3 Results and Discussion

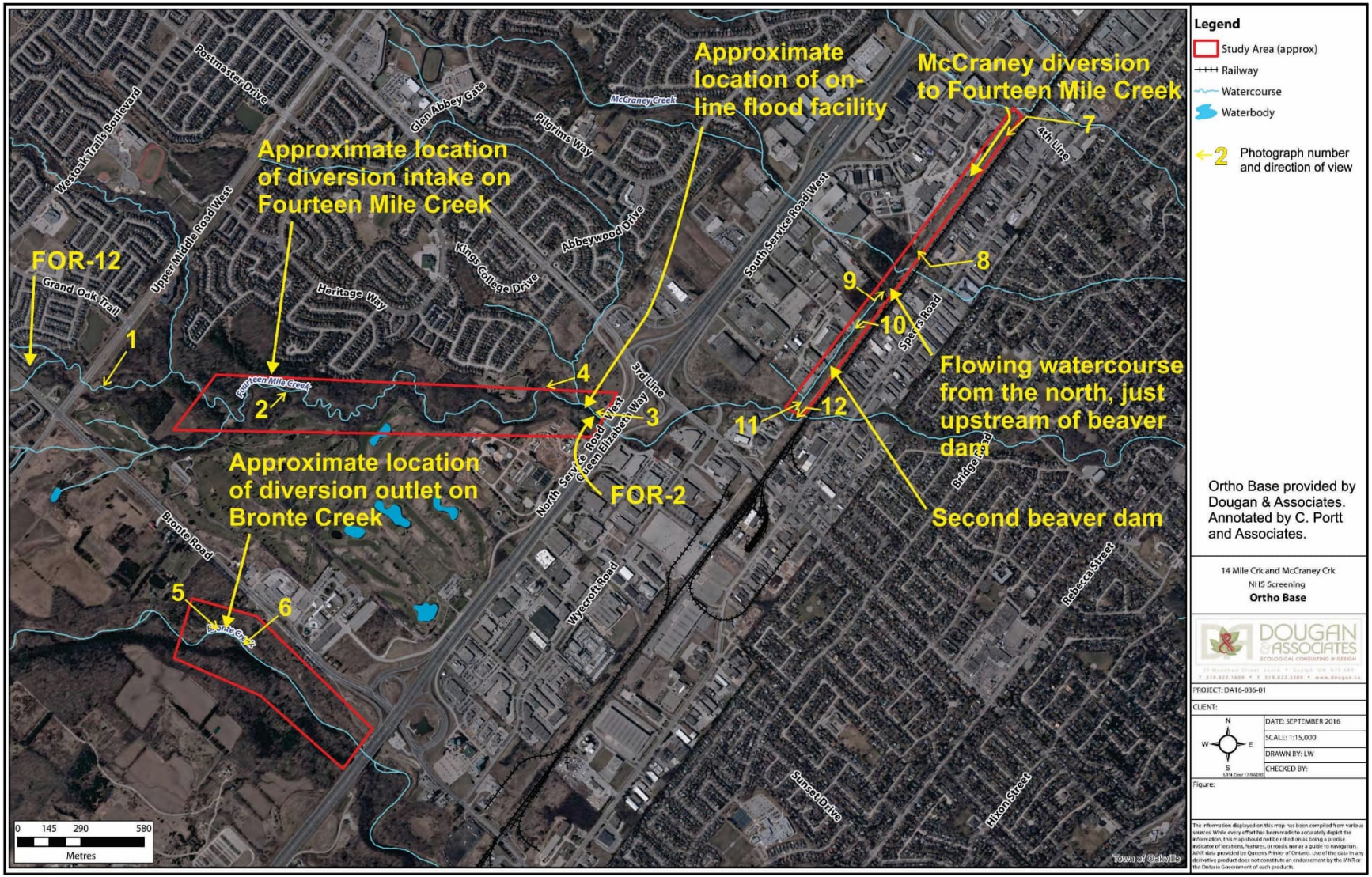
3.1 Fourteen Mile Creek

Fish community information for Fourteen Mile Creek, extracted from Conservation Halton (2013a, b) is provided in Table 3-1. Station FOR-12 is located approximately 1.9 km upstream of the potential diversion structure that could send flow in excess of the 25-50 year flood event to Bronte Creek, and approximately 4.3 km upstream of the potential on-line flood control structure just upstream of the QEW. Station FOR-2 is located in the vicinity of the potential on-line flood control structure, just upstream of the QEW. Station FOR-71 is located approximately 2.8 km downstream of the potential on-line flood control structure. Fourteen Mile Creek provides habitat for a fairly diverse community of common fishes that are found in the Toronto area, but also includes Redside Dace which is listed as Endangered with regulated habitat protection under the Ontario *Endangered Species Act* (ESA), and Special Concern (Schedule 3) federally under the *Species at Risk Act* (SARA).

Table 3-1. Fish collection results from Fourteen Mile Creek (FOR) and McCraney Creek (MCR) in 2010 and 2012 (Conservation Halton 2013a, b). The location of Stations FOR-12 and FOR-2 are shown in Figure 3-1.

Common Name	Scientific Name	FOR-12 (2010)	FOR-12 (2012)	FOR-2 (2010)	FOR-2 (2012)	FOR-71 (2010)	FOR-71 (2012)	MCR-13 (2010)	MCR-13 (2012)	MCR-14 (2010)	MCR-14 (2012)
Black bullhead	*Ameiurus melas*				1						
Blacknose dace	*Rhinichthys atratulus*		7	57	70	26	13	4	13	3	1
Bluntnose minnow	*Pimephales notatus*	3	138	1	19	1	17				
Brook stickleback	*Culaea inconstans*	4	1	1	1	2					
Brown bullhead	*Ameiurus nebulosus*	2	5	1							
Carps and minnows	*Cyprinidae*	61									
Common shiner	*Luxilus cornutus*		241		3		3	1			
Creek chub	*Semotilus atromaculatus*	52	463	52	21	5	20	59	19	36	7
Fantail darter	*Etheostoma flabellare*			8	14						
Fathead minnow	*Pimephales promelas*	2	29	1	1		6	2			
Largemouth bass	*Micropterus salmoides*		1								
Longnose dace	*Rhinichthys cataractae*			1		13	11	5	5		
Pumpkinseed	*Lepomis gibbosus*	1	5	2							
Rainbow darter	*Etheostoma caeruleum*	6	5	105	46	19	43				
Rainbow trout	*Oncorhynchus mykiss*				4		1				
Redside dace	*Clinostomus elongatus*	1	108								
Smallmouth bass	*Micropterus dolomieu*						3				
White sucker	*Catostomus commersonii*	29	91	13	11	12	16	5			

Figure 3-1. Study area showing main points of discussion and photograph locations.



As presented in Table 3-1, in recent years Redside Dace have mainly been found within the upstream portion of the study area nearer Upper Middle Road, where there is abundant evidence of groundwater inputs to maintain cool water temperatures, a high proportion of sand and gravel in the substrate, overhanging vegetation and undercut banks, riparian meadow with scattered trees and shrubs, and relatively slow water velocity which is generally associated with pools (Appendix A: Photograph 1), all of which are important attributes of Redside Dace habitat (ref. Section 2.1.2 Habitat Preferences *In* MNRF, 2016). As one moves downstream the amount of apparent groundwater input is reduced, as is the proportion of sand and gravel in the substrate, though habitat in the vicinity of the potential intake structure appears to still be reasonably suitable for Redside Dace (Appendix A: Photograph 2). Farther downstream the amount of bedrock observed in the stream bottom increases, severely reducing the number and depth of pools and becoming quite dominant in the lower 1.2 km upstream of the QEW, including at the location of the potential on-line flood control facility. Here the creek channel is very shallow in most places, and bank erosion has limited the amount of low overhanging vegetation or accessible root structures that provide important cover for many small stream fishes (Appendix A: Photographs 3 and 4).

3.2 Bronte Creek

Fish community information for Bronte Creek, extracted from Conservation Halton (2013a, b) is provided in Table 3-2. BRO-119 is located approximately 3.2 km downstream of the potential outlet location for flood water diverted from Fourteen Mile Creek, and Station BRO-21 is located approximately 5.4 km upstream from the potential outlet location. Pacific salmons (*Oncorhynchus* spp.) are not listed in Table 3-2, but a large spawning run of these was underway when Bronte Creek was examined on October 28, 2016. Bronte Creek provides habitat for a diverse community of fishes that are typically found in the Toronto area, but also includes Silver Shiner which is listed as Threatened with general habitat protection under the Ontario *Endangered Species Act* (ESA), and Special Concern (Schedule 3) federally under the *Species at Risk Act* (SARA).

Silver Shiner are found in larger, clear, warm water streams of moderate gradient and hard bottom, within the larger, deeper pools near ample current (Jenkins and Burkhead, 1993; Coad *et al*, 1995; Smith, 1985). Trautman (1981) states that it is most abundant in deep, swift riffles and in the swifter eddies and currents of the pools immediately below such riffles. Silver Shiners patrol the mid to upper reaches of the water column and may not be associated with the substrate (Jenkins and Burkhead, 1993), suggesting that hard substrates may not be an important part of its habitat, but may instead be the most common substrate type in the type of stream it inhabits. Spawning is thought to occur from late May to mid-June, and though spawning habitat is poorly known, there is some evidence that spawning occurs in relatively deep riffles, similar to habitats used by *Luxilus* spp. and *Nocomis* spp. (COSEWIC, 2011).

Though not listed in the Conservation Halton monitoring information from 2010 and 2012, the MNRF has also indicated that American Eel (*Anguilla rostrata*) has been known from Bronte Creek. American Eel is listed as Endangered with general habitat protection under the Ontario *Endangered Species Act* (ESA), but has no status federally under the *Species at Risk Act* (SARA). Habitat use by eels is extremely diverse, and eels are frequently reported as habitat generalists in freshwater (MacGregor *et al*, 2013). Wiley *et al* (2004) evaluated the importance of 17 physical habitat, chemical, and biological variables on the density of American Eels in 5 major Maryland river basins. While the results of Wiley *et al* (2004) were generally consistent with other studies suggesting a general lack of significant stream habitat

associations, velocity-depth diversity was identified as the only important habitat variable positively correlated with eel density (Wiley *et al*, 2004). American Eels also exhibit daily, seasonal, and ontogenetic (e.g. size/age) variation in habitat use (Johnson and Nack, 2013). Vegetation and interstitial spaces such as found in rock piles, logs and other complex structures, as well as deciduous leaf litter, are important to eels as cover, especially during daylight hours (MacGregor *et al*, 2013).

Table 3-2. Fish collection results from Bronte Creek for 2010 and 2012 (Conservation Halton 2013a, b).

Common Name	Scientific Name	BRO-119 (2012)	BRO-119 (2010)	BRO-21 (2010)
Blacknose dace	*Rhinichthys atratulus*			2
Carps and minnows	*Cyprinidae*		41	5
Common shiner	*Luxilus cornutus*	11	31	28
Creek chub	*Semotilus atromaculatus*			109
Emerald shiner	*Notropis atherinoides*	7		
Fantail darter	*Etheostoma flabellare*		21	78
Johnny darter	*Etheostoma nigrum*			9
Longnose dace	*Rhinichthys cataractae*		69	69
Northern hog sucker	*Hypentelium nigricans*	80	4	2
Notropis sp.	*Notropis* sp.			9
Pumpkinseed	*Lepomis gibbosus*	1	1	7
Rainbow darter	*Etheostoma caeruleum*		52	128
River chub	*Nocomis micropogon*		30	113
Rock bass	*Ambloplites rupestris*		2	1
Rosyface shiner	*Notropis rubellus*	28		
Round goby	*Neogobius melanostomus*	3	8	
Silver shiner	*Notropis photogenis*	7		
Smallmouth bass	*Micropterus dolomieu*	11	1	
Spotfin shiner	*Cyprinella spiloptera*	26		
Stonecat	*Noturus flavus*		2	3
White sucker	*Catostomus commersonii*		3	14

Habitat in Bronte Creek, for 1.2 km upstream of the QEW bridge, which includes the potential location for the diversion outlet from Fourteen Mile Creek, is generally broad shallow riffles of different gradients. Some locations of relative flatwater may be considered broad shallow pools, but still have relatively swift flow. While bedrock was exposed in many places in the channel, granular substrates dominated and were mainly cobble, gravel and sand, with an occasional boulder and a few sheltered locations where leaves and silt had been deposited (Appendix A: Photographs 5 and 6). While habitat in the examined portion of Bronte Creek seems generally too fast and too shallow to be high quality Silver Shiner habitat, it must be assumed that this species may, at a minimum, occur here in lower numbers. Given the fact that American Eel is not known to display any significant stream habitat associations, it must be assumed that they could be found anywhere within the portion of Bronte Creek examined, but

likely in low numbers. The study area in Bronte Creek is an important migration route for spawning fishes from Lake Ontario.

3.3 Diversion Alignment from McCraney Creek to Fourteen Mile Creek

At the east end of the potential diversion route along the north side of the CNR railway tracks, near 4th Line, there does not appear to be a watercourse (Appendix A: Photograph 7). However, within about 200 m west of 4th Line, drainage from the industrial facilities immediately to the north begins to accumulate in a broad swale and flow towards the west and Fourteen Mile Creek. When examined on October 25 and 26, 2016, there was standing water within 250 m of 4th Line, though it had been dry earlier in the summer as indicated by the cracked clay substrate beneath the shallow water of the swale. Progressing to the west the swale becomes a formalized ditch with other ditches and culverts entering it from the industrial lands to the north. A concrete weir is located 813 m west of 4th Line (Appendix A: Photograph 8). Downstream of the weir there was still no apparent flow, but the ditch was backwatered due to a large beaver dam located 1000 m west of 4th Line (Appendix A: Photograph 9). Immediately upstream of the beaver dam a flowing watercourse joins from the north (Figure 3-1), which was contributing approximately 5 L/s flow on October 26, 2016, and therefore that flow also continues downstream of the beaver dam. At most locations examined from 4th Line to the beaver dam, the stagnant water appeared very low in oxygen, as indicated by its black colour and the black colour and odour of the substrate where water had apparently persisted throughout the summer. Downstream of the beaver dam the channel examined now had flow, but was soon backed up again (Appendix A: Photograph 10) by a second tall beaver dam (Figure 3-1) located 1450 m west of 4th Line. Over the next 200 m to the west the watercourse occupies a naturalized ditch with two low beaver dams that maintain flatwater conditions. Downstream from here to the west for another 100 m the watercourse is in a deep shrub and debris-choked ditch, with high vertical eroding banks (Appendix A: Photograph 11), but exits the deep ditch at the edge of the Fourteen Mile Creek floodplain, after which it flows along a narrow watercourse (Appendix A: Photograph 12) until joining Fourteen Mile Creek approximately 1700 m west of 4th Line.

C. Portt and Associates staff (C. Portt and G. Coker) examined and electrofished this watercourse downstream of the second beaver dam (Figure 3-1) on April 21, 2005. On that occasion there were no beaver dams and there was only one significant debris jam located in the section of ditch with the high vertical eroding banks. On that occasion 113 Blacknose Dace, 75 Creek Chub, 40 White Sucker, 2 Bluntnose Minnow, 3 Fathead Minnow, 6 Brook Stickleback, and 1 Redside Dace were captured. While no electrofishing was undertaken during the examination of this section of watercourse on October 26, 2016, the multiple barriers that now exist have fragmented and altered the habitat since 2005, likely reducing fish community diversity and shifting the fish community towards species that prefer lower flow velocities and that can tolerate poorer water quality.

Fish community information for McCraney Creek, extracted from Conservation Halton (2013a, b) is provided in Table 3-1. Station MCR-14 is located approximately 500 m downstream from the potential diversion site, and Station MCR-13 is located approximately 2 km downstream from the potential diversion site and approximately 500 m upstream from Lake Ontario. The higher community diversity at Station MCR-13 is likely due to its less constrained location within a park, and its close proximity to Lake Ontario. McCraney Creek is channelized with little riparian buffer along much of its length, and provides habitat for a simple community of mainly tolerant fishes that are commonly found in small urban watercourses of southern Ontario.

4 Discussion and Conclusions

4.1 Flow Diversion from Fourteen Mile Creek

Assumptions

1. The footprint of the potential flood diversion intake structure on Fourteen Mile Creek will be located outside of the stream channel, but within the floodplain and the regulated habitat of Redside Dace (meanderbelt width plus 30 m setbacks).
2. A restriction in the floodplain may be necessary to provide sufficient water depth to divert a portion of flows in excess of the approximately 25-50 year storm event.
3. All work will follow the Best Management Practices provided in MNRF (2016).

Assessment

The Endangered Redside Dace and its habitat is protected under the Ontario ESA, and this location is likely considered a Redside Dace stronghold. While the required structural components of the intake will not directly impact the stream channel, regulatory review and approvals will be required for work within the regulated Redside Dace habitat that is riparian to good quality stream habitat. Best efforts should be made to minimize the footprint of the structure and the extent of construction-related disturbances. While rare high flow events will be attenuated, high flows that are important for the maintenance of instream habitats (e.g. sediment flushing, removal of debris jams and beaver dams, etc.) will still occur downstream. With thoughtful planning and careful implementation and mitigation, this project can be undertaken with minimal impacts to Fourteen Mile Creek and Redside Dace habitat.

4.2 Flow Diversion to Bronte Creek

Assumptions

1. The footprint of the potential flood diversion outlet structure on Bronte Creek will be located outside of the stream channel, but within the floodplain.
2. The diversion of the 25-50 year flood peaks from Fourteen Mile Creek (a relatively small system) will amount to a small proportion of the flow in Bronte Creek (a relatively large system).
3. All work will follow appropriate Best Management Practices to minimize impacts to Bronte Creek habitats and species at risk.

Assessment

The Threatened Silver Shiner and the Endangered American Eel, and their habitats, are protected under the Ontario ESA, and both are known to occur in Bronte Creek. While regulatory review and approvals will be required, it is expected that the diversion of 25-50 year flood peaks from Fourteen Mile Creek will have minimal impacts upon Bronte Creek.

4.3 Fourteen Mile Creek On-line Flood Control Structure

Assumptions

1. The footprint of the potential on-line flood control structure on Fourteen Mile Creek, just upstream from the QEW, will be located outside of the stream channel, but within the floodplain and the regulated habitat of Redside Dace (meanderbelt width plus 30 m setbacks).
2. Flood control will only target flows in excess of the 25-50 year storm events.

3. All work will follow the Best Management Practices provided in MNRF (2016).

Assessment

The Endangered Redside Dace and its habitat is protected under the Ontario ESA, though the instream Redside Dace habitat at this location is considered poor. While the required structural components of the control structure will not directly impact the stream channel, regulatory review and approvals will be required for work within the regulated Redside Dace habitat that is riparian to the instream habitats. Best efforts should be made to minimize the footprint of the structure and the extent of construction-related disturbances. While rare high flow events will be attenuated by this flood control facility, high flows that are important for the maintenance of instream habitats (e.g. sediment flushing, removal of debris jams and beaver dams, etc.) will still occur downstream. With thoughtful planning and careful implementation and mitigation, this project can be undertaken with minimal impacts to Fourteen Mile Creek and Redside Dace habitat.

4.4 Flow Diversion from McCraney Creek

Assumptions

1. The diversion of the 25-50 years flood flows and greater from McCraney Creek will be facilitated by the modification of an existing on-line flood control facility just upstream of 4th Line.
2. All work will follow appropriate Best Management Practices to minimize impacts to aquatic habitats.

Assessment

The diversion of occasional flood flows from McCraney Creek will likely have little impact upon the already poor habitat and the simple community of resilient fishes that occurs in McCraney Creek.

4.5 Flow Diversion Path from McCraney to Fourteen Mile Creek

Assumptions

1. The diversion of the 25-50 years flood flows and greater from McCraney Creek to Fourteen Mile Creek will be facilitated by the construction and modification of a connecting ditch from an existing on-line flood control facility on McCraney Creek, to an existing drainage ditch that flows west to Fourteen Mile Creek along the north side of the CNR tracks.
2. The existing ditch along the north side of the CNR tracks will be rehabilitated/reconstructed to provide better flow conveyance and improved aquatic habitat.
3. One Redside Dace was captured in the potential diversion channel in 2005, and therefore it is likely that a field investigation will be required to determine the current status of the fish community and Redside Dace, to guide the treatment of this channel.
4. All work will follow appropriate Best Management Practices to minimize impacts to aquatic habitats and species at risk.

Assessment

The diversion of occasional flood flows from McCraney Creek will likely have a positive effect upon habitat in the existing ditch along the north side of the CNR tracks, because a certain level of channel rehabilitation/reconstruction will initially be required, and the occasional higher flood flows may flush the channel of debris, beaver dams, and accumulated sediments.

4.6 Flow Diversion to Fourteen Mile Creek

Assumptions

1. No instream work will be required, because the outlet to Fourteen Mile Creek already exists within the floodplain of Fourteen Mile Creek.
2. The diversion of the 25-50 year flood peaks and greater from McCraney Creek (a relatively small system) will amount to a very small proportion of the flow in Fourteen Mile Creek (a relatively large system).
3. All work will follow appropriate Best Management Practices to minimize impacts to Fourteen Mile Creek habitats and species at risk.

Assessment

While regulatory review and approvals will be required, it is expected that the diversion of 25-50 year flood peaks and greater from McCraney Creek will have minimal impacts upon Fourteen Mile Creek. It is believed that Redside Dace no longer occur in Fourteen Mile Creek downstream of the potential diversion outlet.

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Photograph 1. December 6, 2015. Pool in Fourteen Mile Creek, near Upper Middle Road.

Photograph 2. December 6, 2015. Fourteen Mile Creek in the vicinity of the potential flood diversion structure.

Photograph 3. October 24, 2016. Fourteen Mile Creek just upstream of the QEW in the vicinity of the potential on-line flood control structure.

Photograph 4. October 24, 2016. Fourteen Mile Creek approximately 220 m upstream from the potential on-line flood control structure. Bedrock substrate.

Photograph 5. October 28, 2016. Bronte Creek in the vicinity of the potential outlet structure for flood flows from Fourteen Mile Creek.

Photograph 6. October 28, 2016. Bronte Creek in the vicinity of the potential outlet structure for flood flows from Fourteen Mile Creek. Silt and leaves.

Photograph 7. October 25, 2016. Just west of 4th Line, where no watercourse exists along the potential diversion alignment.

Photograph 8. October 26, 2016. Concrete weir in ditch. No apparent flow. Note dark water that suggests low oxygen.

Photograph 9. October 26, 2016. Tall beaver dam approximately 1000 m west of 4th Line. Flowing watercourse enters from left, just upstream of dam.

Photograph 10. October 26, 2016. Ditch backwatered from second tall beaver dam.

Photograph 11. October 26, 2016. Shrub and debris choked section of ditch, with high eroding banks. Approximately 1450 m west of 4th Line.

Photograph 12. October 26, 2016. Watercourse within the Fourteen Mile Creek floodplain.