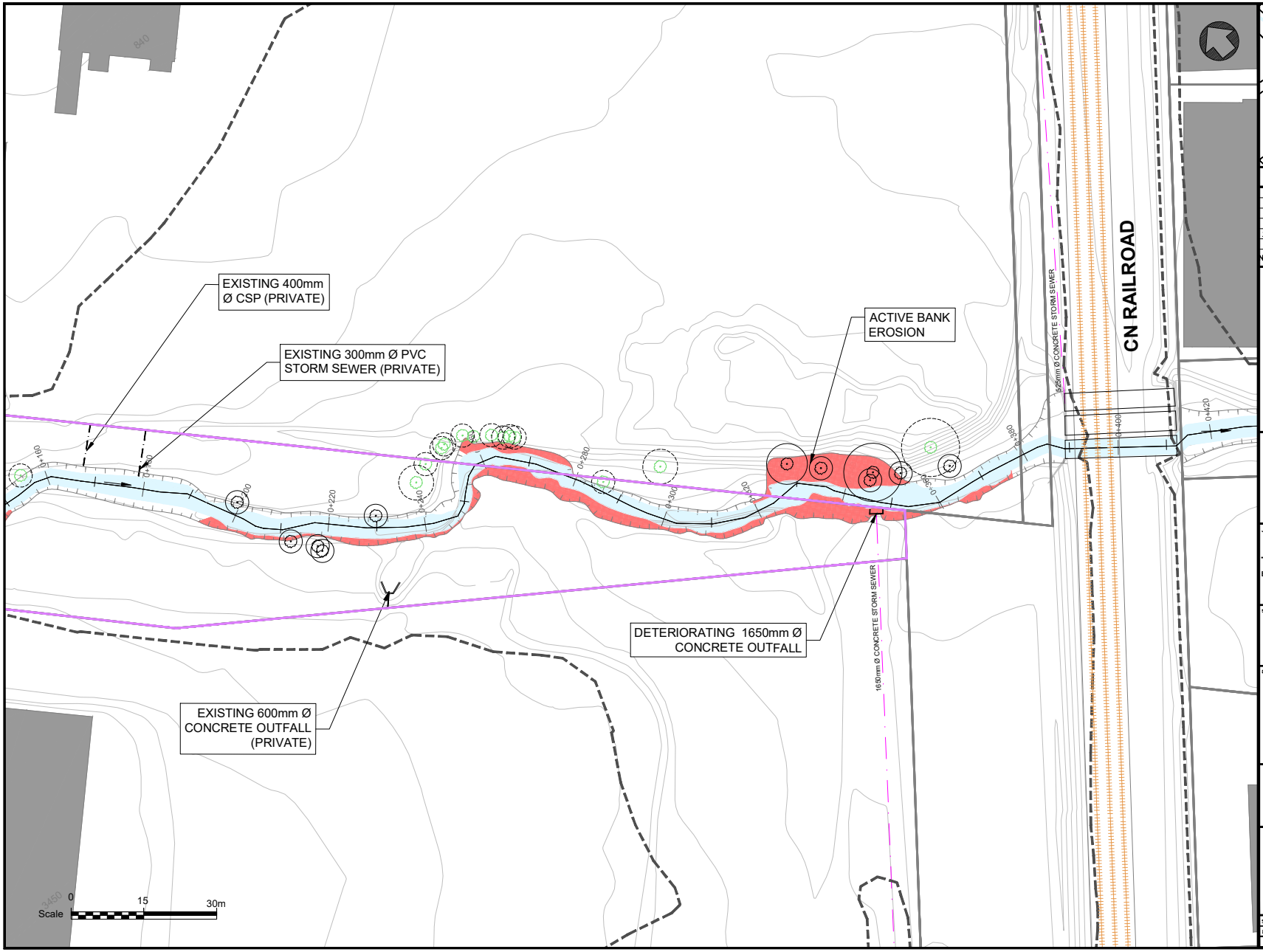
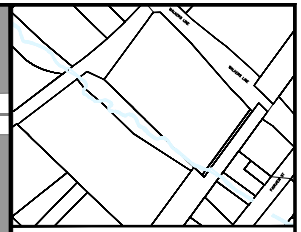
Appendix A –

Existing Conditions Drawings





No.	REVISION	By	DATE
2	ISSUED FOR EA		2022-01-05
1	ISSUED FOR REVIEW		2020-11-26

LEGEND

- PROPERTY LINE
- STORMLINE
- ERODING/UNSTABLE BANK
- FLOODLINE
- CITY OF BURLINGTON PROPERTY LINE
- HYDRO CORRIDOR
- EXISTING TREE DRIPLINE

THE POSITION OF THE POLE LINES, CONDUITS, WATERMAINS, SEWERS, AND OTHER UTILITIES AND STRUCTURES ARE NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED.

BEFORE STARTING WORK

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JOB TITLE

Tuck Creek Erosion Control E.A.
BURLINGTON, ONTARIO

SHEET TITLE

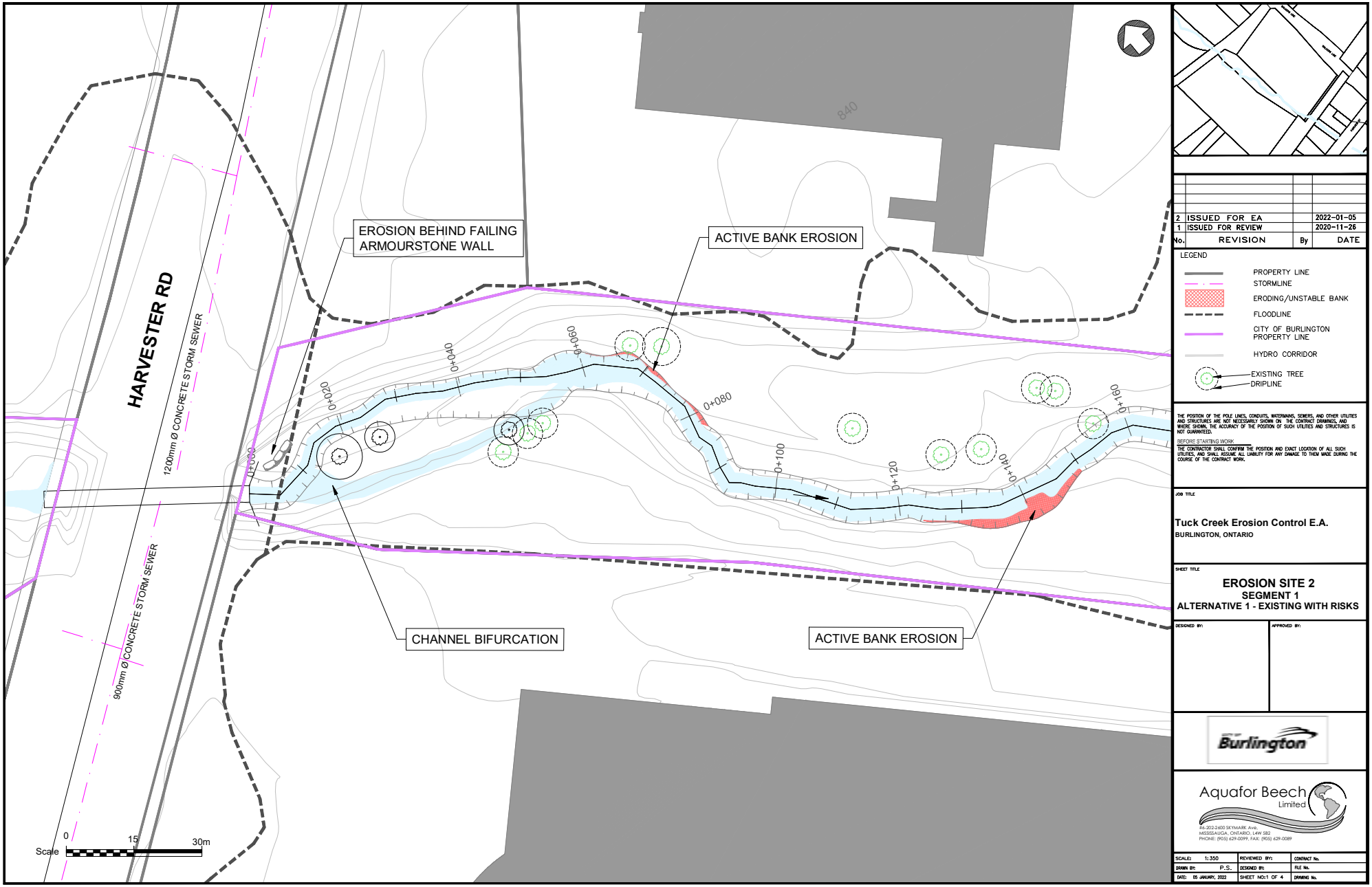
EROSION SITE 1
SEGMENT 1
ALTERNATIVE 1 - EXISTING WITH RISKS

DESIGNED BY:	APPROVED BY:

City of Burlington

Aquafor Beech Limited
#4-2122400 SKYMARK Ave.,
MISSISSAUGA, ONTARIO, L4W 5B2
PHONE: (905) 629-0099, FAX: (905) 629-0089

SCALE: 1:350	REVIEWED BY:	CONTRACT No.
DRAWN BY: P.S.	DESIGNED BY:	FILE No.
DATE: 05 JANUARY, 2022	SHEET NO:1 OF 4	DRAWING No.



No.	REVISION	By	DATE
2	ISSUED FOR EA		2022-01-05
1	ISSUED FOR REVIEW		2020-11-26

LEGEND

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BURLINGTON, ONTARIO

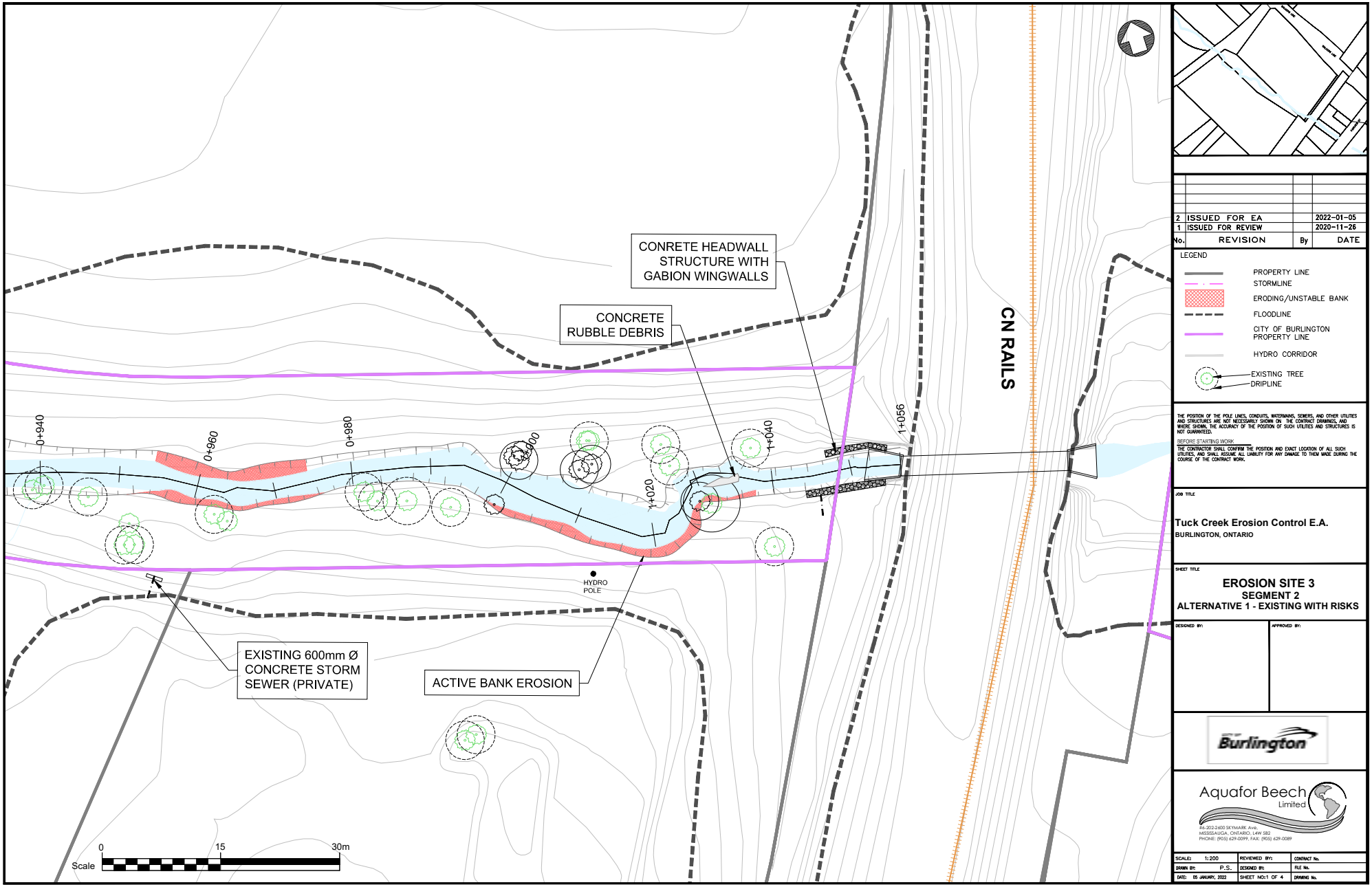
SHEET TITLE

EROSION SITE 2
SEGMENT 1
ALTERNATIVE 1 - EXISTING WITH RISKS

DESIGNED BY:	APPROVED BY:

Aquafor Beech Limited
#4-2224400 SKYMARK Ave.,
MISSISSAUGA, ONTARIO, L4W 5B2
PHONE: (905) 629-0099, FAX: (905) 629-0089

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BURLINGTON, ONTARIO

SHEET TITLE

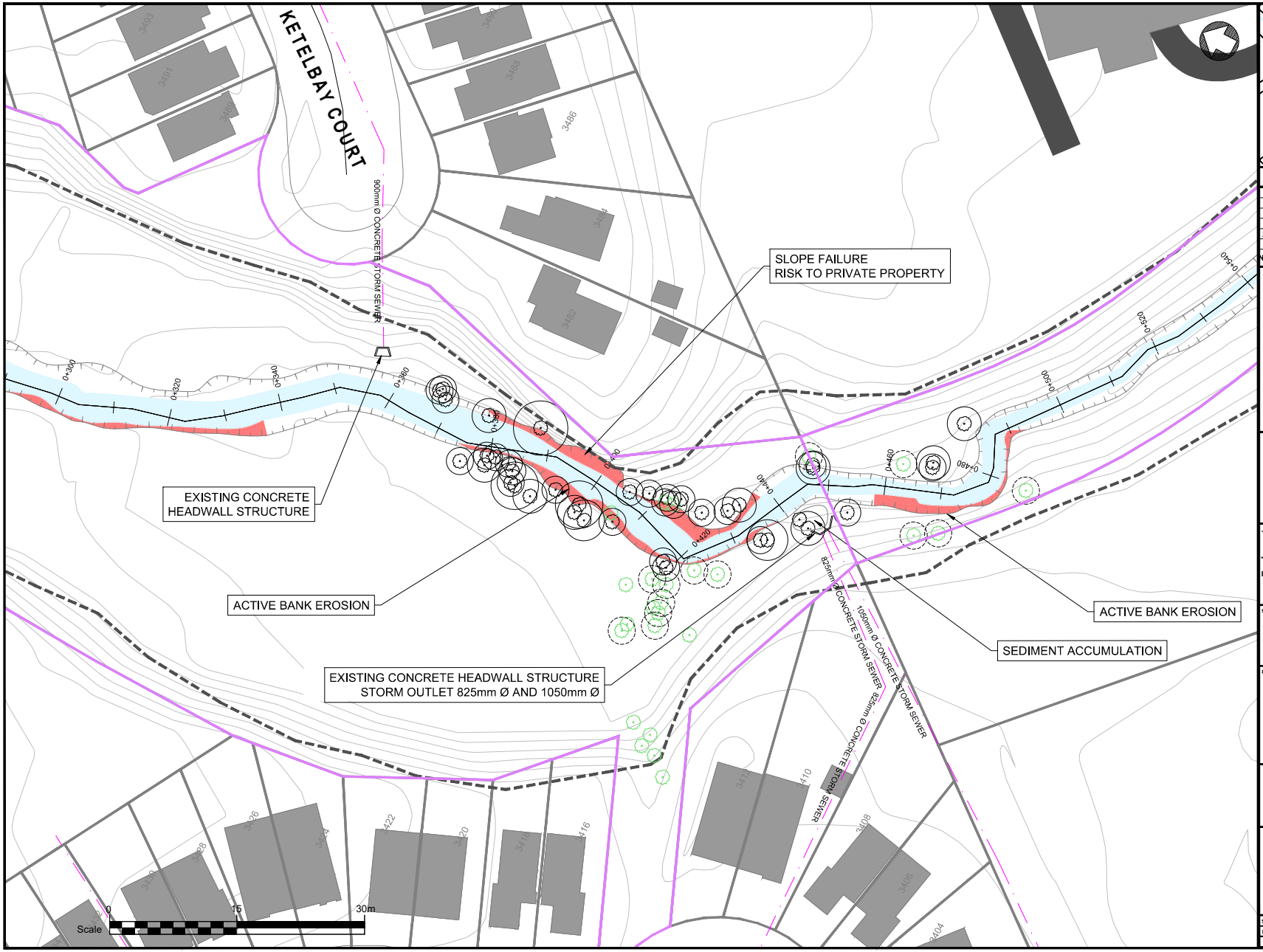
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ALTERNATIVE 1 - EXISTING WITH RISKS

DESIGNED BY:	APPROVED BY:

Burlington

Aquafor Beech Limited
Unit 2-2.2.400 SKYMARK Ave.,
MISSISSAUGA, ONTARIO, L4W 5B2
PHONE: (905) 629-0099, FAX: (905) 629-0089

SCALE: 1:200	REVIEWED BY:	CONTRACT No.	
DRAWN BY: P.S.	DESIGNED BY:	FILE No.	
DATE: 05 JANUARY, 2022	SHEET NO:1 OF 4	DRAWING No.	



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BURLINGTON, ONTARIO

SHEET TITLE

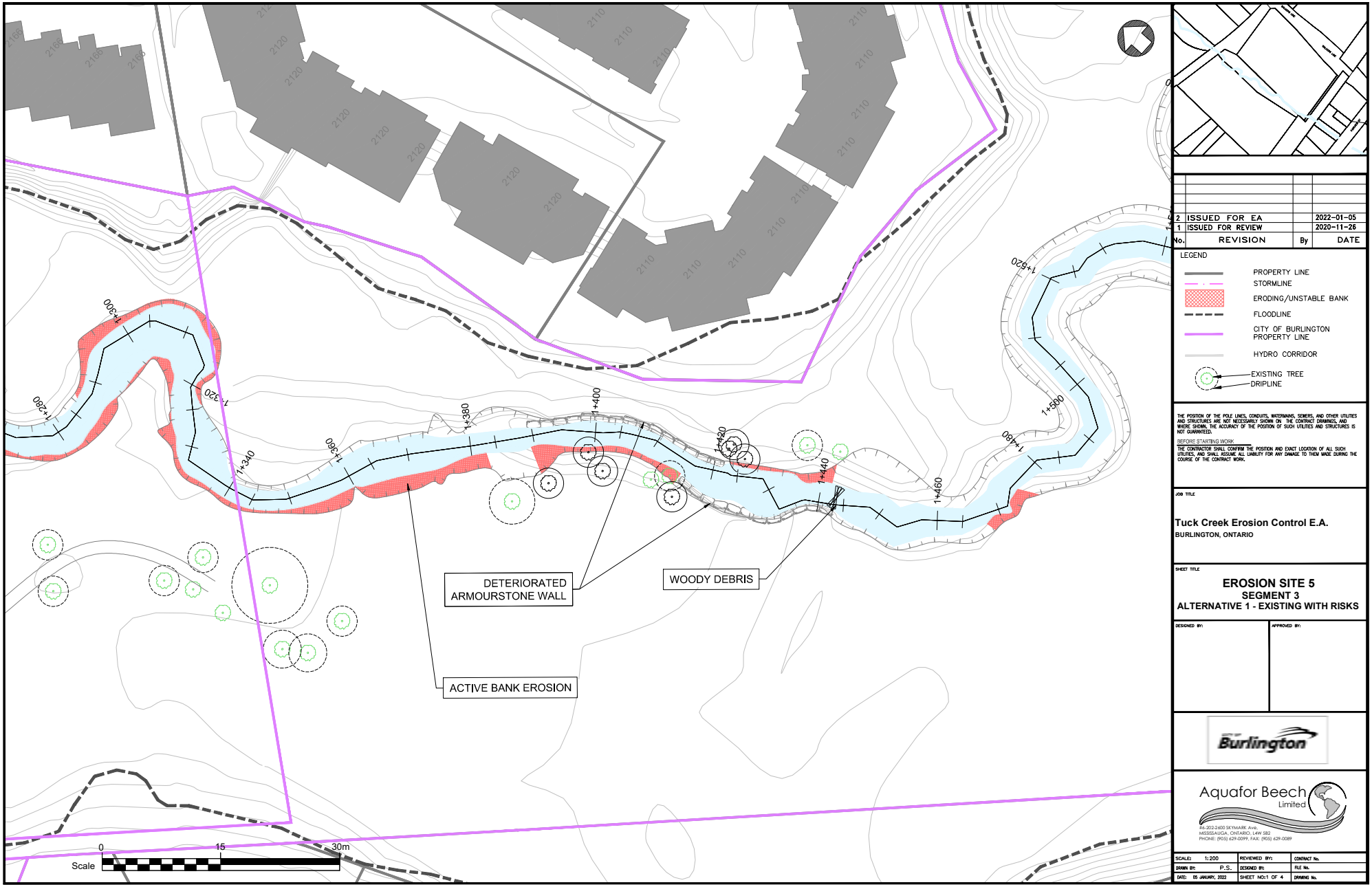
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DESIGNED BY:	APPROVED BY:

Burlington

Aquafor Beech Limited
14-2324400 SKYMARK Ave.,
MISSISSAUGA, ONTARIO, L4W 5B2
PHONE: (905) 629-0099, FAX: (905) 629-0089

SCALE: 1:200	REVIEWED BY:	CONTRACT No.	
DRAWN BY: P.S.	DESIGNED BY:	FILE No.	
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SHEET TITLE

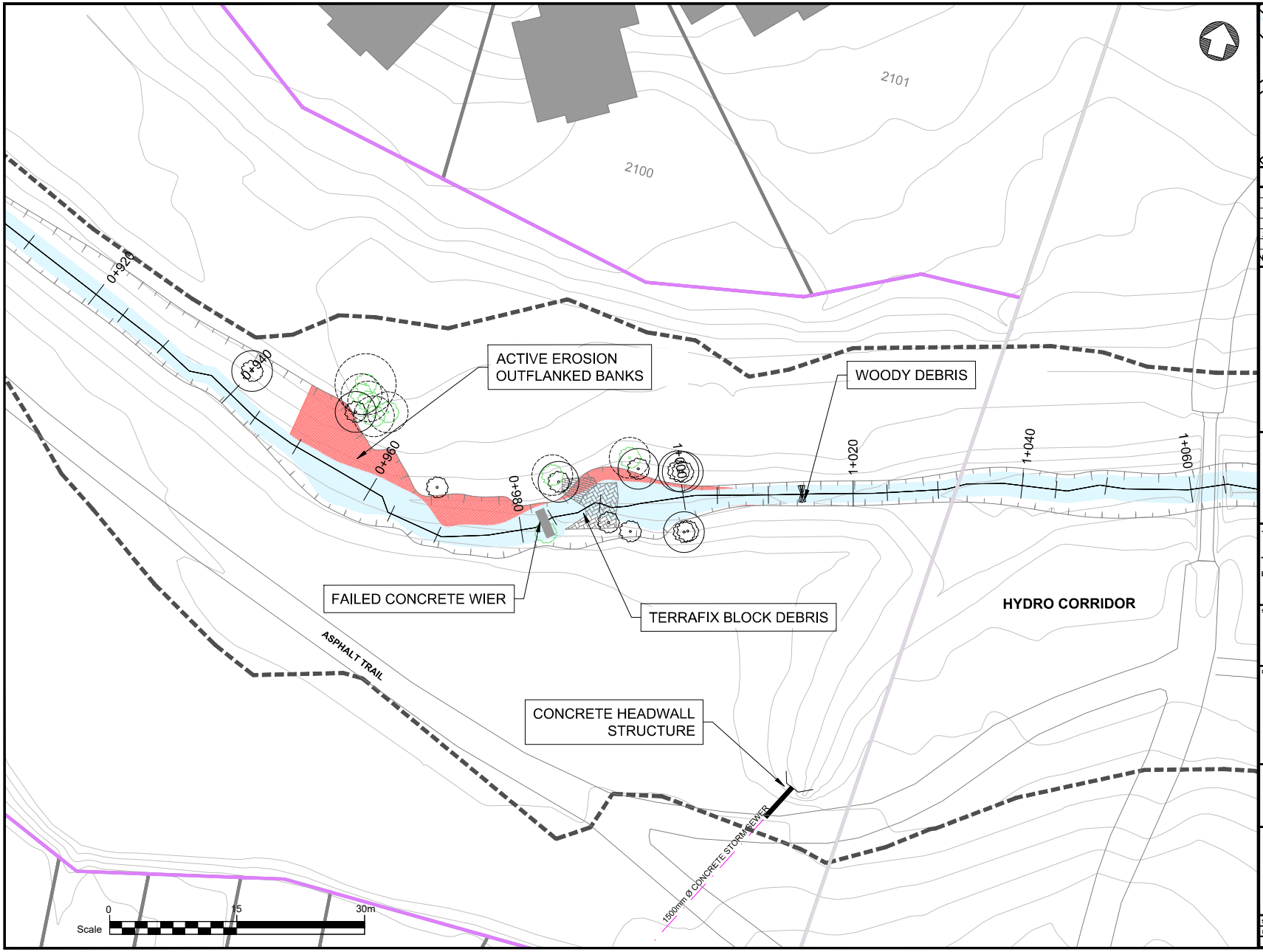
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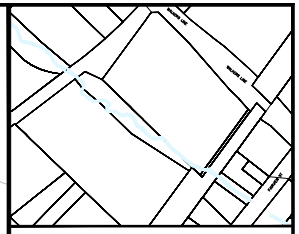
DESIGNED BY:	APPROVED BY:

Burlington

Aquafor Beech Limited
1A-2122400 SKYMARK Ave,
MISSISSAUGA, ONTARIO, L4W 5B2
PHONE: (905) 629-0099, FAX: (905) 629-0089

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BURLINGTON, ONTARIO

SHEET TITLE

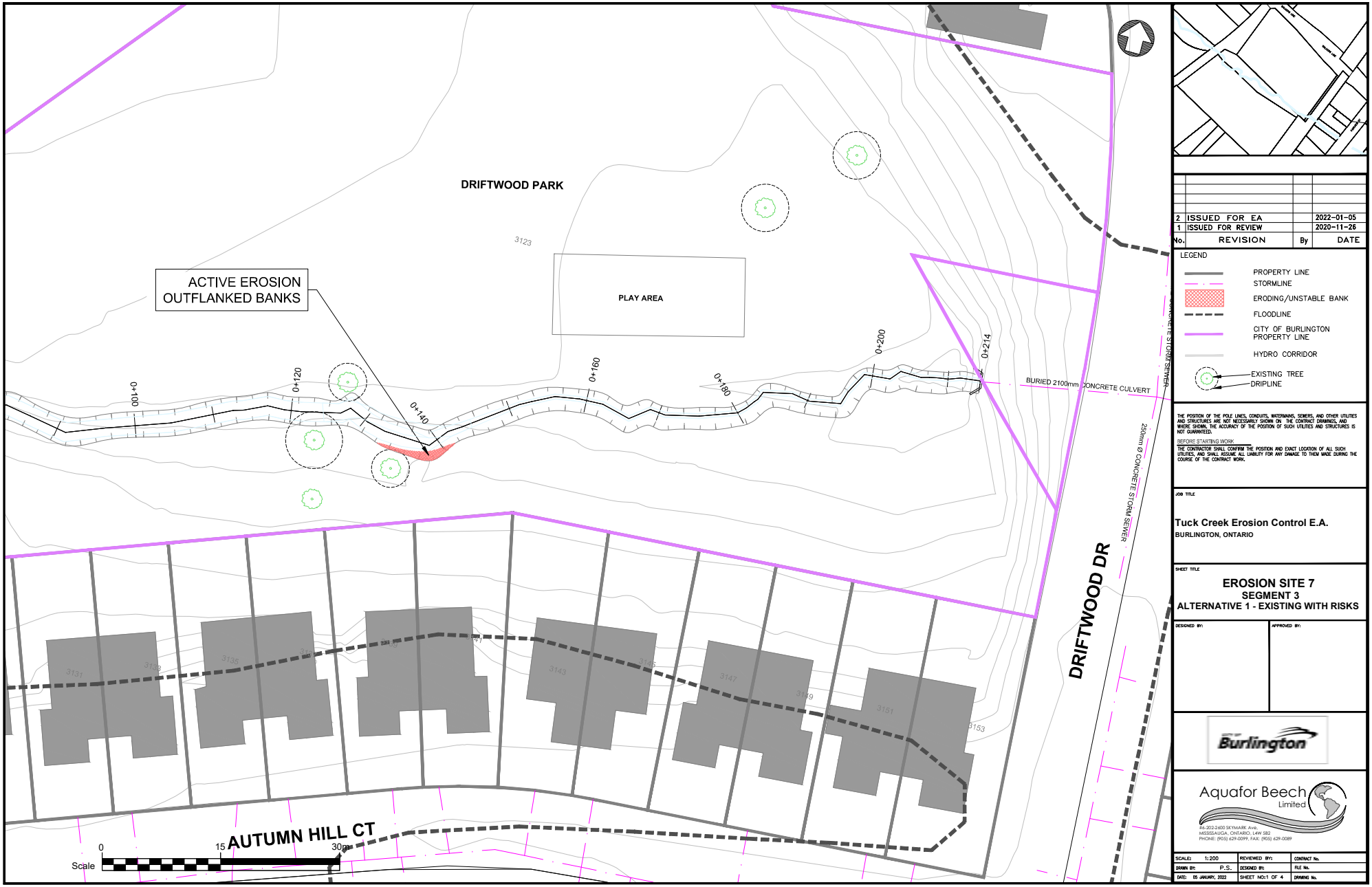
EROSION SITE 6
SEGMENT 3
ALTERNATIVE 1 - EXISTING WITH RISKS

DESIGNED BY:	APPROVED BY:

Burlington

Aquafor Beech Limited
#4-2224400 SKYMARK Ave.,
MISSISSAUGA, ONTARIO, L4W 5B2
PHONE: (905) 629-0099, FAX: (905) 629-0089

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JOB TITLE

Tuck Creek Erosion Control E.A.
BURLINGTON, ONTARIO

SHEET TITLE

EROSION SITE 7
SEGMENT 3
ALTERNATIVE 1 - EXISTING WITH RISKS

DESIGNED BY:

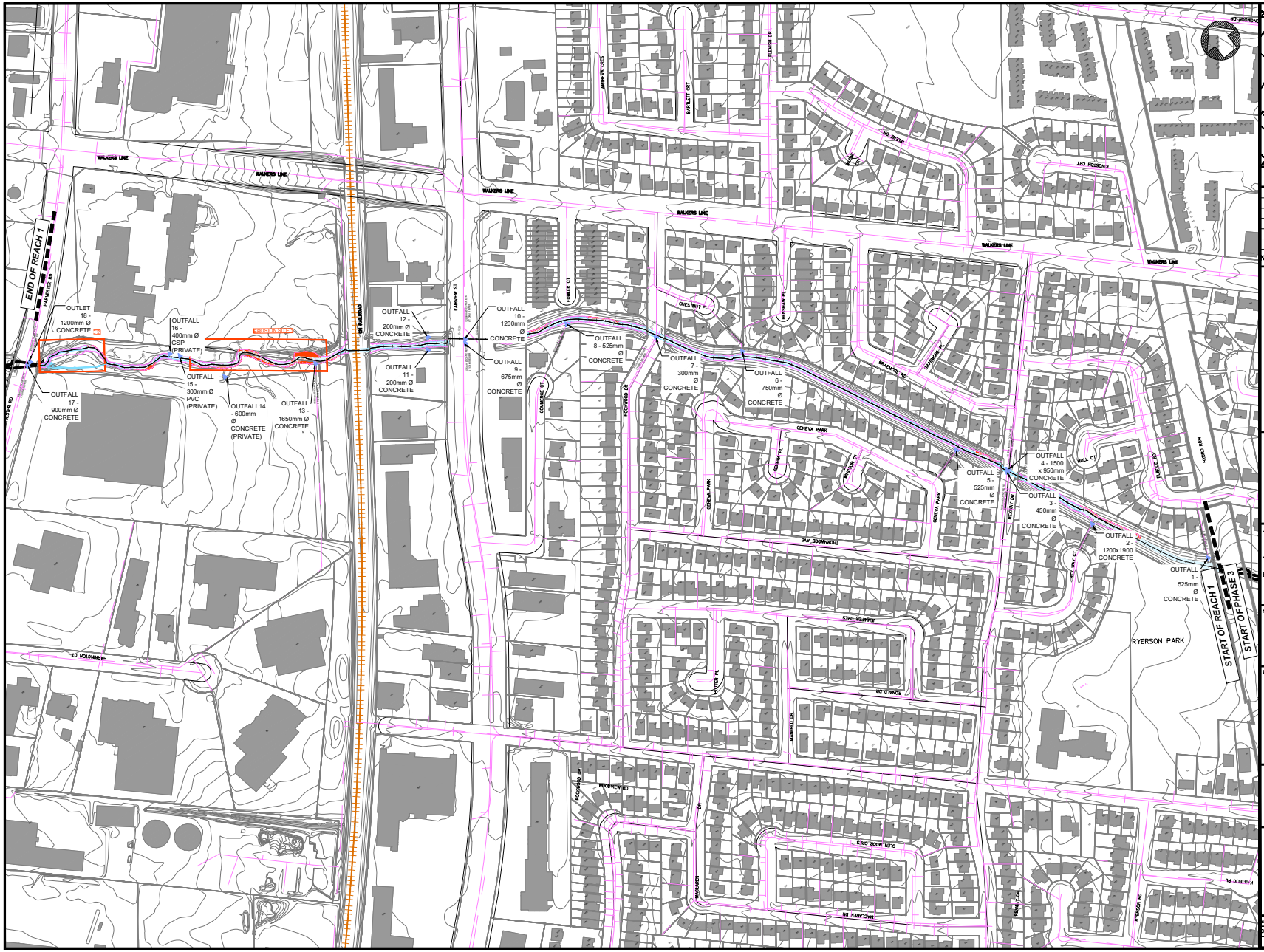
APPROVED BY:

Aquafor Beech Limited
Unit 2-2020 2400 SKYMARK Ave.,
MISSISSAUGA, ONTARIO, L4W 5B2
PHONE: (905) 629-0099, FAX: (905) 629-0089

SCALE: 1:200	REVIEWED BY:	CONTRACT No.	
DRAWN BY: P.S.	DESIGNED BY:	FILE No.	
DATE: 05 JANUARY, 2022	SHEET No:1 OF 4	DRAWING No.	

Appendix B –

Storm Sewer Outfall Inventory and Mappings



No.	REVISION	By	DATE
1	Existing Conditions		2020-02-26

LEGEND

PROPERTY LINE

STORMLINE

OUTFALL

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JOB TITLE

Tuck Creek Erosion Control E.A.

BURLINGTON, ONTARIO

SHEET TITLE

Storm Outfall Location

General Plan - Reach 1

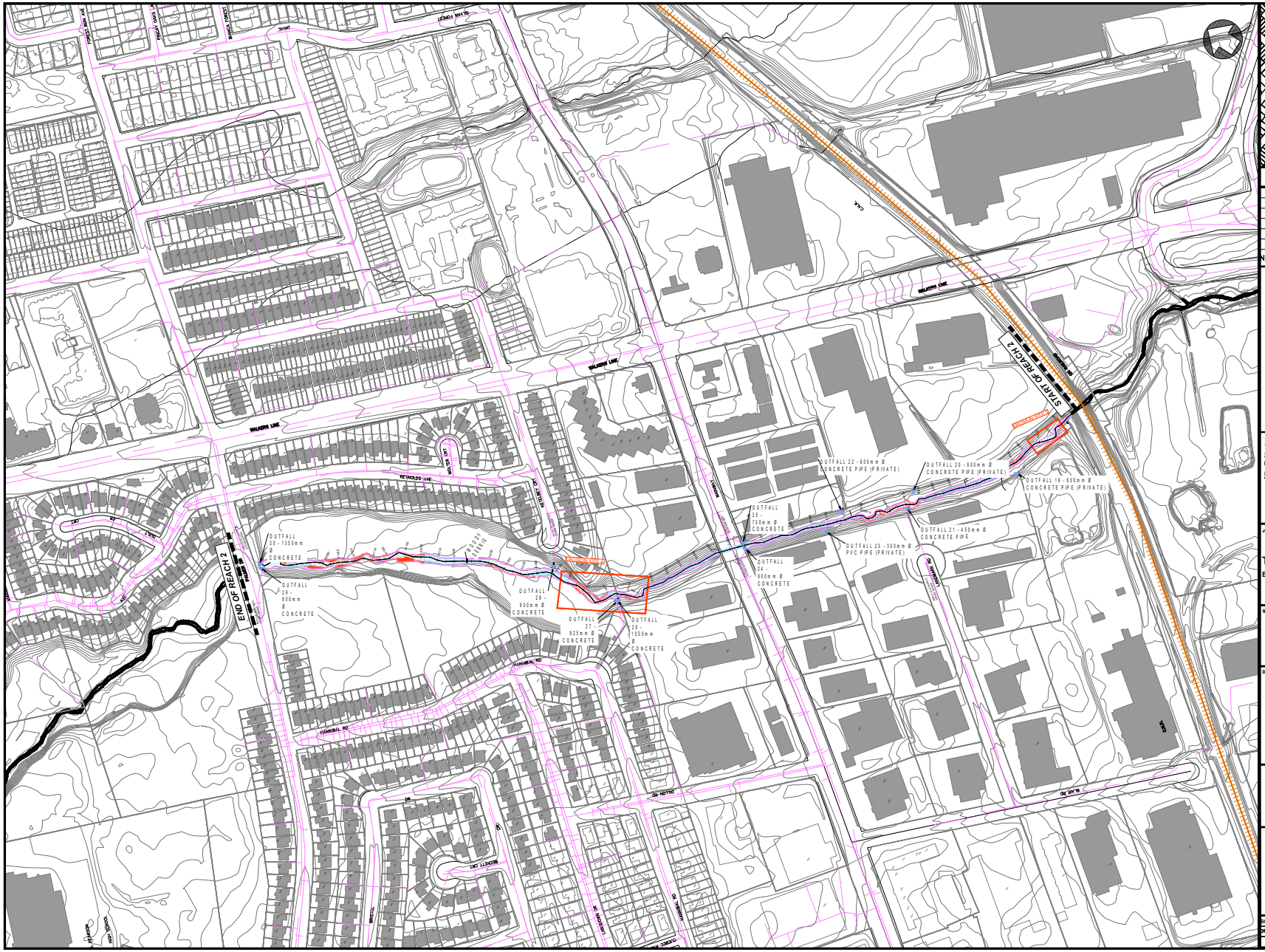
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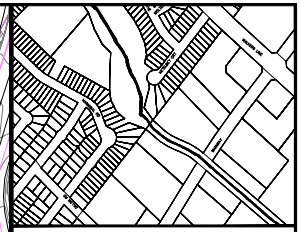
Burlington

Aquafor Beech Limited

2-202-2800 SKYMARK AVE
MISSISSAUGA, ONTARIO, L4W 5B2
PHONE: (905) 629-0099, FAX: (905) 629-0089

SCALE: HOR. – 1:500	REVIEWED BY:	CONTRACT No.	
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DATE: 29 APRIL 2021	SHEET NO: 1 OF 3	DRAWING No.	





No.	REVISION	By	DATE
1	Existing Conditions		2020-02-26

LEGEND

- PROPERTY LINE
- STORMLINE
- OUTFALL

THE POSITION OF THE POLE LINES, CONDUITS, WATERMAINS, SEWERS, AND OTHER UTILITIES AND STRUCTURES ARE NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED.

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JOB TITLE

Tuck Creek Erosion Control E.A.

BURLINGTON, ONTARIO

SHEET TITLE

Storm Outfall Location
General Plan - Reach 2

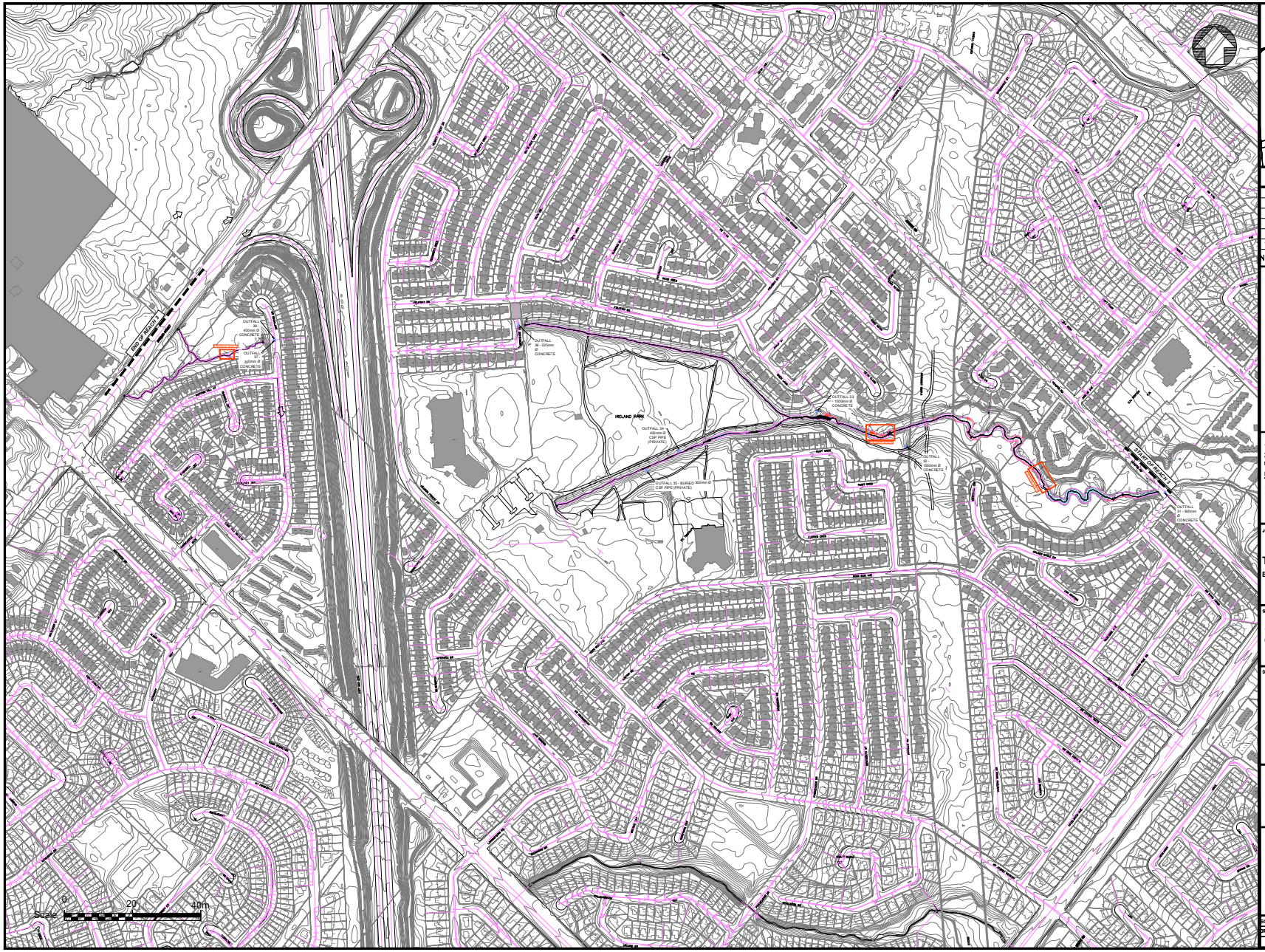
DESIGNED BY:	APPROVED BY:

Burlington

Aquafor Beech Limited

6-202-2600 SKYMARK AVE
MISSISSAUGA, ONTARIO, L4W 5B2
PHONE: (905) 629-0099, FAX: (905) 629-0089

SCALE: HOR. - 1:500	REVIEWED BY:	CONTRACT No.	
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DATE: 29 APRIL, 2021	SHEET NO: 2 OF 3	DRAWING No.	





No.	REVISION	By	DATE
1	Existing Conditions		2020-02-26

LEGEND

PROPERTY LINE

STORMLINE

OUTFALL

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JOB TITLE

Tuck Creek Erosion Control E.A.

BURLINGTON, ONTARIO

SHEET TITLE

Storm Outfall Location
General Plan - Reach 3

DESIGNED BY:	APPROVED BY:

Aquafor Beech Limited
2-202-2600 SKYMARK AVE,
MISSISSAUGA, ONTARIO, L4W 5B2
PHONE: (905) 629-0099, FAX: (905) 629-0089

SCALE: HOR.- 1:500		REVIEWED BY:	CONTRACT No.
DRAWN BY:	SS	DESIGNED BY:	FILE No.
DATE:	29 APRIL, 2021	SHEET NO: 3 OF 3	DRAWING No.

Outfall Number	Photo	Ownership	Properties	Condition
Outfall 1		City	525mm ø Concrete Year of Construction: 1968	Fair
Outfall 2		City	1200x1900mm Year of Construction: 1968	Fair
Outfall 3		City	450mm ø Concrete Year of Construction: 1967	Fair

Outfall Number	Photo	Ownership	Properties	Condition
Outfall 4		City	1500x950mm Concrete Year of Construction: 1967	Fair
Outfall 5		City	525 mm ø Concrete Year of Construction: 1967	Good
Outfall 6		City	750 mm ø Concrete Year of Construction: 1967	Fair

Outfall Number	Photo	Ownership	Properties	Condition
Outfall 7		City	Unknown – Not Available in City's Basemapping	Good
Outfall 8		City	300 mm ø Concrete Year of Construction: 1967	Good
Outfall 9		City	525 mm ø Concrete Year of Construction: 1976	Good

Outfall Number	Photo	Ownership	Properties	Condition
Outfall 10		City	675 mm ø Concrete Year of Construction: 1978	Good
Outfall 11		City	1200 mm ø Concrete Year of Construction: 1978	Good
Outfall 12		Private	200mm ø Concrete Year of Construction: Unknown	Poor

Outfall Number	Photo	Ownership	Properties	Condition
Outfall 13		Private	200 mm ø Concrete Year of Construction: Unknown	Poor
Outfall 14		City	1650 mm ø Concrete Year of Construction: 1976	Poor
Outfall 15		Private	600 mm ø Concrete Year of Construction: Unknown	Good

Outfall Number	Photo	Ownership	Properties	Condition
Outfall 16		Private	300 mm ø PVC Year of Construction: Unknown	Poor
Outfall 17		City	400 mm ø CSP Year of Construction: Unknown	Poor
Outfall 18		City	900 mm ø Concrete Year of Construction: 1980	Fair

Outfall Number	Photo	Ownership	Properties	Condition
Outfall 19		City	1200 mm ø Concrete Year of Construction: 1980	Fair
Outfall 20		Private	600 mm ø Concrete Year of Construction: Unknown	Fair
Outfall 21		Private	600 mm ø Concrete Year of Construction: Unknown	Poor

Outfall Number	Photo	Ownership	Properties	Condition
Outfall 22		Private	450 mm ø Concrete Year of Construction: Unknown	Poor
Outfall 23		Private	300 mm ø PVC Year of Construction: Unknown	Good
Outfall 24		City	750 mm ø Concrete Year of Construction: 1971	Good

Outfall Number	Photo	Ownership	Properties	Condition
Outfall 25		City	900 mm ø Concrete Year of Construction: 1971	Good
Outfall 26 and 27		City	825 and 1025 mm ø Concrete Year of Construction: 1979	Poor
Outfall 28		Private	900 mm ø Concrete Year of Construction: 1984	Fair

Outfall Number	Photo	Ownership	Properties	Condition
Outfall 29 and 30		City	West Wingwall Outfall 29 600mm ø Concrete East Wingwall Outfall 30 1350mm ø Concrete Year of Construction: 1979	Fair
Outfall 31		City	1350mm ø Concrete Year of Construction: 1988	Fair
Outfall 32		City	1500 mm ø Concrete Year of Construction: 1986	Fair

Outfall Number	Photo	Ownership	Properties	Condition
Outfall 33		City	1500 mm ø Concrete Year of Construction: 1987	Fair
Outfall 34	Not available	Private	400 mm ø CSP Year of Construction: Unknown	Unknown
Outfall 35	Not available	Private	400 mm ø CSP Year of Construction: Unknown	Unknown
Outfall 36	Not accessible	City	525 mm ø Concrete Year of Construction: Unknown	Unknown
Outfall 37	Not accessible	City	250 mm ø Concrete Year of Construction: 1983	Unknown
Outfall 38	Not accessible	City	450 mm ø Concrete Year of Construction: 1983	Unknown

Appendix C –

Natural Environment Information

Appendix C - Natural Heritage Existing Conditions

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1 INTRODUCTION

Aquafor Beech completed a series of ecological investigations to identify the existing natural features and functions within the study area, allow for a preliminary assessment of potential impacts, identify any additional studies required at later stages, and recommend mitigation measures for the preferred alternatives. Field investigations were focused on the areas identified as being a priority for erosion but the stream corridor as a whole was reviewed on a high level to give a landscape perspective. A detailed review of available background information sources was also completed to supplement the field investigations. Field investigations completed for this study include:

- Vegetation community surveys using the Ecological Land Classification system for southern Ontario (Lee et al, 1998);
- Botanical inventory;
- Breeding bird surveys;
- Snake and amphibian surveys;
- Bat roosting habitat surveys;
- Tree inventory;
- Aquatic habitat assessment; and
- Incidental wildlife observations.

A detailed accounting of the natural heritage features and functions in the study area, based on the results of field investigations and background information review, is provided in the following sections.

2 METHODOLOGY

2.1 Background Information Review

In the preparation of this document, the following background information resources were reviewed and relevant data were incorporated where available:

- Natural Heritage Information Centre (NHIC) database accessed via the online Make-a-Map: Natural Heritage Areas tool;
- Online ‘citizen science’ observation databases such as iNaturalist and eBird;
- Past study reports by Aquafor in the Tuck Creek corridor (Tuck Creek at Headon Road Species at Risk Summary Report, 2018; Tuck Creek at Billings and Harvester Spring Species Inventory, 2016; Tuck Creek Erosion Control Municipal Class EA, 2012);

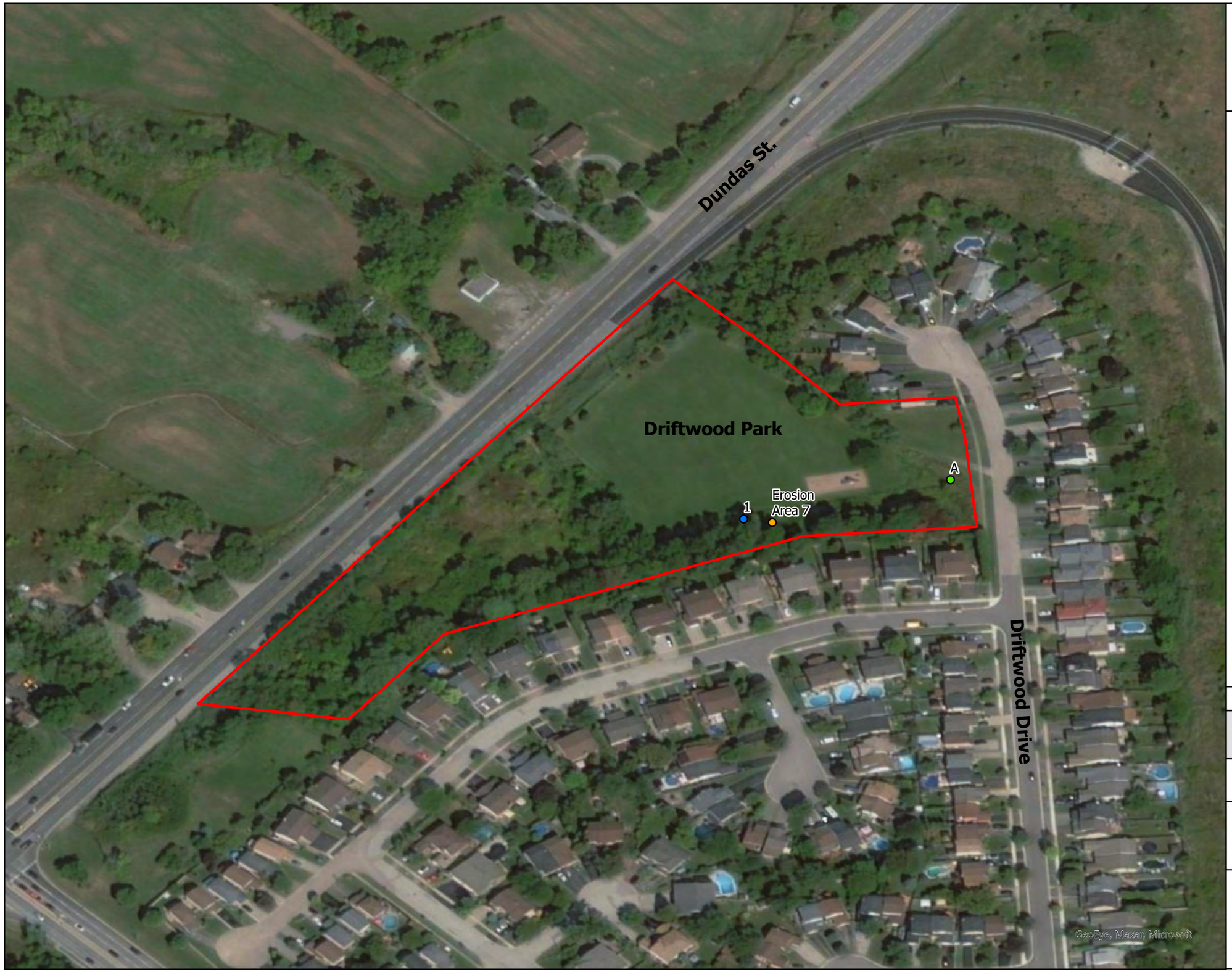
- Halton Natural Areas Inventory (NAI), Volume 1: Site Summaries and Volume 2: Species Checklists (2006); and
- The Official Plans of Halton Region and the City of Burlington.

2.2 Field Investigations

Field inventory methodologies and timing are detailed in **Table C-1**, below. Survey locations are illustrated on **Figure C-1** through **Figure C-4**.

Table C-1: Field Inventory Methodologies and Timing

Component	Methodology	Date(s)
Vegetation Communities	Vegetation community assessments were completed in accordance with the Ecological Land Classification (ELC) system for Southern Ontario (Lee et al., 1998).	June 4 and 25, and July 15, 2020
Botanical Survey	A botanical survey was compiled in concert with the vegetation community assessment and species were also noted incidentally during the course of other field investigations.	June 4 and 25, and July 15, 2020
Bat Maternity Roosts	Trees with cavities, cracks, loose bark, or similar features that could potentially provide bat habitat were identified during leaf-off conditions in accordance with the MNRF's April 2017 "Survey Protocol for Species at Risk Bats within Treed Habitats". Additional live trees with the potential to provide habitat (primarily large oaks and maples, per the above survey protocol) were identified as part of the tree inventory completed for this project.	April 16, 24, and 28, 2020
Breeding Birds	Birds were identified by sight and sound during two separate early morning site visits completed between late May and early July, separated by at least 15 days. Surveys include 10-minute point counts at selected locations plus general area search surveys throughout.	June 4 and 25, 2020
Amphibians	Amphibian calling surveys were completed per the Marsh Monitoring Program protocol which requires three separate site visits in April, May, and June, beginning half an hour after sunset on nights which meet minimum air temperature requirements.	April 6, May 25, and June 22, 2020
Snakes	Staff walked transects in potential habitat and attempted to detect snakes moving or basking; creek banks and exposed surfaces were visually scanned; flat rocks, debris, and similar materials were lifted to look for snakes beneath.	April 24 and 28, June 4 and 25, and July 15, 2020
Incidental Wildlife	Incidental wildlife and/or traces of wildlife (e.g., tracks, scat, dens, etc.) were recorded during all field surveys.	All site visit dates
Aquatic Habitat	The Ontario Stream Assessment Protocol (v.10; Stanfield 2017), Section 1 - Modules 1, 2 and 3 and Section 4 - Modules 2 and 3, were used to assess aquatic habitat in the study area.	June 25 and 26, 2020



CITY OF Burlington

Legend

- Study Area
- Erosion Area (General Location)
- Breeding Bird Survey Station
- Amphibian Calling Survey Station
- Ontario Stream Assessment Protocol Survey Station

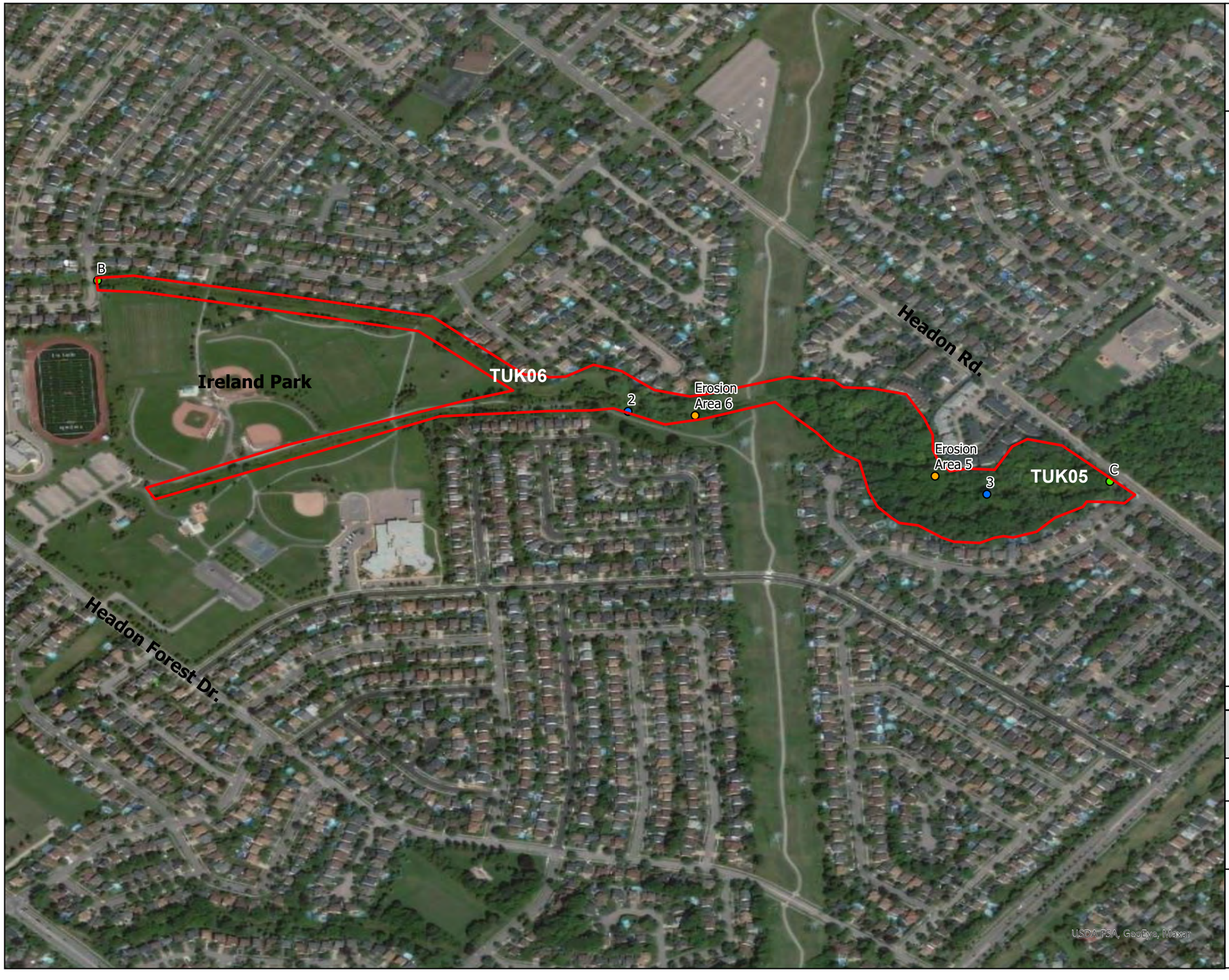
Figure C-1

Study Area and Survey Locations (1 of 4)

Date: November 2020
Author: KB
Projection: UTM_Zone_17N
Source: City of Burlington, LIO

0 55 110
Metres

N



CITY OF Burlington

Legend

- Study Area
- Erosion Area (General Location)
- Breeding Bird Survey Station
- Amphibian Calling Survey Station
- Ontario Stream Assessment Protocol Survey Station

Figure C-2

Study Area and Survey Locations (2 of 4)

Date: November 2020
Author: KB
Projection: UTM_Zone_17N
Source: City of Burlington, LIO

0 175 350
Metres

N



CITY OF Burlington

Legend

- Study Area
- Erosion Area (General Location)
- Breeding Bird Survey Station
- Amphibian Calling Survey Station
- Ontario Stream Assessment Protocol Survey Station

Figure C-3

Study Area and Survey Locations (3 of 4)

Date: November 2020
Author: KB
Projection: UTM_Zone_17N
Source: City of Burlington, LIO

0 115 230
Metres

N



CITY OF Burlington

Legend

- Study Area
- Erosion Area (General Location)
- Breeding Bird Survey Station
- Amphibian Calling Survey Station
- Ontario Stream Assessment Protocol Survey Station

Figure C-4

Study Area and Survey Locations (4 of 4)

Date: November 2020
Author: KB
Projection: UTM_Zone_17N
Source: City of Burlington, LIO

0 175 350
Metres

N

2.3 Species at Risk and Significant Wildlife Habitat Screening

For the purpose of this study, Species at Risk (SAR) are defined as species listed as Endangered (END), Threatened (THR), or Special Concern (SC) under the provincial *Endangered Species Act* (ESA) and/or the federal *Species at Risk Act* (SARA). Primary and secondary information sources were consulted to assess the presence of SAR within the study area. Information from all background sources was combined to create a comprehensive list of potential SAR associations which was then screened by comparing the habitat needs of each species with the habitat conditions present within the subject property and adjacent lands.

Other Species of Conservation Concern (SOCC) which were reviewed by this study are those with Subnational (Provincial) ranks of S1-S3 indicating a degree of provincial rarity, or local/regional rarity as identified by appropriate sources. The Halton Natural Areas Inventory (2006) species checklists were used to identify species that are considered uncommon (HU) or rare (HR) in the region.

Similarly, the Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E (MNRF, 2015) document was used to screen for the presence of Significant Wildlife Habitat (SWH) within the study area by comparing the requirements for the various SWH categories with the features and habitats present in the study area.

3 VEGETATION COMMUNITIES AND FLORA

Vegetation communities and flora within the study area were identified during field surveys completed in June and July, 2020. A complete list of the vegetation communities and flora recorded during field surveys are detailed in the following subsections.

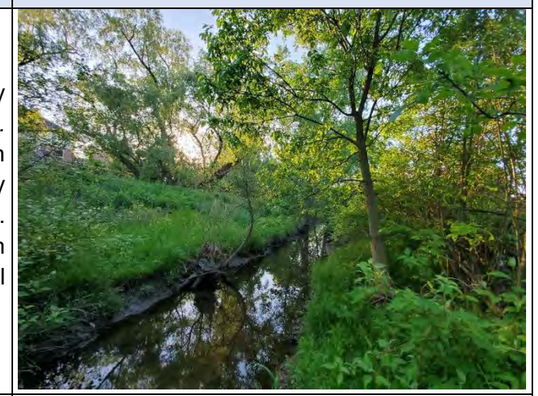
3.1 Vegetation Communities

The study area includes a portion of Tuck Creek and its associated riparian habitats. Vegetation communities within the study area were classified and delineated according to the Ecological Land Classification (ELC) for Southern Ontario (Lee, et al., 1998). A total of 23 polygons were delineated, comprised of 15 distinct vegetation community types. Community types ranged from disturbed woodlands and open meadows, to deciduous forest habitats containing mature species and moderate to high quality habitat.

The vegetation communities within the study area are detailed in **Table C-1**, and illustrated on **Figure C-5** through **Figure C-8**. Field sheets are provided for reference at the end of this Appendix.

Table C-1: Vegetation Community Descriptions

Polygon	Ecological Land Classification		Ranking		Description	Representative Photograph
	Code	Name	Global	Provincial		
1	MAS2-1	Cattail Mineral Shallow Marsh	G5	S5	This community is located in Driftwood Park along an open portion of a creek in the southeast part of the park. Cattails (*Typha latifolia* and *T. angustifolia*) dominate the community, with other common meadow species along the edges such as Red Canary Grass (*Phalaris arundinacea*), Field Horsetail (*Equisetum arvense*), Purple Loosestrife (*Lythrum salicaria*), Spotted Jewelweed (*Impatiens capensis*), Marsh Bedstraw (*Galium palustre*), Canada Anemone (*Anemonastrum canadense*), Cow Vetch (*Vicia cracca*), Creeping Thistle (*Cirsium arvense*), common asters (*Symphyotrichum* spp.) and goldenrods (*Solidago* spp.) and other cultural meadow species. Trees and shrubs were very occasionally observed along the slopes of this community, primarily Black Walnut (*Juglans nigra*), Manitoba Maple (*Acer negundo*) and American Pussy Willow (*Salix discolor*). Aquafor noted that a large portion of this community had been removed at the culvert outlet in late summer, compared to an earlier site visit in spring when it was observed to be intact.	
2	FOD7-3	Fresh - Moist Willow Lowland Deciduous Forest	GNR	S4S5	This Willow-dominant community exists along the riparian corridor within Driftwood Park south and west of Polygon 1. The canopy and subcanopy is mainly composed of White Willow (*Salix alba*), Black Walnut and Manitoba Maple, although instances of planted Norway Maple (*Acer platinoides*) are present particularly next to adjacent residences. European Buckthorn (*Rhamnus cathartica*), Red Osier Dogwood (*Cornus sericea*) and Heartleaved Willow (*Salix eriocephala*) were common in the shrub layer. The ground layer contained Bluejoint Reedgrass (*Calamagrostis canadensis*), Kentucky Bluegrass (*Poa pratensis*), and Garlic Mustard (*Alliaria petiolata*) among other species common in the surrounding cultural communities.	
3	CUM1-1	Dry -Moist Old Field Meadow	-	-	This open cultural meadow community is located in a large, unmaintained patch at the west end of Driftwood Park and contains common graminoids and forbs found in disturbed upland areas, primarily Smooth Brome (*Bromus inermis*), Kentucky Bluegrass, and Canada Goldenrod, although many other species such as Orchard Grass (*Dactylis glomerata*), New England Aster (*Symphyotrichum novae-angliae*), Common Teasel *(Dipsacus fullonum*), Creeping Thistle, and others were also common. Occasional shrubs and vines such as Gray Dogwood (*Cornus racemosa*), Staghorn Sumac (*Rhus typhina*), Multiflora Rose (*Rosa multiflora*), and Riverbank Grape (*Vitis riparia*) are common in this community, along with young Black Walnut and Manitoba Maple.	

Polygon	Ecological Land Classification		Ranking		Description	Representative Photograph
	Code	Name	Global	Provincial		
4	FOD7-3	Fresh - Moist Willow Lowland Deciduous Forest	GNR	S4S5	This community is a small, naturalized, riparian strip within urban parkland in the eastern portion of the study area (Ireland Park). The dominant canopy species were large White and Crack Willow (*Salix alba* and *S. euxina*), and Manitoba Maple, along with Eastern Cottonwood (*Populus deltoides*), Black Walnut and Ash (*Fraxinus* spp). The shrub layer contained species such as Multiflora Rose, Riverbank Grape, Black Raspberry (*Rubus occidentalis*), Red Osier Dogwood (*Cornus sericea*), and Cranberry Viburnum (*Viburnum opulus* ssp. *opulus*). The ground layer contained species common to disturbed meadows and woodlands such as Common Burdock (*Arctium minus*), Sedges (*Carex* spp.), White Panicled Aster (*Symphyotrichum lanceolatum*), Tall Buttercup (*Ranunculus acris*), Spotted Jewelweed (*Impatiens capensis*) and others.	
5	FOD7-4	Fresh – Moist Black Walnut Lowland Deciduous Forest Type	G4?	S2S3	This is a lowland community dominated by Black Walnut, with occasional occurrences of Green Ash (*Fraxinus pennsylvanica*), Willows, and Manitoba Maple within the canopy and subcanopy. Shrub cover was moderate and, where present, was primarily composed of non-natives such as Multiflora Rose, Tatarian Honeysuckle (*Lonicera tatarica*), European Buckthorn, and Japanese Tree Lilac (*Syringa reticulata*). Ground cover was dense, containing graminoids (e.g., Kentucky Bluegrass, Orchard Grass) as well as common disturbance-tolerant forbs such as Canada Goldenrod, Avens (*Geum* spp.), Garlic Mustard, Cleavers (*Galium aparine)*, Dame's rocket (*Hesperis matronalis)*, Canada Garlic (*Allium canadense*), or escapes from neighbouring backyards (e.g., Periwinkle – *Vinca minor*). A well-used community trail was observed north of the watercourse throughout this community. *Where intact, the FOD7-4 community is represented by relatively undisturbed Walnut dominated floodplain and is provincially ranked S2S3, indicating it is rare in Ontario. Based on the disturbance indicators observed within Polygon 5, it is Aquafor's opinion that this community is not representative of the rare, S2S3 Black Walnut community described in the ELC first approximation (Lee et. al., 1998). Notwithstanding, this community has been assigned as FOD7-4 in the absence of an ELC code better suited to its characteristics.*	

Polygon	Ecological Land Classification		Ranking		Description	Representative Photograph
	Code	Name	Global	Provincial		
6	FOD6-5	FOD6-5 – Fresh Moist Sugar Maple – Hardwood Deciduous Forest	GNR	S5	This community contains a mix of lowland floodplain and mature hardwood species. The canopy was variable but contained a mixture of upland hardwoods (e.g., Sugar Maple – *Acer saccharum*, Red Oak – *Quercus rubra*, Shagbark Hickory – *Carya ovata*, Basswood – *Tilia americana*), particularly at the furthest east extent of the polygon, and lowland species such as those found in the neighbouring lowland community (e.g., Manitoba Maple and Black Walnut) further west. It is possible that this community represents a transition zone between mid-aged to mature upland and lowland forest. The shrub layer most commonly contained Japanese Lilac and European Buckthorn, although Black Raspberry, Chokecherry (*Prunus virginiana*) and others were present. Ground layer vegetation contained many species common to moderately disturbed woodlands, such as Avens (*Geum* spp.), Virginia Stickseed (*Hackelia virginiana*), Spotted Geranium (*Geranium maculatum*), Great Ragweed (*Ambrosia trifida*) and other species found in the neighbouring FOD7-4 Polygon. Spring ephemerals such as Yellow Trout Lily (*Erythronium americanum*), Wild Leek (*Allium tricoccum*), and Narrow-leaved Spring Beauty (*Claytonia virginica*) were also noted as present particularly in the easternmost portion of the community. A well used community trail was observed north of the watercourse throughout.	
7	CUM1-1	Dry -Moist Old Field Meadow	-	-	This community is located centrally within the study area next to a rail line and industrial area. Due to access restrictions, Aquafor observed this community remotely from across the rail line. As such, a comprehensive species list could not be obtained here, although the location, recent aerial imagery and general observations suggest that the composition of this community likely resembles that of Polygons 3 and 15 (also classified CUM1-1). The community consists of a large open upland meadow of grasses and forbs, likely common to disturbed, urban areas. Species such as Common Teasel, Canada Goldenrod (*Solidago canadense*), Wild Carrot (*Daucus carota*), Creeping Thistle, and abundant graminoids were confirmed from a distance. Trees and shrubs such as Trembling Aspen (*Populus tremuloides*), Black Walnut, European Buckthorn, Honeysuckle, Multiflora Rose, Dogwood, and Willow were also found in low abundance, particularly on the periphery of the community.	
8	FOD7	Fresh - Moist Lowland Deciduous Forest	-	-	This community forms the majority of the riparian corridor north of Lansdown Park. The canopy and subcanopy contained a variety of lowland species, with relatively mixed composition. Species in the canopy and subcanopy included Black Walnut, Willows, Maples (Manitoba, Sugar, Norway and Silver – *Acer saccharinum*) and Sweet Cherry (*Prunus avium*). Remnant mature Ash (Green – *Fraxinus pennsylvanica*, and White – *F. americana*) were evident in this community, either as snags or individuals in the late stages of Emerald Ash Borer infestation. The shrub layer was moderately dense and contained abundant European Buckthorn, Black Raspberry, and Hawthorn (*Crataegus* spp). The ground layer contained both moist and upland species such as Avens, Garlic Mustard, Herb-Robert (*Geranium robertianum*), Broad-leaved Enchanter's Nightshade (*Circaea canadensis*), Dame's Rocket (*Hesperis matronalis*), Canada Garlic (*Allium canadense*), Stinging Nettle (*Urtica dioica*), Thicket Creeper (*Parthenocissus vitacea*), Sedges and many others. Abundant spring ephemerals such as Cut-leaved Toothwort (*Cardamine concatenata*), Yellow Trout Lily, Bloodroot, Violets and Wild Leek were also noted during investigations early in the season. A well used community trail was observed south of the watercourse throughout this community.	

Polygon	Ecological Land Classification		Ranking		Description	Representative Photograph
	Code	Name	Global	Provincial		
9	FOD5-3	Dry - Fresh Sugar Maple - Oak Deciduous Forest	G?	S5	This mature deciduous forest community is found along the upper ridge of the riparian corridor abutting Lansdown Park. Mature upland species such as large Red and White Oak (*Quercus alba*), Sugar Maple, Basswood and Hickories (Shagbark and Bitternut – *Carya cordiformis*) were common in the canopy. One provincially rare tree species – Pignut Hickory (*Carya glabra* – S3) was observed in this community. The understory layer contained a similar composition to the canopy with the addition of several tall shrubs including Ironwood and Apple (*Malus pumila*), and the shrub layer contained European Buckthorn, Hawthorn, Chokecherry and others common in the area. The ground layer was generally sparse, although Aquafor noted abundant spring ephemerals such as Mayapple (*Podophyllum peltatum*), Bloodroot (*Sanguinaria canadensis*), Yellow Trout-lily, Narrow-leaved Spring Beauty, and Wild Leek early in the season. Access points to the main community trail in the neighbouring community (Polygon 8) were found intermittently throughout this community.	
10	CUT1/ CUM1-1	Mineral Cultural Thicket / Dry - Moist Old Field Meadow Complex	-	-	This semi-open community contained a mixture of common tree, shrub, graminoid, and forb species common to disturbed urban areas. Cover alternated from open meadow to wooded thicket or small woodland patches throughout the corridor. Species such as Black Walnut, Staghorn Sumac, and Willows were the most common in the canopy and shrub layers. The ground layer was densely populated with graminoids and forbs common in other CUM1-1 communities throughout the study area.	
11	FOD7	Fresh - Moist Lowland Deciduous Forest	-	-	This narrow, wooded corridor contained a canopy of common, disturbance-tolerant lowland species such as Black Walnut and Willow (mainly White and Crack), with occurrences of dead and dying Ash and other species (e.g., Manitoba Maple, European Mountain Ash - *Sorbus aucuparia*, Black Locust - *Robinia pseudoacacia,* etc.). The shrub layer contained a mixture of primarily European Buckthorn and regenerating Ash. The ground layer was heavily dominated by Garlic Mustard, with a wide variety of other disturbance-tolerant graminoids and forbs common in the area.	

Polygon	Ecological Land Classification		Ranking		Description	Representative Photograph
	Code	Name	Global	Provincial		
12	CUW1	Mineral Cultural Woodland	-	-	This community is located centrally along the riparian corridor near a rail line and industrial areas. Canopy cover was moderate and composed primarily of Manitoba Maple and Black Walnut with some Ash. The shrub layer contained Tatarian Honeysuckle and Riverbank Grape. The ground layer was dominated by Reed Canary Grass and Garlic Mustard. Other species common to disturbed habitats elsewhere in the study area were present in low abundance.	
13	CUT1	Mineral Cultural Thicket	-	-	This community was located in the northwest extent of Driftwood Park and was dominated by a large patch of Staghorn Sumac and Dogwood, secondarily European Privet (*Ligustrum vulgare*). Trees where present were urban species such as Black Walnut, Black Locust, Honey-locust (*Gleditsia triacanthos var. inermis*), Siberian Elm (*Ulmus pumila*) and White Willow. The ground layer contained a composition similar to the neighbouring Polygon 3 (CUM1-1)	
14	FOD7	Fresh - Moist Lowland Deciduous Forest	-	-	This community is located centrally within the study area and is dominated by Manitoba Maple, Willow, and Black Walnut. Despite slight variation in dominant canopy species, this community closely resembles the form and composition of Polygon 11, described above.	

Polygon	Ecological Land Classification		Ranking		Description	Representative Photograph
	Code	Name	Global	Provincial		
15	CUM1-1	Dry -Moist Old Field Meadow	-	-	The composition of this community resembles that of Polygons 3 and 7 (also classified CUM1-1) and consists of a large open upland meadow of grasses and forbs common to disturbed, urban areas.	



CITY OF Burlington

Legend

- Study Area
- Anthropogenic (ANTH)
- Cultural Meadow (CUM)
- Cultural Thicket (CUT)
- Cultural Woodland (CUW)
- Deciduous Forest (FOD)
- Shallow Marsh (MAS)

Figure C-5

Vegetation Communities (1 of 4)

Date: November 2020
Author: KB
Projection: UTM_Zone_17N
Source: City of Burlington, LIO

0 55 110
Metres

N



CITY OF Burlington

Legend

- Study Area
- Anthropogenic (ANTH)
- Cultural Meadow (CUM)
- Cultural Thicket (CUT)
- Cultural Woodland (CUW)
- Deciduous Forest (FOD)
- Shallow Marsh (MAS)

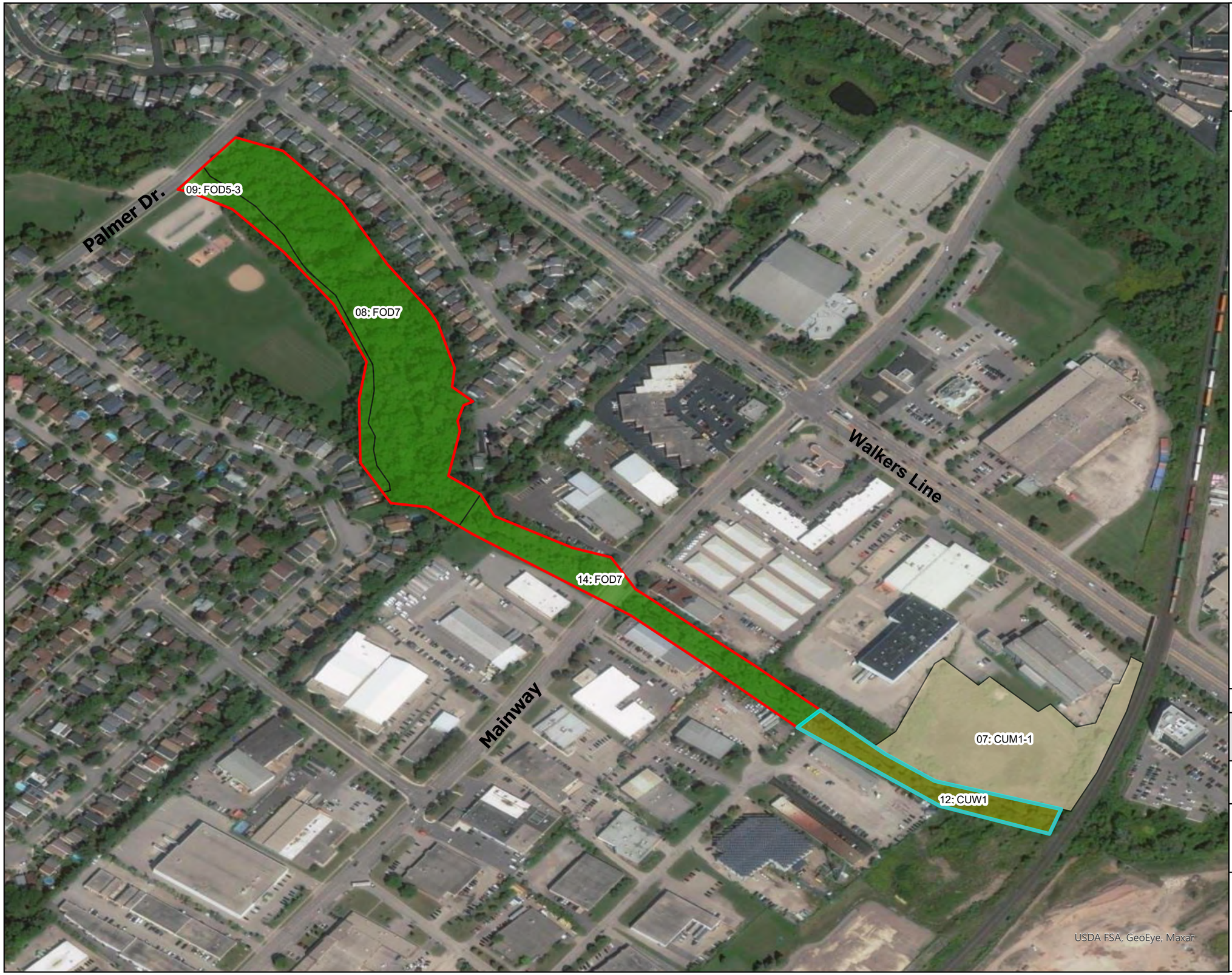
Figure C-6

Vegetation Communities (2 of 4)

Date: November 2020
Author: KB
Projection: UTM_Zone_17N
Source: City of Burlington, LIO

0 175 350
Metres

N



CITY OF Burlington

Legend

- Study Area
- Anthropogenic (ANTH)
- Cultural Meadow (CUM)
- Cultural Thicket (CUT)
- Cultural Woodland (CUW)
- Deciduous Forest (FOD)
- Shallow Marsh (MAS)

Figure C-7

Vegetation Communities (3 of 4)

Date: November 2020
Author: KB
Projection: UTM_Zone_17N
Source: City of Burlington, LIO

0 115 230
Metres

N



CITY OF Burlington

Legend

- Study Area
- Anthropogenic (ANTH)
- Cultural Meadow (CUM)
- Cultural Thicket (CUT)
- Cultural Woodland (CUW)
- Deciduous Forest (FOD)
- Shallow Marsh (MAS)

Figure C-8

Vegetation Communities (4 of 4)

Date: November 2020
Author: KB
Projection: UTM_Zone_17N
Source: City of Burlington, LIO

0 175 350
Metres

N

3.2 Botanical Inventory

A total of 201 vascular plant species were identified within the study area, 14 of which were only identified to genus due to a lack of diagnostic features at the time of survey. Many species observed within the study area are non-native or considered disturbance tolerant and common in urban environments. Notwithstanding, some communities retained features reminiscent of an intact undisturbed forest (e.g., Polygon 9 – FOD5-3, or Polygon 6 - FOD6-5). **Table C-2**, below, provides an overview of the results of the botanical inventory. A full botanical species list for the study area is provided at the end of this Appendix.

Table C-2: Botanical Inventory Results Summary

Species Breakdown	Total Species: 201 Native Species: 86 (43%) Introduced Species: 78 (39%) Species identified only to genus: 14 (7%)	The majority of the species are native to Ontario although non-natives comprise a large proportion of the species identified. Of the introduced species, European Buckthorn, Garlic Mustard, Goutweed (*Aegopodium podagraria),* Norway Maple, European Privet, Purple Loosestrife, Black Locust, Multiflora Rose, Periwinkle and European Swallow-wort (a.k.a. Dog Strangling Vine - *Vincetoxicum rossicum*) are considered non-native invasive species.
Significance	Species at Risk: 0	n/a
	Provincially Rare Species: 1	Pignut Hickory, documented in Polygon 9, is ranked S3 provincially.

Significance (continued)	Regionally Rare Species: 22	Oldham's List of the Vascular Plants of Ontario's Carolinian Zone (Ecoregion 7E-4) – 2017, and the Halton Natural Areas Inventory (2006) were used to determine species regional and local rarity. 16 species are considered regionally uncommon (U) or rare (R) in Ecoregion 7E-4 and/or uncommon or rare in Halton Region (HU or HR): • Canada Garlic - *Allium canadense* (R/HU) • Great Ragweed - *Ambrosia trifida* (U/HU) • Hemp Dogbane - *Apocynum cannabinum* (U/HU) • False Nettle - *Boehmeria cylindrica* (U) • Bluejoint Reedgrass - *Calamagrostis canadensis* (U) • False Bindweed - *Calystegia sepium* (HU) • Cut-leaved Toothwort - *Cardamine concatenata* (U) • Pennsylvania Bittercress - *Cardamine pensylvanica* (R/HU) • Pignut Hickory – *Carya glabra* (HR) • Shagbark Hickory – *Carya ovata* (U) • Common Hackberry - *Celtis occidentalis* (R/HR) • Narrow-leaved Spring Beauty - *Claytonia virginica* (HU) • Meadow Horsetail - *Equisetum pratense* (R/HU) • Cleavers - *Galium aparine* (U) • Virginia Stickseed - *Hackelia virginiana* (U/HU) • Eastern Red Cedar - *Juniperus virginiana* (U/HU) • Wild Bergamot - *Monarda fistulosa* (U) • Dwarf Clearweed - *Pilea pumila (*U) • Fragrant Sumac - *Rhus aromatica* (HU) • Cut-leaved Coneflower - *Rudbeckia laciniata (*HU) • Shining Willow – *Salix lucida* (R/HU) • Wooly Blue Violet - *Viola sororia* (U)
Coefficient of Conservatism	Number of species with CC 7 or greater: 7	CC values range from 1 to 10 and are assigned based on a species' likelihood to be found in a relatively unaltered landscape (Oldham, 2017). Plants with high CC values are found only in a relatively narrow range of conditions provided by specific habitats and tend to be intolerant to anthropogenic disturbances. Species with low CC values are able to persist in a wide variety of habitats and are generally more tolerant to anthropogenic disturbances. The following species within the study area have CC values greater or equal to 7: • Canada Garlic (8) • Wild Leek (7) • Pignut Hickory (9) • Common Hackberry (8) • Meadow Horsetail (8) • Fragrant Sumac (8) • Cut-leaved Cone Flower (7)

Floristic Quality Index	FQI: 36.7	FQI is a calculated value based on species richness and quality of species (i.e., CC value), see below for the equation. A high FQI indicates a higher quality of habitat. $$FQI = average\ CC\sqrt{species\ richness}$$ Calculation is based on the number of species with CC values assigned (106). Generally, FQI greater than 50 is considered high; 30 to 39 is medium, and less than 30 is considered low. This site has an FQI of 36.7 which is medium, likely due to the high number of introduced species and disturbed nature of many of the communities. As this FQI is representative of the entirety of the study area, a higher FQI is expected in individual communities that resemble intact forests, such as Polygon 6 (FOD 6-5) and Polygon 9 (FOD5-3), as these communities contain a higher proportion of plant species less tolerant to disturbance.

4 TERRESTRIAL WILDLIFE

4.1 Migratory Birds

4.1.1 Aquafor Beech 2020 Breeding Bird Surveys

Breeding bird surveys were conducted on the site on June 4 and June 25, 2020, and incidental observations of birds were recorded during all site visits. Point count survey stations were established in wooded areas near the erosion priority areas identified by this study, generally in keeping with the Ontario Forest Bird Monitoring Program protocol, and birds were also documented throughout the study area while moving to and from the point count stations using area search methodology.

Survey stations were previously illustrated on **Figure C-1** through **Figure C-4**. Details of each survey date are provided in **Table C-3**. The results of breeding bird surveys are documented in **Table C-5** through **Table C-9,** below, with the highest observed breeding evidence noted per the terminology used by the Ontario Breeding Bird Atlas which is described in **Table C-4**.

Table C-3: Breeding Bird Survey Information

Survey #	Date	Start/End Time (All Stations)	Weather Conditions
1	04-June-2020	6:09 – 8:55 AM	Sunny, calm, 15-23ºC
2	25-June-2020	6:38 – 9:10 AM	Sunny, occasional light breeze, 14-19ºC

Table C-4: Breeding Bird Survey Evidence Codes (Bird Studies Canada, 2001)

Code		Breeding Evidence
X – Observed		Species observed in its breeding season (no evidence of breeding – e.g., flyover)
PO – Possible Breeding	H	Species observed in its breeding season in suitable nesting habitat
	S	Singing male present, or breeding calls heard, in its breeding season in suitable nesting habitat
PR – Probable Breeding	P	Pair observed in their breeding season in suitable nesting habitat
	A	Agitated behaviour or anxiety calls of an adult
	D	Courtship or display between a male and a female or two males, including courtship feeding or copulation
	T	Permanent territory presumed through registration of territorial song on at least two days, a week or more apart, at the same place
CO – Confirmed Breeding	FY	Recently fledged young or downy young, including young incapable of sustained flight
	AE	Adults leaving or entering nest site in circumstances indicating occupied nest

Table C-5: Breeding Bird Survey Results - Station #1, Driftwood Park

Species	Point Count:		Area Search:		Highest Observed Breeding Evidence
	1st Visit	2nd Visit	1st Visit	2nd Visit	
American Goldfinch	✓	✓			PR – T
American Robin	✓	✓			PO – H
Cedar Waxwing	✓	✓			PO – H
Common Grackle	✓	✓			PO – H
European Starling	✓			✓	X
House Wren		✓			PO – S
Mourning Dove		✓	✓		PO – H
Northern Cardinal	✓	✓			PR – P, T
Red-winged Blackbird	✓	✓			PR – A
Ring-billed Gull	✓	✓			X
Song Sparrow	✓	✓			PR – T
Warbling Vireo	✓	✓			PR – T (two males countersinging)
Yellow Warbler		✓			PO – S

Table C- 6: Breeding Bird Survey Results - Station #2, Hydro Corridor

Species	Point Count:		Area Search:		Highest Observed Breeding Evidence
	1st Visit	2nd Visit	1st Visit	2nd Visit	
American Goldfinch	✓	✓			PO – S
American Robin	✓	✓			CO – AE
Baltimore Oriole	✓				PO – S
Black-capped Chickadee		✓			PO – S
Blue Jay			✓		PO – H
Cedar Waxwing	✓				PO – H
Common Grackle		✓			X
European Starling	✓				X
Great Blue Heron			✓		X
House Wren		✓			PO – S
Indigo Bunting		✓			PO – S
Mourning Dove			✓	✓	PO – H
Northern Cardinal	✓	✓			PR – T, P
Red-winged Blackbird			✓		PO – H
Ring-billed Gull	✓	✓			X
Savannah Sparrow			✓		PO – H
Song Sparrow	✓	✓	✓		PR – T
Yellow Warbler			✓		PO – S

Table C-7: Breeding Bird Survey Results - Station #3, Headon Road Forest

Species	Point Count:		Area Search		Highest Observed Breeding Evidence
	1st Visit	2nd Visit	1st Visit	2nd Visit	
American Goldfinch		✓	✓		PO – S
American Robin		✓			PO – S
Baltimore Oriole			✓		PO – S
Black-capped Chickadee	✓	✓			PR – T
Blue Jay	✓	✓			PO – H
Brown-headed Cowbird			✓		PO – H
Cedar Waxwing			✓		PO – H
Common Grackle	✓				PO – H
Downy Woodpecker		✓			PO – H
House Wren	✓	✓			PR – T
Indigo Bunting		✓	✓		PO – S (two males countersinging)
Mallard			✓		CO - FY
Northern Cardinal		✓			PO – S
Northern Flicker	✓				PO – H
Red-eyed Vireo	✓				PO – S
Red-winged Blackbird		✓			PO – S
Ring-billed Gull	✓	✓			X
Song Sparrow	✓				PO – S

Table C-8: Breeding Bird Survey Results - Station #4, Lansdown Park

Species	Point Count:		Area Search:		Highest Observed Breeding Evidence
	1st Visit	2nd Visit	1st Visit	2nd Visit	
American Goldfinch	✓				X
American Robin	✓	✓	✓		PR – T
Baltimore Oriole	✓	✓			PR – T
Barn Swallow				✓	X (foraging in park)
Black-capped Chickadee	✓	✓	✓		PR – T
Blue Jay		✓			PO – H
Chipping Sparrow			✓		PO – S
Common Grackle		✓			PO – H
Downy Woodpecker				✓	PR – P
Eastern Wood-pewee	✓				PO – S
European Starling	✓				X

Species	Point Count:		Area Search:		Highest Observed Breeding Evidence
	1st Visit	2nd Visit	1st Visit	2nd Visit	
Gray Catbird			✓		PO – S
Hairy Woodpecker		✓			PR – P
House Sparrow			✓	✓	X
House Wren			✓		PO – S
Mallard	✓				X
Mourning Dove		✓			PO – H
Northern Cardinal		✓	✓		PO – S
Red-eyed Vireo	✓			✓	PO – S
Red-winged Blackbird	✓				PO – S
Song Sparrow		✓	✓		PO – S
White-breasted Nuthatch	✓	✓			PO – S

Table C-9: Breeding Bird Survey Results - Station #5, Harvester Road

Species	Point Count:		Area Search:		Highest Observed Breeding Evidence
	1st Visit	2nd Visit	1st Visit	2nd Visit	
American Goldfinch	✓	✓			X
Chipping Sparrow	✓				PO – S
Common Grackle	✓	✓			X
European Starling		✓			X
Gray Catbird				✓	PO – S
House Sparrow		✓			CO – AE (on adjacent building)
Killdeer			✓		X
Northern Cardinal	✓	✓			PR – T
Rock Pigeon				✓	X
Red-winged Blackbird	✓	✓			PR – T
Ring-billed Gull	✓			✓	X
Song Sparrow	✓	✓			PR – T
Warbling Vireo				✓	PO – S
Yellow Warbler	✓	✓			PR – T

4.1.2 Incidental Bird Observations and Background Records

Incidental field observations plus background information sources (primarily the eBird.org website) also indicate additional bird species associated with the study area. Most notably, a nesting pair of Cooper's Hawks was documented during early April field surveys on the site and was subsequently confirmed for the area through discussions

with local residents. The nesting territory was noted in the vicinity of Breeding Bird Point Count Station #4.

Overall, however, the species assemblage documented throughout the study area is typical of remnant habitats in urban areas in southern Ontario. Most of the species observed are common and widespread, and do not have any habitat sensitivities or special requirements. Two of the documented species, Barn Swallow and Eastern Wood-pewee, are designated SAR and will be discussed further in **Section 6** of this Appendix.

Table C-10, below, provides a master list of all bird species observed in the study area or documented in the vicinity via background sources. The indicated data sources include: Aquafor's breeding bird surveys ("ABL–BBS") and incidental observations ("ABL–IN"); confirmed observations submitted to the iNaturalist website within the Tuck Creek corridor ("iNat", with most recent observation date provided); and checklist data submitted to the eBird website within the Tuck Creek corridor ("eBird", again with most recent date provided). Please note that additional data sources are cited only where species differed from Aquafor's observed species list; common species may have been documented via multiple sources but for the sake of brevity will be cited only to Aquafor's on-site observations.

Observation records obtained via the eBird website included a number of spring migrants including multiple species of wood-warblers, which were all reported from the same general location (i.e., larger wooded areas between the hydro corridor just east of Ireland Park and the south end of Lansdown Park). This suggests that migrating songbirds may use the larger wooded areas along Tuck Creek as migration habitat (all of the noted 'migrant' species were reported in early to mid-May which is considered the peak spring migration period, or in the fall when the breeding season has ended; many of the wood-warblers, in particular, are known to breed much further north than the study area). The potential for the Tuck Creek corridor to provide Significant Wildlife Habitat related to migratory songbirds is discussed in **Section 7** of this Appendix.

Table C-10: Master List of Bird Species in the Tuck Creek Study Area

Species		Status	Data Source	Comments
Common Name	**Scientific Name**			
American Crow	*American Crow*	S5B	eBird 2020	
American Goldfinch	*Spinus tristis*	S5B	ABL-BBS	
American Redstart	*Setophaga ruticilla*	S5B	eBird 2020	
American Robin	*Turdus migratorius*	S5B	ABL-BBS	
Baltimore Oriole	*Icterus galbula*	S4B	ABL-BBS	
Barn Swallow	*Hirundo rustica*	S4B, THR	ABL-BBS	
Bay-breasted Warbler	*Setophaga castanea*	S5B	eBird 2020	Migrant
Black-and-white Warbler	*Mniotilta varia*	S5B, HU	iNat 2020 eBird 2020	Migrant. Halton NAI noted this to be a common migrant, uncommon summer resident.
Black-capped Chickadee	*Poecile atricapillus*	S5	ABL-BBS	
Black-crowned Night Heron	*Nycticorax nycticorax*	S3B	ABL-IN	Foraging in creek at Frog Survey Station F
Black-throated Blue Warbler	*Setophaga caerulescens*	S5B, HR	eBird 2020	Migrant. Halton NAI noted this to be an uncommon migrant, rare summer resident.
Black-throated Green Warbler	*Setophaga virens*	S5B, HU	eBird 2020	Potential migrant
Blackburnian Warbler	*Setophaga fusca*	S5B, HR	eBird 2020	Migrant. Halton NAI noted this to be an uncommon migrant, rare summer resident.
Blue Jay	*Cyanocitta cristata*	S5	ABL-BBS	
Brown-headed Cowbird	*Molothrus ater*	S4B	ABL-BBS	
Brown Creeper	*Certhia americana*	S5B, HU	eBird 2010	Migrant
Cedar Waxwing	*Bombycilla cedrorum*	S5B	ABL-BBS	
Chestnut-sided Warbler	*Setophaga pensylvanica*	S5B, HU	eBird 2020	Migrant. Halton NAI noted this to be an uncommon summer resident.
Chipping Sparrow	*Spizella passerina*	S5B	ABL-BBS	
Canada Goose	*Branta canadensis*	S5	ABL-IN	
Common Grackle	*Quiscalus quiscula*	S5B	ABL-BBS	

Species		Status	Data Source	Comments
Common Name	**Scientific Name**			
Cooper's Hawk	*Accipiter cooperii*	S4, HU	ABL-IN	Nesting territory present in forest unit between Palmer Dr. and Mainway
Dark-eyed Junco	*Junco hyemalis*	S5B	eBird 2017	Winter resident only
Downy Woodpecker	*Dryobates pubescens*	S5	ABL-BBS	
Eastern Phoebe	*Sayornis phoebe*	S5B	eBird 2010	
Eastern Screech-owl	*Megascops asio*	S4	iNat 2015	
Eastern Towhee	*Pipilo erythrophthalmus*	S4B, HU	eBird 2014	Migrant. Halton NAI noted this to be an uncommon summer resident.
Eastern Wood-pewee	*Contopus virens*	S4B, SC	ABL-BBS	
European Starling	*Sturnus vulgaris*	SNA	ABL-BBS	
Golden-crowned Kinglet	*Regulus satrapa*	S5B, HR	eBird 2010	Migrant. Halton NAI noted this to be a common migrant, rare summer resident.
Gray Catbird	*Dumetella carolinensis*	S4B	ABL-BBS	
Great Blue Heron	*Ardea herodias*	S4B	ABL-BBS	
Hairy Woodpecker	*Dryobates villosus*	S5	ABL-BBS	
Hermit Thrush	*Catharus guttatus*	S5B	eBird 2020	Migrant
Herring Gull	*Larus argentatus*	S5B, S5N	eBird 2020	
House Finch	*Haemorhous mexicanus*	SNA	ABL-IN	
House Sparrow	*Passer domesticus*	SNA	ABL-BBS	
House Wren	*Troglodytes aedon*	S5B	ABL-BBS	
Indigo Bunting	*Passerina cyanea*	S4B	ABL-BBS	
Killdeer	*Charadrius vociferus*	S5B, S5N	ABL-BBS	
Least Flycatcher	*Empidonax minimus*	S4B, HU	eBird 2020	Migrant. Halton NAI noted this to be an uncommon summer resident – HU status assumed not to apply to migrants.
Magnolia Warbler	*Setophaga magnolia*	S5B, HR	eBird 2020	Migrant. Halton NAI noted this to be rare both as migrant and summer resident.

Species		Status	Data Source	Comments
Common Name	**Scientific Name**			
Mallard	*Anas platyrhynchos*	S5	ABL-BBS	
Mourning Dove	*Zenaida macroura*	S5	ABL-BBS	
Nashville Warbler	*Leiothlypis ruficapilla*	S5B, HR	eBird 2020	Migrant. Halton NAI noted this as a common migrant and rare summer resident – HR status assumed not to apply to migrants
Northern Cardinal	*Cardinalis cardinalis*	S5	ABL-BBS	
Northern Flicker	*Colaptes auratus*	S4B	ABL-BBS	
Northern Waterthrush	*Parkesia noveboracensis*	S5B	eBird 2020	Potential migrant – early May observation
Ovenbird	*Seiurus aurocapilla*	S4B	eBird 2020	Potential migrant – early May observation
Palm Warbler	*Setophaga palmarum*	SNR	eBird 2020	Migrant
Rock Pigeon	*Columba livia*	SNA	ABL-BBS	
Rose-breasted Grosbeak	*Pheucticus ludovicianus*	S4B	eBird 2020	
Red-eyed Vireo	*Vireo olivaceus*	S5B	ABL-BBS	
Red-bellied Woodpecker	*Melanerpes carolinus*	S4, HU	eBird 2020	This species has drastically increased its range and presence in southern Ontario since the Halton NAI was published and is likely not ‘uncommon’ in the region anymore.
Red-tailed Hawk	*Buteo jamaicensis*	S5	ABL-IN	
Red-winged Blackbird	*Agelaius phoeniceus*	S4	ABL-BBS	
Ring-billed Gull	*Larus delawarensis*	S5B, S4N	ABL-BBS	
Ruby-crowned Kinglet	*Regulus calendula*	S4B	eBird 2020	Migrant
Savannah Sparrow	*Passerculus sandwichensis*	S4B	ABL-BBS	
Song Sparrow	*Melospiza melodia*	S5B	ABL-BBS	
Swainson’s Thrush	*Catharus ustulatus*	S4B	eBird 2020	Migrant
Turkey Vulture	*Cathartes aura*	S5B	eBird 2020	

Species		Status	Data Source	Comments
Common Name	**Scientific Name**			
			iNat 2020	
Warbling Vireo	*Vireo gilvus*	S5B	ABL-BBS	
White-breasted Nuthatch	*Sitta carolinensis*	S5	ABL-BBS	
White-throated Sparrow	*Zonotrichia albicollis*	S5B	eBird 2020	Migrant
Wood Thrush	*Hylocichla mustelina*	S4B, SC	eBird 2020	Reported in creek corridor north of Palmer Dr. Potentially migrant due to timing (May).
Yellow-rumped Warbler	*Setophaga coronata*	S5B, HR	eBird 2020	Migrant
Yellow Warbler	*Setophaga petechia*	S5B	ABL-BBS	

4.2 Amphibians

Calling surveys for frogs and toads were completed at selected roadside survey locations throughout the study area. Per the Marsh Monitoring Program protocol (Bird Studies Canada, 2008), surveyors stood quietly and listened for the breeding calls of amphibians for three minutes at each station, categorising calls into Call Codes as follows:

- Call Code 1 – calls not simultaneous, individual calls can be counted; number of calling individuals indicated in brackets.
- Call Code 2 – some overlap in calls but individual calls distinguishable; an estimate of the number of calling individuals is indicated in brackets.
- Call Code 3 – full chorus, calls overlapping and individual calls are not distinguishable; an estimate of number of individuals is not feasible.

The timing and weather conditions associated with each survey date are provided in **Table C-11**. Full survey results follow in **Table C-12**.

Table C-11:Amphibian Calling Survey Information

Survey Date	Survey Time	Temperature	Wind (Beaufort Scale)	Cloud Cover
April 6, 2020	8:23 – 9:28 PM	11 – 12 ºC	1	95%
May 25, 2020	9:50 – 11:09 PM	25 – 22 ºC	1	20 – 80%
June 22, 2020	9:35 – 10:57 PM	23 ºC	1	100%

Table C-12: Amphibian Calling Survey Results

Date	Station	Species		Results	
		Common Name	Scientific Name	Call Code	No. of Individuals
April 6, 2020	A	n/a – no calls	n/a	n/a	n/a
	B	n/a – no calls	n/a	n/a	n/a
	C	n/a – no calls	n/a	n/a	n/a
	D	n/a – no calls	n/a	n/a	n/a
	E	n/a – no calls	n/a	n/a	n/a
	F	n/a – no calls	n/a	n/a	n/a
	G	n/a – no calls	n/a	n/a	n/a
May 25, 2020	A	Spring Peeper	*Pseudacris crucifer*	1	1
	B	n/a – no calls	n/a	n/a	n/a
	C	n/a – no calls	n/a	n/a	n/a

Date	Station	Species		Results	
		Common Name	**Scientific Name**	**Call Code**	**No. of Individuals**
	D	n/a – no calls	n/a	n/a	n/a
	E	n/a – no calls	n/a	n/a	n/a
	F	n/a – no calls	n/a	n/a	n/a
	G	n/a – no calls	n/a	n/a	n/a
June 22, 2020	A	Green Frog	*Lithobates clamitans*	1	1
	B	n/a – no calls	n/a	n/a	n/a
	C	n/a – no calls	n/a	n/a	n/a
	D	n/a – no calls	n/a	n/a	n/a
	E	n/a – no calls	n/a	n/a	n/a
	F	n/a – no calls	n/a	n/a	n/a
	G	n/a – no calls	n/a	n/a	n/a

Spring Peeper (*Pseudacris crucifer*) was heard calling distantly from survey stations in the north part of the study area, and one was heard calling in the second survey in the ditch near Highway 407. A single Green Frog (*Lithobates clamitans*) was heard at Station A during the second survey. The survey results did not indicate the presence of significant amphibian breeding habitat in the study area.

4.3 Snakes

Aquafor's targeted snake surveys did not result in any snake observations within the study area, nor did they identify any areas containing habitat features considered high quality, such as rock piles outside of the creek bed or exposed basking surfaces. However, it must be noted that survey efforts were focused in the areas identified as erosion priority sites and therefore this should not be taken to suggest that snakes and their habitat are absent from the system as a whole. Snakes are often cryptic and difficult to detect even with dedicated survey effort, and spring weather in 2020 was generally cool and overcast, affecting snake activity and making it difficult to select survey dates with the appropriate conditions.

Background information (particularly the iNaturalist website) provided confirmed records of three species in the general vicinity of the study area: Eastern Milksnake (*Lampropeltis triangulum*), Eastern Gartersnake (*Thamnophis sirtalis sirtalis*), and Dekay's Brownsnake (*Storeria dekayi*). None of these species are provincially-designated SAR; Milksnake is a federal Special Concern species but was reassigned as NAR or "not at risk" under the Ontario ESA.

4.4 Bat Habitat

Phase 1 and 2 of the MNRF's Survey Protocol for Species at Risk Bats within Treed Habitats (MNRF, 2017) was completed to identify candidate maternity roosting sites for Ontario's four Endangered bats: Little Brown Myotis (*Myotis lucifugus*), Northern Myotis (*Myotis septentrionalis*), Eastern Small-footed Myotis (*Myotis leibii*), and Tricolored Bat (*Perimyotis subflavus*). These animals are at risk mainly due to a fungal infection ("White Nose Syndrome") affecting these species during their winter hibernation.

Candidate Little Brown and Northern Myotis roost sites are similar, consisting of "snags", or standing/dead trees >10cm diameter at breast height (DBH) with cracks, hollows, cavities, and/or loose or naturally exfoliating bark. These features were surveyed for primarily during "leaf-off" conditions during which they are more easily seen. Per the protocol, trees in woodlands with a DBH 10 cm and greater in various states of decay with attributes as described above were identified and mapped. A total of 170 suitable candidate trees with these features were identified in the Tuck Creek corridor.

Candidate Tricolored Bat roost sites consist primarily of maple trees (*Acer* spp.) >25 cm DBH, maples >10 cm DBH with a broken branch with dying leaf clusters, and any oak (*Quercus* spp.) >10cm DBH. Other trees species with notable dead leaf clusters or similar features such as old squirrel nests could also feasibly be used. Trees with these characteristics were identified from the overall tree inventory data collected for this project. A total of 156 trees with potential to provide *Perimyotis* habitat in the study area was documented as follows (with some overlap between the categories):

- Oak: 5 trees
- Maple: 91 trees
- Leaf Clumps (all trees): 74 trees

Specific details of SAR Bat habitat status have been provided in **Appendix C-3** at the end of this document.

4.5 Other Wildlife

Mammal species observed incidentally by Aquafor staff throughout the study area include: Eastern Cottontail (*Sylvilagus floridanus*), Eastern Grey Squirrel (*Sciurus carolinensis*), Red Squirrel (*Tamiasciurus hudsonicus*), Raccoon (*Procyon lotor*), and Striped Skunk (*Mephitis mephitis*). All of these are very common species in urban and suburban southern Ontario habitats. Similarly common species such as Eastern Chipmunk (*Tamias striatus*) are also highly likely to be present.

A wide variety of insects were also observed in the study area; butterfly, odonate, and bee species are listed in **Table C-13** which provides the master list for the study area including all data sources.

Three insect species are notable:


River Bluet

- River Bluet, an S2-ranked or provincially "imperilled" species, was observed by Aquafor ecologists in the grassy margins of Tuck Creek adjacent to Lansdown Park. Multiple individuals (5-7) were potentially present at this location although the identity of each individual was not confirmed to rule out other *Enallagma* species. Although River Bluet is not a regulated SAR, its presence suggests that the creek corridor provides Significant Wildlife Habitat, as is further discussed in **Section 7** of this Appendix.

- Monarch, a designated Special Concern species both federally and provincially, was documented in the vicinity of the study area via the iNaturalist citizen science website. This species required milkweed (*Asclepias* sp.) as a larval host plant, and is commonly found where wildflowers are present to provide food, especially in fall as individuals prepare to migrate south. Monarch is discussed further in **Section 6** of this Appendix.


Fragile Forktail

- Fragile Forktail is considered rare in Halton Region according to the Natural Areas Inventory (2006). One confirmed male of this species was observed in grassy areas adjacent to Tuck Creek between Headon Rd. and the hydro corridor. Females were likely also present but the very similar Eastern Forktail was also present nearby and females of these two species look similar.

Table C-13: Insect Species List

Species		Status	Data Source
Common Name	**Scientific Name**		
Butterflies			
Black Swallowtail	*Papilio polyxenes*	S5	iNaturalist 2020
Cabbage White	*Pieris rapae*	SNA	Aquafor
European Skipper	*Thymelicus lineola*	SNA	Aquafor
Least Skipper	*Ancyloxypha numitor*	S5	Aquafor
Little Wood Satyr	*Megisto cymela*	S5	Aquafor
Monarch	*Danaus plexippus*	SC	iNaturalist 2020
Northern Pearly-eye	*Lethe anthedon*	S5	iNaturalist 2019
Dragonflies and Damselflies			
Blue Dasher	*Pachydiplax longipennis*	S5	iNaturalist 2020
Calico Pennant	*Celithemis elisa*	S5	iNaturalist 2019
Eastern Forktail	*Ischnura verticalis*	S5	Aquafor
Ebony Jewelwing	*Calopteryx maculata*	S5	Aquafor
Fragile Forktail	*Ischnura posita*	S4, HR	Aquafor
River Bluet	*Enallagma anna*	S2	Aquafor
Bees			
Common Eastern Bumble Bee	*Bombus impatiens*	S5	Aquafor
Eastern Carpenter Bee	*Xylocopa virginica*	S4	iNaturalist 2020
Two-spotted Bumble Bee	*Bombus bimaculatus*	S5	Aquafor

LDD Moth (*Lymantria dispar*) was also observed in high numbers in the study area. This non-native invasive species experienced a population boom throughout Ontario in 2020. Defoliation of native trees in natural areas is a concern with high concentrations of LDD Moths present.

5 AQUATIC HABITAT AND FISHERIES

Aquatic habitat characteristics, as described in the following section, are major determinants for biotic composition, which is an indicator of aquatic ecosystem health. Understanding aquatic habitat can therefore determine relationships with biotic composition, providing a better understanding of subwatershed health and integrity. While aquatic habitat changes constantly, anthropogenic disturbance can impact habitat, stressing the relationship with aquatic habitat and biological/chemical indicators. The habitat characteristics investigated within the Tuck Creek study area include:

- Bank characteristics;
- Stream width (wetted and bankfull);
- Instream cover (e.g., woody debris, undercut banks, boulders, vegetation);

- Riparian cover (vegetation composition, quality and width); and
- Physical barriers to fish movement (e.g., woody or debris jams, knickpoints, etc.).

Aquatic habitat assessment methodology followed by this study is as follows:

- OSAP Version 10 (Stanfield, 2017) was used for habitat assessments by certified Aquafor Beech Limited biologists;
- Site limits were located using OSAP Section 1: Modules 1 and 2 (Defining Site Boundaries and Key Identifiers; Screening Level Site Documentation);
- Habitat features including barriers to fish movement and other channel disturbances were recorded using OSAP Section 1: Module 3 (Assessment Procedures for Site Features Documentation);
- Depth, wetted width, habitat type, instream cover, instream vegetation, riparian vegetation, width/depth ratio, bank stability, substrate, and entrenchment were assessed using OSAP Section 4: Modules 2 and 3 (Point-Transect Sampling for Channel Structure, Substrate and Bank Conditions; Bankfull Profiles and Channel Entrenchment);

Proof of staff's OSAP certification is provided in **Appendix C-4**. Aquafor Beech Limited biologists received Flowing Waters Information System FWIS training (conducted by Les Stanfield). OSAP data was summarized using FWIS and is outlined in **Table C-14**. **Table C-15** summarizes the diagnostic channel indicators from the investigations. All field sheets are located in **Appendix C-5** and FWIS data summaries are located in **Appendix C-6**. Aquatic sampling sites were previously illustrated in **Figure C-1** through **Figure C-4**, and representative photographs of sampling sites are provided in **Appendix C-7**.

Table C-14: OSAP Channel Structure Summaries

Site	General Flow Regime	Site Location	Site Characteristics	Habitat Description	Substrate Composition	Bank Stability	Instream and Riparian Vegetation	Fish Barriers and Other Disturbances
TUK01	Permanent	TUK01 was the most downstream site within the main Tuck Creek branch, located approx. 174 m downstream of the Rexway Drive crossing and 100 m upstream of the Centennial Bikeway.	Site length was 45 m. Minimum wetted width at the time of sampling was 3.1 m, and the average wetted width was 4.76 m. The average depth was 80.75 mm and the maximum depth sampled was 200 mm. The site demonstrated past straightening and stabilization (angular stones) with evidence of naturalization. The site fell adjacent to a busy public park on the west bank separated by a narrow, forested corridor and encroaching residences on the east bank with a section of mowed lawn (easement) to the top of bank. A busy bike path (Centennial Bikeway) and ongoing construction was downstream of the site.	This site was largely dominated by shallow and medium depth glides, with a medium depth run presenting the greatest area of refuge to potential fish species. Two slow riffles were observed at the upstream and downstream extent, with the downstream riffle contributed by a small rock weir that was likely built by adjacent landowners or park users. Some cover was provided throughout by overhanging canopy, which was more abundant in the upstream reach of the site. Instream cover was provided largely by unembedded cobbles (average point particle 207.06 mm). Very little aquatic vegetation was observed, consisting only of filamentous algae and mosses. Fish were observed in abundance within the deeper runs.	This site was poorly sorted, consisting of sands, gravels, and cobbles, with areas of consolidated clay near the deeper runs. Cobbles consisted mainly of angular stones, likely resulting from past engineering. The mean point particle was 207.06 mm and mean maximum particle size was 335.83 mm.	Both banks were largely comprised of silts, with larger cobbles (angular rip rap) and consolidated clay observed throughout. Only three transects on the left bank did not fall on undercuts, with depths ranging from 120 mm to 310 mm. While the right bank observed the greatest evidence of erosion, contributed by an area of lacking riparian cover and mowed lawn to the top of bank, it demonstrated the greatest stability with only two transects falling on undercuts (90 & 110 mm).	Instream vegetation was minimal throughout this site, consisting of filamentous algae and moss. Riparian vegetation was moderate, with the left bank consisting of a narrow but well-established mixed forest ~20 m riparian zone deep. The right bank was less established as the adjacent residents and mowed lawn associated with a small easement encroached on the watercourse in the downstream section.	A number of road crossings exist upstream of the site, along with multiple residential areas and residential developments. Further upstream were industrial and commercial areas with agricultural lands further still. A well-used park existed on the left bank with maintained lawn and sports fields. A mowed easement and residential lawns existed on the right bank. No fish barriers were observed.
TUK02	Permanent	TUK02 was approximately 1 km upstream of TUK01, and approximately 230 m downstream of the Harvester Road right-of-way within the main Tuck Creek branch.	Site length was 48.3 m. Minimum wetted width at the time of sampling was 1.6 m, and the average wetted width was 2.79 m. The average depth was 101.83 mm and the maximum depth sampled was 340 mm.	This site was mainly shallow to medium depth runs, with few riffles and few pools. Canopy cover was not in abundance at the time of investigation, with in-stream vegetation dominated by filamentous algae. Substrate provided instream cover through angular cobbles and concrete pieces from past engineering. Fish were observed throughout, with many congregating in deeper refuge areas.	This site was poorly sorted, with sands and gravels observed in slower velocity areas and large, angular stones (rip rap) observed throughout. Few areas of consolidated clay were also observed. The mean point particle was 280.39 mm and the mean maximum particle size was 484.38 mm.	The left bank consisted almost entirely of silt and consolidated clay, with some larger cobbles (angular stones and concrete pieces) observed throughout, likely introduced by past engineering. The right bank was better sorted between silts, sands and cobbles. The right bank observed no undercuts while the left bank demonstrated greater bank instability, with 6 of the 12 transects falling on undercuts ranging from 30 mm to 540 mm. The left bank was largely incised with clear signs of down cutting.	Instream vegetation was limited to filamentous algae, in abundance. The left bank consisted of a narrow strip of scrubland before transitioning to meadow and the right bank consisted of a narrow, forested corridor with a large industrial lot beyond.	The site was downstream of Harvester Road, a well-travelled regional road which likely contributed to nutrients and pollutant loading within the site and system. Other contributions were likely adjacent industrial areas and parking lots, as well as stormwater inputs with a large outfall observed downstream. The GO Rail Line fell approximately 100 m downstream of the site. No barriers to fish were observed.

Site	General Flow Regime	Site Location	Site Characteristics	Habitat Description	Substrate Composition	Bank Stability	Instream and Riparian Vegetation	Fish Barriers and Other Disturbances
TUK03	Permanent	TUK03 was located within the main Tuck Creek branch approximately 1.3 km upstream of TUK02 and 600 m upstream of Highway 403. The site was between Mainway and the CN Railway line, adjacent to Landmark Road.	Site length was 45.3 m. Minimum wetted width was 2.0 m and the average wetted width was 3.58 m. The average depth was 155.17 mm and the maximum depth sampled was 475.0 mm. The site fell within an industrial area with large concrete lots bordered by a very narrow riparian corridor. A hydro corridor was observed on the west bank.	This site was slow moving at the time of assessment with very little hydraulic head throughout. Riffles were only observed at the upstream and downstream extent with the majority of the site consisting of medium depth glides and pool habitat. Cover was provided by overhanging terrestrial vegetation throughout and very little canopy cover, as well as some unembedded cobbles where sedimentation wasn't evident.	Substrate was very poorly sorted, with evidence of sedimentation throughout. Silts and sands dominated, with the D50 represented by sand. Few cobbles were observed throughout. The mean maximum particle size was observed at 94.27 mm which was uncharacteristic to the rest of Tuck Creek where much of the other sites demonstrated larger, angular cobbles.	Both banks were fairly stable when comparing to downstream sites, with low bank angles, well vegetated banks and little downcutting. Four undercuts were observed on the left bank (260-540 mm) and three on the right bank (100-140 mm).	Instream vegetation was limited consisting mainly of filamentous algae, with some mosses and very little rooted macrophytes. Riparian vegetation consisted of a meadow and scrubland on both banks, with the right bank extending up to 25 m and the right up to 15 m. Little canopy cover was provided with some overhanging terrestrial vegetation and fewer established trees.	The site was downstream of Mainway and surrounded by industrial and commercial lands, which likely contributed to nutrients and pollutant loading within the site and system. Other contributions were likely adjacent parking lots, as well as upstream residential areas and agriculture. No barriers to fish were observed.
TUK04	Permanent	TUK04 was downstream of the Palmer Drive right-of-way within the main Tuck Creek branch. Lansdown Park bordered the west bank.	Site length was 45.3 m. Minimum wetted width was 2.0 m and the average wetted width was 3.96 m. The average depth was 77.92 mm and the maximum depth sampled was 330.0 mm. The site fell within the relatively well-used natural area, bordered a large recreational area and well-maintained park to the west. A residential development to the east was distanced by 70 m of well-established forest.	This site was well distributed between riffles and runs, with one large pool observed adjacent to a largely eroded clay bank over 2 m in height. Aquatic vegetation was minimal at the time of observation, consisting only of filamentous algae in limited habitat. Well-established forest canopy provided cover through the entire reach. Instream cover was provided by unembedded cobbles and few larger boulders.	Substrate was poorly sorted consisting mainly of sands, gravels and unembedded flat rocks. Islands were observed throughout with aggradation of cobbles and gravels. D50 was represented by cobble (37.5 mm) with the mean point particle represented by large, flat cobbles (218.78 mm). The mean maximum particle size was observed at 395.88 mm with the largest observed as approximately 640 mm. Consolidated clay was exposed along the eroded west bank near the downstream extent.	Evidence of bank instability was observed mainly near the downstream extent, with extremely steep angles demonstrated on the left bank and a riverbed elevation below the top of bank indicating downcutting. Four undercuts were also observed on the left bank ranging from 250-490 mm.	Instream vegetation was very limited consisting entirely of filamentous algae. Riparian vegetation consisted of forest up to 30 m and on both banks and up to 100 m on the right bank before transitioning to residential area. Left bank consisted of a well-maintained lawn/parkland beyond the forest corridor. The forested areas provided ample canopy cover.	The site was downstream of Palmer Drive, a well-travelled but traffic-calmed road which likely contributed to nutrients and pollutant loading within the site. Other contributions were likely the adjacent parkland on the left bank beyond the ~30 m riparian and the largely residential area upstream and to the east. Upstream residential areas were also likely contributors as well as upstream agricultural land. Palmer Drive was serviced by a largely perched concrete box culvert that contribute to the system as a fish barrier.

Site	General Flow Regime	Site Location	Site Characteristics	Habitat Description	Substrate Composition	Bank Stability	Instream and Riparian Vegetation	Fish Barriers and Other Disturbances
TUK05	Permanent	TUK05 was approximately 1.2 km upstream of TUK04 and immediately upstream of the Headon Road right-of-way within a large residential development.	Site length was 46.7 m. Minimum wetted width was 1.9 m and the average wetted width was 3.27 m. The average depth was 109.42 mm and the maximum depth sampled was 390.0 mm. Similar to TUK04, the site fell within a relatively un-assumed and well-established natural area with walking trails on either bank. Evidence of past engineering and bank stabilization was observed through the upstream extent in the form of large, angular stones on a 45-degree bank angle.	This site was largely dominated by medium depth runs and glides, with slower riffles observed at the upstream and downstream extent. Water level was too low to crest the upstream riffle consisting of angular stones which was likely created during past engineering. Flow was therefore filtering through gaps in the angular stones and through finer substrate with no low flow channel form. Aquatic vegetation cover was minimal at the time of observation, consisting only of moss and very limited macrophytes. Cover was mainly provided by angular stones from past engineering.	Substrate was poorly sorted and was uniform throughout the majority of the reach. Cobbles represented substrate above the D16, which was represented by sands. The mean point particle was 122.01 mm and the mean max particle was 276.68 mm. There was evidence of aggradation downstream of the site where point bars consisting of sand were observed.	Evidence of bank instability was observed throughout the downstream extent of the site where engineering efforts ended, indicating downcutting throughout the system. Only one minor undercut (90 mm) was observed on the left bank, downstream of the angular stone bank treatment.	Instream vegetation was dominated by moss. Riparian vegetation consisted of well-established mixed deciduous forest which provided the entire reach with ample canopy cover.	The site was within a well-established forest and public walking trail system, with few unofficial trail crossings observed throughout. TUK05 was approximately 0.5 km downstream of a well-used pedestrian trail and mowed lawn/recreation area/park, which likely contributed to nutrient and pollutant loading. No clear barriers to fish were observed within the site; however, the upstream riffle consisting of angular stones may contribute to passage issues during low flow as observed. Furthermore, a large woody material jam was observed downstream that could contribute to migration issues.
TUK06	Permanent	TUK06 was the furthest upstream site within the study area, approximately 800 m upstream of TUK05 and approximately 260 m upstream of the hydro corridor pedestrian trail.	Site length was 41.0 m. Minimum wetted width was 1.5 m and the average wetted width was 2.08 m. The average depth was 223.0 mm and the maximum depth sampled was 420.0 mm. The site fell within one of the more altered areas, with evidence of past straightening and engineering observed throughout the entire reach. Both banks were largely cleared and actively mowed.	This site was nearly entirely a uniform, historically straightened, slow moving and medium depth glide. Cover was provided by the narrow riparian corridor and the overhanging banks contributed by downcutting and terrestrial roots. Some unembedded cobbles provided instream cover. Aquatic vegetation was limited to filamentous algae which did not contribute to instream cover. Fish were observed throughout the reach.	Substrate was poorly sorted though largely different from the downstream reaches. Unlike downstream sites, silts and fines represented the D16 for point substrate. Sands represented the D50 point particle and the D16 maximum particle, indicating that this reach is dominated by finer substrate where downstream reaches consisted of larger cobbles and gravels. Evidence of aggradation existed on the left bank, downstream of the upstream riffle. The mean maximum particle size was observed at 89.39 mm, second smallest to TUK03 which was also dominated by smaller substrates.	Banks were relatively stable, likely due to historic straightening and a low stream gradient. No transects fell on bank undercuts. Less evidence of downcutting was observed here than at the downstream sites. Bank particles were almost entirely silts which were held in place by rooted terrestrial plants.	Instream vegetation was more abundant in this reach, likely due to the low stream gradient and softer channel bed. Rooted macrophytes and filamentous algae made up the majority of aquatic vegetation, with moss observed on larger substrate. Riparian vegetation consisted of a narrow strip of overhanging willows and grasses, with some larger deciduous trees throughout which provided canopy cover to the stream.	TUK06 was not immediately downstream of any major crossings, however Highway 407 fell approximately 820 m upstream of the site which likely contributed to disturbances. Moreover, much of the land upstream and adjacent was cleared of riparian cover and consisted almost entirely of lawn for recreational sporting fields and parkland. A large secondary school with a turf sporting field was also observed upstream of the site with the rest of the landuse comprised of high-density residential area. Upstream of Highway 407 was agricultural land, which likely contributed to nutrients and pollutant loading to the site and system.

Table C-15: Diagnostic Channel Indicators

	TUK01	TUK02	TUK03	TUK04	TUK05	TUK06
Average Wetted Width (m)	4.76	2.79	3.58	3.96	3.27	2.08
Minimum Wetted Width (m)	3.10	1.60	2.00	2.00	1.90	1.50
Maximum Wetted Width (m)	5.60	3.80	5.60	5.30	4.30	2.60
Average Depth (mm)	80.75	101.83	155.17	77.92	109.42	223.00
Maximum Depth (mm)	200.00	340.00	475.00	330.00	390.00	420.00
Width/Depth Ratio	58.95	27.41	23.09	50.80	29.86	9.30
Count of Point Particles	60.00	60.00	60.00	60.00	60.00	60.00
Mean Point Particles (mm)	207.06	280.39	21.90	218.78	122.01	18.47
SD Point Particles (mm)	388.03	427.78	46.21	386.23	279.84	44.27
Count of Max Particles	60.00	60.00	60.00	60.00	60.00	60.00
Mean Max (mm)	335.83	484.22	94.27	395.88	276.68	78.69
SD Max (mm)	352.20	424.38	72.84	388.48	298.97	89.39
D16 Point (mm)	0.10	0.10	0.10	0.10	0.10	0.05
D50 Point (mm)	25.00	47.50	0.10	37.50	20.00	0.10
D84 Point (mm)	226.80	1111.00	60.00	318.00	202.40	15.00
D16 Maximum (mm)	144.40	134.40	0.10	130.00	45.00	0.10
D50 Maximum (mm)	180.00	250.00	90.00	215.00	230.00	27.50
D84 Maximum (mm)	776.16	1111.00	175.60	1111.00	330.00	190.00
Sorting Index (Point)	129.54	249.19	300.50	191.74	105.06	76.00
Sorting Index (Maximum)	2.78	3.15	450.98	3.41	3.27	140.95

Within the study area, Tuck Creek and its contributing tributaries provide a variety of aquatic habitat, varying in functionality throughout the reaches. The majority of the study area fell within the urban city centre of Burlington, with surrounding land use consisting of medium- to high-density residential, commercial, and industrial areas with some well-used parkland and recreational areas throughout. A number of major road and rail crossings were observed throughout the site, including Highways 403 and 407, and both the GO Rail line and the CN Rail line. As such, most of the study area has undergone realignment and past engineering attempts to accommodate for development and crossings, leading to a heavily urban-impacted watercourse with highly altered and degraded habitat. Not surprisingly, the highest quality habitat was observed in the reaches bordered by wide riparian corridors consisting of well-established forest, as demonstrated at TUK04 and TUK05. Areas where riparian clearing and channel straightening (TUK06) likely contributed to downstream disturbance and potentially increased stream temperatures.

Despite these observations, fish and other aquatic life were observed throughout the entire system, suggesting that the demonstrated conditions provided integral habitat to a number of fish communities. Aquatic Resource Area (ARA) information provided by the

Land Information Ontario (LIO) database show that the Tuck Creek study area provides warmwater habitat for a community dominated by urban adaptive, common and largely tolerant species, such as Blacknose Dace, Creek Chub, Fathead Minnow, and White Sucker. Invasive species such as Goldfish were also recorded throughout. Reaches downstream of Spruce Avenue and outside of the study area near Lake Ontario show more diversity, with coldwater migratory species such as Chinook Salmon, Rainbow Trout, and Brown Trout recorded. Diversity could be impacted throughout the watershed due to instream barriers, changes in aquatic habitat and compounding impacts from adjacent landuse development.

In general, aquatic habitat was observed throughout the study area as both direct and contributing fish habitat. Tuck Creek and its contributing tributaries should be regarded as key features to fish habitat within the subwatershed and protected under the Federal *Fisheries Act*.

6 SPECIES AT RISK AND PROVINCIALLY RARE SPECIES

A full list of SAR and provincially rare species that either were observed during Aquafor's field investigations or which resulted from the review of background resources is provided in **Appendix C-8**. Please note that presumed migrant birds with SOCC status (from the master list provided in **Table C-10**) have not been included in this screening, but the significance of migratory stopover habitat for songbirds has been considered in the following **Section 7**.

The species listed below were determined through the SAR screening process to either be present in the study area (per direct observation by Aquafor staff or confirmed, recent records from other sources) or to potentially be present based on habitat suitability and proximity to prior occurrences.

Plants

- Pignut Hickory (S3) - confirmed present by Aquafor staff along valley slope adjacent to Lansdown Park.

Birds

- Barn Swallow (THR) - observed by Aquafor staff foraging in Lansdown Park; nesting habitat (structures) is not present in the project study area.
- Black-crowned Night-heron (S3) - observed by Aquafor staff foraging in the creek near amphibian survey station F (Harvester Rd. crossing); nesting habitat is not present.
- Eastern Wood-pewee (SC) - observed by Aquafor staff during breeding bird surveys; suitable nesting habitat is present in association with erosion area 4.

- Red-headed Woodpecker (federally THR, provincially SC) - not observed during breeding bird surveys, but previously documented by the Ontario Breeding Bird Atlas for the area at large; suitable wooded habitat is present in the study area.
- White-eyed Vireo (S2) - not observed during breeding bird surveys, but recent records are present for the area at large and suitable habitat is present.
- Wood Thrush (federally THR, provincially SC) - not observed during breeding bird surveys, but recent records are present for the area at large and suitable habitat is present.
- Yellow-breasted Chat (END) - not observed during breeding bird surveys, but previously documented by the Ontario Breeding Bird Atlas for the area at large; suitable habitat is present in the study area.

Mammals

- Bats (END) - suitable habitat for Ontario's four SAR bat species is present in wooded portions of the study area, as previously discussed in **Section 4.4**.

Reptiles

- Eastern Milksnake (federally SC) - noted for the area at large via background information, and suitable habitat is present in the study area.

Invertebrates

- River Bluet (S2) - confirmed present by Aquafor in Tuck Creek near Lansdown Park; breeding habitat expected to be present in the watercourse and foraging habitat in the riparian zone.
- Monarch (SC) - confirmed present in the study area at large via recent iNaturalist records; potential to breed in areas containing milkweed plants and forage throughout open habitats.
- Hentz's Orbweaver (S3S4) - confirmed present in the vicinity (Ireland Park) via recent iNaturalist records; suitable moist woodland habitat is present in the study area.
- Tiger Bee Fly (S3S4) - confirmed present in the vicinity (Lansdown Park) via recent iNaturalist records; suitable habitat is present in the study area.

7 SIGNIFICANT WILDLIFE HABITAT

Aquafor reviewed the MNRF's Significant Wildlife Habitat Criteria Schedules for EcoRegion 7E and applied the relevant criteria to the study area in order to identify potentially significant habitat features or areas. **Table C-16** provides an overview of the various SWH categories defined in the MNRF criteria schedules and discusses the presence of those categories in the study area.

In summary, the following five categories of SWH are considered relevant to the current study:

- Bat Maternity Colonies (see **Figure C-9** through **Figure C-12**): The presence of cavity trees and similar features that provide potential habitat for roosting bats was discussed in Section 4.4. Wooded habitats within the study area provide suitable conditions to potentially support maternity colonies of Silver-haired Bat and Big Brown Bat, and are therefore considered Candidate SWH in this category. It should be noted that this habitat type directly overlaps with SAR bat habitat (discussed above) and that mitigation/protection measures for the two are therefore likely to be the same moving forward.

- Landbird Migratory Stopover Areas (see **Figure C-13**): The woodland habitat associated with the Tuck Creek corridor adjacent to Lansdown Park is approximately 3.2 ha in size and within 5 km of the lakeshore. This woodland is also somewhat contiguous with additional habitat to the north (separated by Palmer Drive; 5+ ha; also just within 5 km of the lakeshore) which is where multiple regionally-uncommon or regionally-rare migrant songbird species were documented. Aerial photo interpretation suggests that woodlands could be considered rare between this location and the lakeshore, so the Lansdown Park woodland could be considered candidate SWH despite being less than 5 ha in size on its own.

- Woodland Raptor Nesting Habitat (see **Figure C-14**): A Cooper's Hawk nesting territory was documented in the woodlot between Palmer Dr. and Mainway, via direct observation of the species and discussion with area residents. SWH for Cooper's Hawk, as defined by the provincial criteria, includes a radius of 100 m around the nest location; as the nest was not pinpointed during field investigations, the entire community containing the territory has been identified as candidate SWH pending further refinement.

- Seeps and Springs (see **Figure C-15**): Iron staining, a common sign of groundwater seepage, was documented in one location at Driftwood Park. The provincial SWH criteria require two seeps/springs to confirm the significance of habitat; as the site was not exhaustively surveyed for the presence of seeps, it is considered candidate SWH pending further review.

- Special Concern and Provincially Rare Species (see **Figure C-16**): Aquafor documented SC species Eastern Wood-pewee and S2 species River Bluet along the creek corridor off Lansdown Park. SWH associated with these species would include habitat elements that support the species' survival, so in this case habitat features that are considered important include the forest plants and structure (to

support nesting by Eastern Wood-pewee) as well as the aquatic environment and herbaceous riparian vegetation (to support the nymph and adult life stages of River Bluet). Aquafor also confirmed one mature, healthy Pignut Hickory (an S2 species), along the upper slopes of the same section of valley corridor, within vegetation community polygon 9. Although no young Pignut Hickory were directly observed in the surrounding areas, it is likely that a viable seed bank is present in the area, particularly including polygon 9 community and adjacent polygon 8. All habitat within these communities should be considered Confirmed SWH to account for existing or potential individuals.

Additional Special Concern species Monarch and Wood Thrush were reported in the area via background resources. Wood Thrush has similar habitat requirements as Eastern Wood-pewee and was reported in the same vicinity, so any consideration of SWH for Wood Thrush would overlap with that of Eastern Wood-pewee. Monarch is largely a habitat generalist that is found as often in urban gardens as in natural meadows; the presence of small meadow patches or low numbers of milkweed stems, such as was found in the study area, is not considered highly significant for the survival of the species and therefore not appropriate to consider as SWH.

From the above, and as illustrated on the following figures, it is noted that multiple SWH categories have been applied to the woodland corridor adjacent to Lansdown Park, between Palmer Drive and Mainway, which is associated with erosion area 4.



CITY OF Burlington

Legend

- Study Area
- Potential Myotis Habitat
- Potential Perimyotis Habitat
- Potential Myotis and Perimyotis Habitat
- Bat Maternity Colonies (Candidate)

Figure C-9

Significant Wildlife Habitat: Candidate Bat Maternity Colonies (1 of 4)

Date: December 2021
Author: KB
Projection: UTM_Zone_17N
Source: City of Burlington, LIO

0 45 90
Metres

N

Aquafor Beech Limited



CITY OF Burlington

Legend

- Study Area
- Potential Myotis Habitat
- Potential Perimyotis Habitat
- Potential Myotis and Perimyotis Habitat
- Bat Maternity Colonies (Candidate)

Figure C-10

Significant Wildlife Habitat: Candidate Bat Maternity Colonies (2 of 4)

Date: December 2021
Author: KB
Projection: UTM_Zone_17N
Source: City of Burlington, LIO

0 150 300
Metres

N

Aquafor Beech Limited



CITY OF Burlington

Legend

- Study Area
- Potential Myotis Habitat
- Potential Perimyotis Habitat
- Potential Myotis and Perimyotis Habitat
- Bat Maternity Colonies (Candidate)

Figure C-11

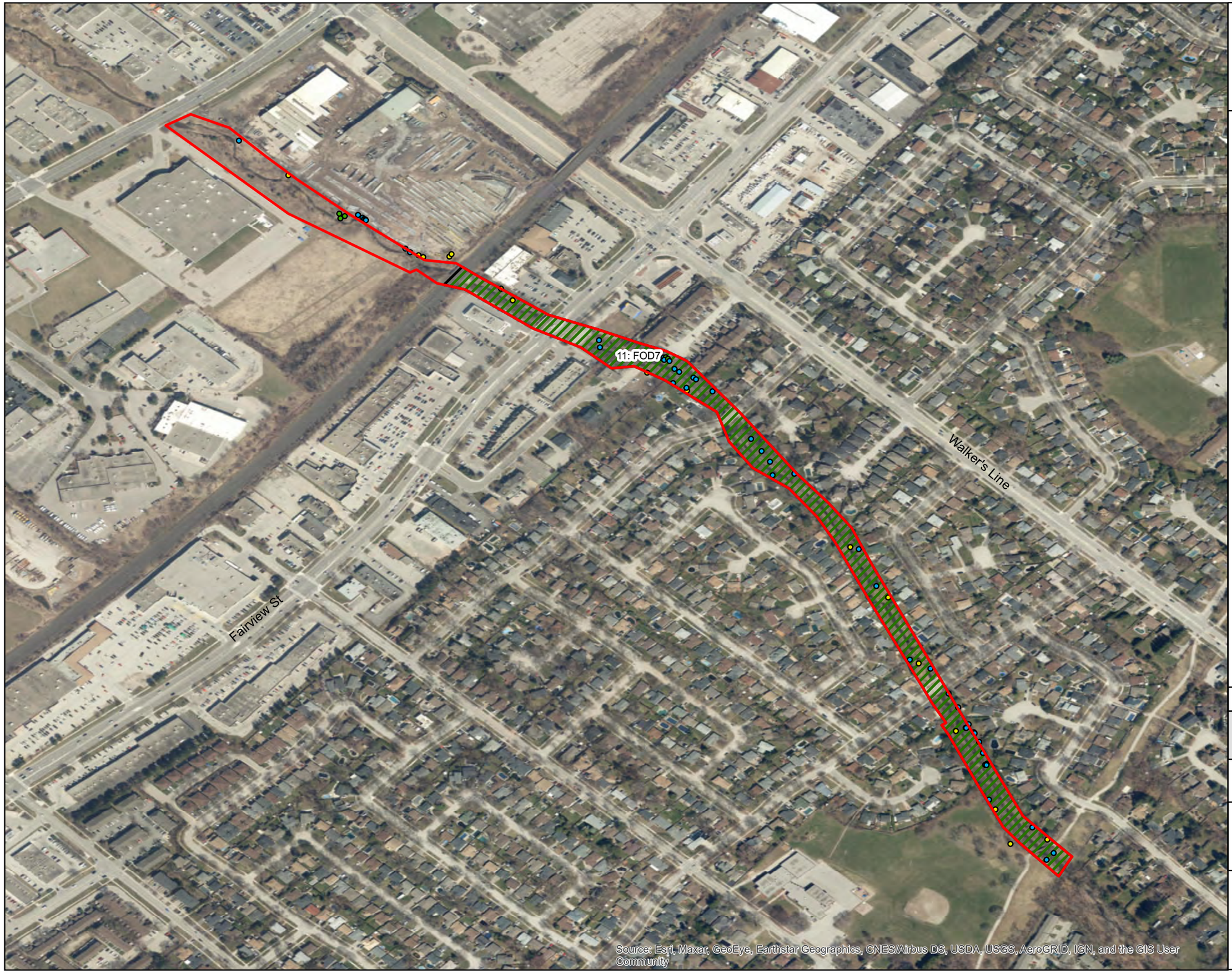
Significant Wildlife Habitat: Candidate Bat Maternity Colonies (3 of 4)

Date: December 2021
Author: KB
Projection: UTM_Zone_17N
Source: City of Burlington, LIO

0 100 200
Metres

N

Aquafor Beech Limited



CITY OF Burlington

Legend

- Study Area
- Potential Myotis Habitat
- Potential Perimyotis Habitat
- Potential Myotis and Perimyotis Habitat
- Bat Maternity Colonies (Candidate)

Figure C-12

Significant Wildlife Habitat: Candidate Bat Maternity Colonies (4 of 4)

Date: December 2021
Author: KB
Projection: UTM_Zone_17N
Source: City of Burlington, LIO

0 145 290
Metres

N

Aquafor Beech Limited



CITY OF Burlington

Legend

- Study Area
- Landbird Migratory Stopover Areas (Candidate)

Figure C-13

Significant Wildlife Habitat:
Candidate Landbird Migratory Stopover Areas

Date: December 2021
Author: KB
Projection: UTM_Zone_17N
Source: City of Burlington, LIO

0 100 200
Metres

N

Aquafor Beech Limited



CITY OF Burlington

Legend

- Study Area
- Woodland Raptor Nesting Habitat (Candidate)

Figure C-14

Significant Wildlife Habitat:
Candidate Woodland Raptor Nesting Habitat

Date: December 2021
Author: KB
Projection: UTM_Zone_17N
Source: City of Burlington, LIO

0 100 200
Metres

N

Aquafor Beech Limited



CITY OF Burlington

Legend

- Study Area
- Seeps and Springs (Candidate)

Figure C-15

Significant Wildlife Habitat:
Candidate Seeps and Springs

Date: December 2021
Author: KB
Projection: UTM_Zone_17N
Source: City of Burlington, LIO

0 45 90
Metres

N

Aquafor Beech Limited



CITY OF Burlington

Legend

- Study Area
- Pignut Hickory
- Confirmed Pignut Hickory, Eastern Wood-pewee, and River Bluet

Figure C-16

Significant Wildlife Habitat:
Confirmed Special Concern and
Provincially Rare Species

Date: December 2021
Author: KB
Projection: UTM_Zone_17N
Source: City of Burlington, LIO

0 100 200
Metres

N

Aquafor Beech Limited

Table C-16: Significant Wildlife Habitat Screening

SWH Category	Overview of Criteria	Assessment of SWH Presence in Study Area
Waterfowl Stopover and Staging Areas (Terrestrial)	Fields with sheet water in spring; annual concentrations of 100+ waterfowl	The required habitat features are not present in the study area.
Waterfowl Stopover and Staging Areas (Aquatic)	Ponds, marshes, lakes, bays, coastal inlets, and watercourses used during migration, with an abundant food supply (mostly aquatic invertebrates and vegetation in shallow water); annual concentrations of 100+ waterfowl over seven days	There is no indication from site observation or background data that large numbers of waterfowl congregate along Tuck Creek. The creek is typically shallow and narrow, and not typical of habitat that would appeal to migrating birds.
Shorebird Migratory Stopover Area	Shorelines of lakes, rivers and wetlands, including beach areas, bars and seasonally flooded, muddy and un-vegetated shoreline habitats	Tuck Creek in the study area does not provide mud flats or other suitable exposed shoreline features.
Raptor Wintering Area	A combination of fields and woodlands that provide roosting, foraging and resting habitats for wintering raptors.	The study area is lacking the overall size and open field components of the required habitat mosaic.
Bat Hibernacula	Caves, mine shafts, underground foundations and Karsts.	The required habitat features are not present in the study area.
Bat Maternity Colonies	Maternity colonies for Big Brown Bat and Silver-haired Bat found in mature deciduous or mixed forest stands with >10/ha large (>25cm dbh) wildlife trees.	**Potentially present.** Woodlands in the area provide suitable habitat to potentially support bat maternity roosts.
Turtle Wintering Areas	Deep pools with soft substrate that will not freeze through over the winter.	Tuck Creek in the study area is generally shallow with no pools meeting the criteria.
Reptile Hibernaculum	Sites located below the frost line, indicated by burrows, rock crevices, rock piles, old stone fences, abandoned crumbling foundations, etc.	Potentially present in the general area, although no features strongly or obviously suggestive of hibernacula entrances were documented in the immediate study area.
Colonially - Nesting Bird Breeding Habitat (Bank and Cliff)	Natural nesting areas for Cliff Swallow and Northern Rough-winged Swallow (i.e., not culverts or bridges).	Indicator species were not found nesting in the study area.

SWH Category	Overview of Criteria	Assessment of SWH Presence in Study Area
Colonially - Nesting Bird Breeding Habitat (Tree/Shrubs)	Live or dead standing trees in wetlands, lakes, islands, and peninsulas, providing nest habitat for herons or egrets.	Specified habitat type and indicator species not found in the study area.
Colonially - Nesting Bird Breeding Habitat (Ground)	Nesting colonies of gulls and terns (islands or peninsulas associated with open water or in marshy areas) or Brewers Blackbird (in close proximity to streams and irrigation ditches within farmlands).	Specified habitat types and indicator species not found in the study area.
Migratory Butterfly Stopover Areas	Combination of field and forest habitat a minimum of 10 ha in size, located within 5 km of Lake Erie or Lake Ontario.	The study area does not contain a suitable sized patch of the specified habitat within 5km of the lakeshore.
Landbird Migratory Stopover Areas	Woodlots >5 ha in size and within 5 km of Lake Erie and Lake Ontario. Woodland fragments 2-5 ha can be considered in areas where woodlands are rare.	**Potentially present.** Lansdown Park woodland meets criteria. Multiple regionally-uncommon or rare migrant species were documented in the adjacent woodland along Tuck Creek just north.
Deer Winter Congregation Areas	These SWH features are identified and mapped by MNRF.	MNRF data does not indicate any deer winter congregation areas in the study area.
Cliffs and Talus Slopes	Any ELC Ecosite within Community Series TAO, CLO, TAS, CLS, TAT, or CLT.	The specified ELC community series were not identified in the study area.
Sand Barrens	ELC Ecosites SBO1, SBS1, or SBT1 >0.5 ha in size.	The specified ELC ecosites were not identified in the study area.
Alvars	Alvar communities containing the specified indicator species.	Neither alvar habitat nor the specified indicator species were observed in the study area.
Old Growth Forest	Forests >0.5 ha characterized by heavy mortality or turnover of overstorey trees resulting in a mosaic of gaps that encourage development of a multi-layered canopy and an abundance of snags and downed woody debris; dominant trees >140 years old.	The specified forest characteristics were not observed in the study area.

SWH Category	Overview of Criteria	Assessment of SWH Presence in Study Area
Savannah	Tallgrass prairie habitat that has tree cover between 25 – 60%; ELC Ecosites TPS1, TPS2, TPW1, TPW2, or CUS2. Savannah indicator species listed in the Significant Wildlife Habitat Technical Guide (MNRF 2000) should be present.	The required vegetation communities and indicator species are not present in the study area.
Tallgrass Prairie	Ground cover dominated by prairie grasses; < 25% tree cover. Prairie indicator species listed in the Significant Wildlife Habitat Technical Guide (MNRF 2000) should be present.	The required vegetation community is not present in the study area.
Other Rare Vegetation Communities	Provincially rare S1, S2 and S3 vegetation communities.	No such communities were documented in the study area.
Waterfowl Nesting Area	Upland habitat adjacent to wetlands; minimum numbers of nesting individuals of specified species required.	The specified indicator species were not observed in the required numbers in the study area.
Bald Eagle and Osprey Nesting, Foraging and Perching Habitat	Nests are associated with lakes, ponds, rivers or wetlands along forested shorelines, islands, or on structures over water.	Osprey and Bald Eagle are generally associated with large water bodies in which they can hunt fish; Tuck Creek within the study area is typically shallow and does not provide such habitat.
Woodland Raptor Nesting Habitat	All forested ecosites containing active nests of the specified raptor species.	**Confirmed present**. Cooper's Hawk was confirmed be nesting in the woodlot between Palmer Dr. and Mainway. SWH for Cooper's Hawk includes a radius of 100 m around the nest location; as the nest was not pinpointed, the entire forest community has been identified as candidate habitat at present.
Turtle Nesting Areas	Areas with exposed sand or gravel adjacent to water or wetlands.	Potential nesting areas were not observed in the study area. The Tuck Creek banks are generally rocky and vegetated rather than exposed sandy or gravelly areas.

SWH Category	Overview of Criteria	Assessment of SWH Presence in Study Area
Seeps and Springs	Often found in headwater areas within forested habitats; any area with two or more seeps/springs is SWH.	**Potentially Present**: Iron staining, a common sign of groundwater seepage, was documented in one location at Driftwood Park.
Amphibian Breeding Habitat (Woodland)	Wetlands, ponds, or vernal pools within or directly adjacent to a woodland; significance is confirmed based on the number of breeding individuals of the specified indicator species.	Amphibian calling surveys completed within the study area did not identify the required number of individuals.
Amphibian Breeding Habitat (Wetlands)	Large wetlands or ponds typically isolated from woodlands; significance is confirmed based on the number of breeding individuals of the specified indicator species.	Amphibian calling surveys completed within the study area did not identify the required number of individuals.
Woodland Area-sensitive Bird Breeding Habitat	Woodlands containing forest interior habitat, typically large mature forest stands; significance is confirmed based on the number of breeding individuals of the specified indicator species.	The specified area-sensitive indicator species were not documented in the study area during breeding bird surveys, and forest interior habitat is absent.
Marsh Breeding Bird Habitat	Wetlands with shallow water and emergent vegetation; significance is confirmed based on the number of breeding individuals of the specified indicator species.	The specified marsh bird indicator species were not documented in the study area during breeding bird surveys, and wetland habitat is generally absent in the study area.
Open Country Bird Breeding Habitat	Large grassland areas >30 ha; significance is confirmed based on the number of breeding individuals of the specified indicator species.	One of the indicator species, Savannah Sparrow, was documented during breeding bird surveys but two or more indicator species are required to confirm SWH. Grassland patches in the study are are generally small and do not meet the stated size threshold.
Shrub/Early Successional Bird Breeding Habitat	Large fields succeeding to shrub thickets; significance is confirmed based on the number of breeding individuals of the specified indicator species.	The specified bird indicator species were not documented in the study area during breeding bird surveys.

SWH Category	Overview of Criteria	Assessment of SWH Presence in Study Area
Terrestrial Crayfish	Any meadow or meadow marsh habitats containing terrestrial crayfish.	Evidence of terrestrial crayfish (i.e., burrows) was not found in the study area.
Special Concern and Rare Species	All occurrences of provincially rare (S1-S3) or Special Concern species; the SWH is the area of the habitat to the finest ELC scale that protects the habitat form and function.	**Confirmed present**. Aquafor documented SC species Eastern Wood-pewee and S2 species River Bluet and Pignut Hickory along the creek corridor off Lansdown Park. Other qualifying species were documented via background information (see **Section 6** and **Appendix C-8**)
Amphibian Movement Corridors	May be found in all ecosites containing water; to be assessed wherever SWH for amphibian breeding (wetland) is confirmed.	Amphibian breeding SWH was not present in the study area, so movement corridors need not be identified.
Bat Migratory Stopover Area	Congregation areas for long-distance migratory bats (Hoary Bat, Eastern Red Bat, Silver-haired Bat). Long Point is the only confirmed location; confirmation criteria to assess other sites are still being developed.	The study area is not located at Long Point and other criteria are not available at this time.

8 REFERENCES

Bird Studies Canada. 2001. *Ontario Breeding Bird Atlas Guide for Participants*.

Bird Studies Canada. 2008. *Marsh Monitoring Program Participant's Handbook for Surveying Amphibians*.

Brouillet L, Desmet P, Coursol F, Meades SJ, Favreau M, Anions M, Bélisle P, Gendreau C, Shorthouse D, and contributors (2010+). *Database of Vascular Plants of Canada (VASCAN)*. Accessed online at http://data.canadensys.net/vascan and http://www.gbif.org/dataset/3f8a1297-3259-4700-91fc-acc4170b27ce, released on 2010-12-10. Version [xx]. GBIF key: 3f8a1297-3259-4700-91fc-acc4170b27ce. Data paper ID: doi: http://doi.org/10.3897/phytokeys.25.3100 [accessed on [07/24/2019]].

Conservation Halton (2006) Halton Natural Areas Inventory 2006: Volume 2 Species Checklists.

Lee, H., Bakowsky, W. Riley, J., Bowles, J., Puddister, M., Uhlig, P., and McMurray, S. (1998). *Ecological Land Classification for Southern Ontario: First Approximation and Its Application*. North Bay: Ontario Ministry of Natural Resources, Southcentral Science Section, 1998. Print.

MNRF. 2000. *Significant Wildlife Habitat Technical Guide.*

MNRF. 2015. *Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E.*

MNRF. 2017. *Survey Protocol for Species at Risk Bats within Treed Habitats*.

Natural Heritage Information Centre (NHIC) (2019). List of All Species. Available at: https://www.ontario.ca/page/get-natural-heritage-information

Oldham, M., Bakowsky, W., Sutherland, D. (1995). *Floristic Quality Assessment System for Southern Ontario.* Natural Heritage Information Centre, Ontario Ministry of Natural Resources.

Appendix C-1 –

Ecological Land Classification Field Data Sheets

ELC COMMUNITY DESCRIPTION & CLASSIFICATION	SITE: Trick Creek	POLYGON: 1	
	SURVEYOR(S): KB ND	DATE: June 25/26	TIME: start / finish
	UTMZ:	UTME:	UTMN:

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
☐ TERRESTRIAL ☐ WETLAND ☐ AQUATIC	☐ ORGANIC ☐ MINERAL SOIL ☐ PARENT MIN. ☐ ACIDIC BEDRK. ☐ BASIC BEDRK. ☐ CARB. BEDRK.	☐ LACUSTRINE ☐ RIVERINE ☐ BOTTOMLAND ☐ TERRACE ☐ VALLEY SLOPE ☐ TABLELAND ☐ ROLL. UPLAND ☐ CLIFF ☐ TALUS ☐ CREVICE / CAVE ☐ ALVAR ☐ ROCKLAND ☐ BEACH / BAR ☐ SAND DUNE ☐ BLUFF	☐ NATURAL ☐ CULTURAL	☐ PLANKTON ☐ SUBMERGED ☐ FLOATING-LVD. ☐ GRAMINOID ☐ FORB ☐ LICHEN ☐ BRYOPHYTE ☐ DECIDUOUS ☐ CONIFEROUS ☐ MIXED	☐ LAKE ☐ POND ☐ RIVER ☐ STREAM ☐ MARSH ☐ SWAMP ☐ FEN ☐ BOG ☐ BARREN ☐ MEADOW ☐ PRAIRIE ☐ THICKET ☐ SAVANNAH ☐ WOODLAND ☐ FOREST ☐ PLANTATION
SITE ☐ OPEN WATER ☐ SHALLOW WATER ☑ SURFICIAL DEP. ☐ BEDROCK			**COVER** ☐ OPEN ☐ SHRUB ☐ TREED		

STAND DESCRIPTION:

	LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (up to 4 sp) (>> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1	CANOPY			Fraxinus > Acer neg
2	SUB-CANOPY			" > " "
3	UNDERSTOREY			Salix discolor
4	GRD. LAYER			Typha AND = Typha latifolia > Forbs

HT CODES: 1 = >25 m 2 = 10<HT≤25 m 3 = 2<HT≤10 m 4 = 1<HT≤2 m 5 = 0.5<HT≤1 m 6 = 0.2<HT≤0.5 m 7 = HT<0.2 m

CVR CODES 0= NONE 1= 0% < CVR ≤ 10% 2= 10 < CVR ≤ 25% 3= 25 < CVR ≤ 60% 4= CVR > 60%

STAND COMPOSITION:	BA:

SIZE CLASS ANALYSIS:		< 10		10 - 24		25 - 50		> 50
STANDING SNAGS:		< 10		10 - 24		25 - 50		> 50
DEADFALL / LOGS:		< 10		10 - 24		25 - 50		> 50

ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE :		PIONEER		YOUNG		MID-AGE		MATURE		OLD GROWTH

SOIL ANALYSIS:

TEXTURE:	DEPTH TO MOTTLES / GLEY	g =	G=
MOISTURE:	DEPTH OF ORGANICS:		(cm)
HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK:		(cm)

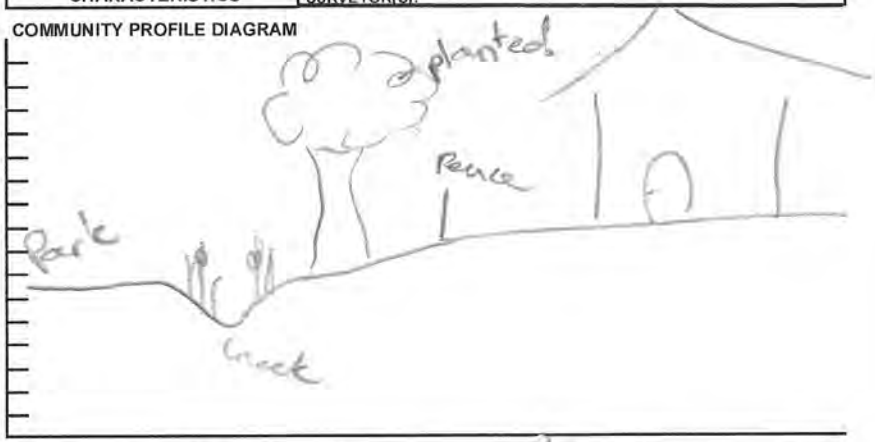
COMMUNITY CLASSIFICATION:

		ELC CODE
COMMUNITY CLASS:		
COMMUNITY SERIES:		
ECOSITE:		
VEGETATION TYPE:		MAS2-1
☐ INCLUSION		
☐ COMPLEX		

Notes:

ELC STAND CHARACTERISTICS	SITE:
	POLYGON:
	DATE:
	SURVEYOR(S):

COMMUNITY PROFILE DIAGRAM



DISTURBANCE (CIRCLE ALL THAT APPLY)				
LOGGING/SUGAR BUSH	GAPS IN FOREST CANOPY	LIVESTOCK	INVASIVE SP./ GARDEN PLANTS	TRACKS/TRAILS/REC. USE
DUMPING	EARTH DISPLACEMENT	NOISE	DISEASE/DEATH OF TREES/HERBS	WIND THROW
DEER BROWSING	BEAVER ACTIVITY	FLOODING	FIRE/ICE DAMAGE	OTHER

Notes:

407

Some creek work near Clarkia

ENTERED

ELC

SOILS ONTARIO

SITE:
POLYGON:
DATE:
SURVEYOR(S):

	P/A	PP	Dr	Position	Aspect	Slope %	Type	Class	Z	UTM EASTING	UTM NORTHING
1											
2											
3											
4											
5											

SOIL	1	2	3	4	5
TEXTURE x HORIZON					
A TEXTURE					
COURSE FRAGMENTS					
B TEXTURE					
COURSE FRAGMENTS					
C TEXTURE					
COURSE FRAGMENTS					
EFFECTIVE TEXTURE					
SURFACE STONINESS					
SURFACE ROCKINESS					
DEPTH TO / OF					
MOTTLES					
GLEY					
BEDROCK					
WATER TABLE					
CARBONATES					
DEPTH OF ORGANICS					
PORE SIZE DISC #1					
PORE SIZE DISC #2					
MOISTURE REGIME					
SOIL SURVEY MAP					
LEGEND CLASS					

ELC

PLANT SPECIES LIST

SITE: TUCK CREEK
POLYGON:
DATE: JUN 25 2020
SURVEYOR(S): KB JS

LAYERS: 1 = CANOPY 2 = SUB-CANOPY 3 = UNDERSTOREY 4 = GROUND (GRD.) LAYER

ABUNDANCE CODES: R = RARE O = OCCASIONAL A = ABUNDANT D = DOMINANT

SPECIES CODE	LAYER 1	2	3	4	COL.
ACER NEG	O	R			
JUGL NIG	O	O	R		
ACER PLAT	R				
ROBI PSEU		R			
ULMU AME		R			
SOLI DIS					
VITR RIP					
SOME CANA					

SPECIES CODE	LAYER 1	2	3	4	COL.
TSUG CAN					
THUJ OCC					
H. VIR COR					
ADCT MIN					
LYTH SAL					
POA PRAT					
VIBU ACE					
FOXI ARG					
SYMPHORICARPOS					
RANUNCULUS					
PYRUS AMER					
LONI DIO					
IMPA CAP					
GAL PAL					
BROM INE					
SONC OLE					
DANC CAR					
ANEM CAN					

ELC COMMUNITY DESCRIPTION & CLASSIFICATION

SITE: Tuck Creek		POLYGON: 2	
SURVEYOR(S): KB JS	DATE: June 25/20	TIME: start / finish	
UTMZ:	UTME:	UTMN:	

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
☐ TERRESTRIAL ☐ WETLAND ☐ AQUATIC	☐ ORGANIC ☐ MINERAL SOIL ☐ PARENT MIN. ☐ ACIDIC BEDRK. ☐ BASIC BEDRK. ☐ CARB. BEDRK.	☐ LACUSTRINE ☐ RIVERINE ☐ BOTTOMLAND ☐ TERRACE ☐ VALLEY SLOPE ☐ TABLELAND ☐ ROLL. UPLAND ☐ CLIFF ☐ TALUS ☐ CREVICE / CAVE ☐ ALVAR ☐ ROCKLAND ☐ BEACH / BAR ☐ SAND DUNE ☐ BLUFF	☐ NATURAL ☐ CULTURAL	☐ PLANKTON ☐ SUBMERGED ☐ FLOATING-LVD. ☐ GRAMINOID ☐ FORB ☐ LICHEN ☐ BRYOPHYTE ☐ DECIDUOUS ☐ CONIFEROUS ☐ MIXED	☐ LAKE ☐ POND ☐ RIVER ☐ STREAM ☐ MARSH ☐ SWAMP ☐ FEN ☐ BOG ☐ BARREN ☐ MEADOW ☐ PRAIRIE ☐ THICKET ☐ SAVANNAH ☐ WOODLAND ☐ FOREST ☐ PLANTATION
SITE ☐ OPEN WATER ☑ SHALLOW WATER ☐ SURFICIAL DEP. ☐ BEDROCK			**COVER** ☐ OPEN ☐ SHRUB ☐ TREED		

STAND DESCRIPTION:

	LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (up to 4 sp) (>> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1	CANOPY			SACI ALB > JUGL NIG > ACER NEG
2	SUB-CANOPY			JUGL NIG = ACER NEG
3	UNDERSTOREY			RHAM CAT > CORN SER > SALI ERIO
4	GRD. LAYER			CALA CAN = POA PRAT > ELLI DET

HT CODES: 1 = >25 m 2 = 10<HT≤25 m 3 = 2<HT≤10 m 4 = 1<HT≤2 m 5 = 0.5<HT≤1 m 6 = 0.2<HT≤0.5 m 7 = HT<0.2 m

CVR CODES 0= NONE 1= 0% < CVR ≤ 10% 2= 10 < CVR ≤ 25% 3= 25 < CVR ≤ 60% 4= CVR > 60%

STAND COMPOSITION:	BA:

SIZE CLASS ANALYSIS:		< 10		10 - 24		25 - 50		> 50
	A		A		O			
STANDING SNAGS:		< 10		10 - 24		25 - 50		> 50
DEADFALL / LOGS:		< 10		10 - 24		25 - 50		> 50

ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE :		PIONEER		YOUNG		MID-AGE		MATURE		OLD GROWTH

SOIL ANALYSIS:

TEXTURE:	DEPTH TO MOTTLES / GLEY	g =	G=
MOISTURE:	DEPTH OF ORGANICS:		(cm)
HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK:		(cm)

COMMUNITY CLASSIFICATION:

		ELC CODE
COMMUNITY CLASS:		
COMMUNITY SERIES:		
ECOSITE:		
VEGETATION TYPE:		FOD7-3
INCLUSION		
COMPLEX		

Notes:

ELC STAND CHARACTERISTICS

SITE:	
POLYGON:	
DATE:	
SURVEYOR(S):	

COMMUNITY PROFILE DIAGRAM



DISTURBANCE (CIRCLE ALL THAT APPLY)				
LOGGING/SUGAR BUSH	GAPS IN FOREST CANOPY	LIVESTOCK	INVASIVE SP./ GARDEN PLANTS	TRACKS/TRAILS/REC. USE
DUMPING	EARTH DISPLACEMENT	NOISE	DISEASE/DEATH OF TREES/HERBS	WIND THROW
DEER BROWSING	BEAVER ACTIVITY	FLOODING	FIRE/ICE DAMAGE	OTHER

Notes:

Faint trail

Between poly 1

ELC
SOILS ONTARIO

SITE:
POLYGON:
DATE:
SURVEYOR(S):

FOD 7-3

	P/A	PP	Dr	Position	Aspect	Slope %	Type	Class	Z	UTM EASTING	UTM NORTHING
1											
2											
3											
4											
5											

SOIL	1	2	3	4	5
TEXTURE x HORIZON					
A TEXTURE					
COURSE FRAGMENTS					
B TEXTURE					
COURSE FRAGMENTS					
C TEXTURE					
COURSE FRAGMENTS					
EFFECTIVE TEXTURE					
SURFACE STONINESS					
SURFACE ROCKINESS					
DEPTH TO / OF					
MOTTLES					
GLEY					
BEDROCK					
WATER TABLE					
CARBONATES					
DEPTH OF ORGANICS					
PORE SIZE DISC #1					
PORE SIZE DISC #2					
MOISTURE REGIME					
SOIL SURVEY MAP					
LEGEND CLASS					

ELC
PLANT SPECIES LIST

SITE: Tryk Creek
POLYGON: 2
DATE: June 25 2020
SURVEYOR(S): KB DS

LAYERS: 1 = CANOPY 2 = SUB-CANOPY 3 = UNDERSTOREY 4 = GROUND (GRD.) LAYER
ABUNDANCE CODES: R = RARE O = OCCASIONAL A = ABUNDANT D = DOMINANT

SPECIES CODE	LAYER 1	2	3	4	COL.
SALI ALB	D	O	R		
SYMPHORI	O	O	R	R	
ACER NEG	R	R	R	R	

ELC COMMUNITY DESCRIPTION & CLASSIFICATION	SITE: Tusk Creek		POLYGON: 3	
	SURVEYOR(S): KB JS	DATE: June 25/20	TIME: start	
			finish	
	UTMZ:	UTME:	UTMN:	

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
☐ TERRESTRIAL ☐ WETLAND ☐ AQUATIC	☐ ORGANIC ☐ MINERAL SOIL ☐ PARENT MIN. ☐ ACIDIC BEDRK. ☐ BASIC BEDRK. ☐ CARB. BEDRK.	☐ LACUSTRINE ☐ RIVERINE ☐ BOTTOMLAND ☐ TERRACE ☐ VALLEY SLOPE ☐ TABLELAND ☐ ROLL. UPLAND ☐ CLIFF ☐ TALUS ☐ CREVICE / CAVE ☐ ALVAR ☐ ROCKLAND ☐ BEACH / BAR ☐ SAND DUNE ☐ BLUFF	☐ NATURAL ☐ CULTURAL	☐ PLANKTON ☐ SUBMERGED ☐ FLOATING-LVD. ☐ GRAMINOID ☐ FORB ☐ LICHEN ☐ BRYOPHYTE ☐ DECIDUOUS ☐ CONIFEROUS ☐ MIXED	☐ LAKE ☐ POND ☐ RIVER ☐ STREAM ☐ MARSH ☐ SWAMP ☐ FEN ☐ BOG ☐ BARREN ☐ MEADOW ☐ PRAIRIE ☐ THICKET ☐ SAVANNAH ☐ WOODLAND ☐ FOREST ☐ PLANTATION
SITE ☐ OPEN WATER ☑ SHALLOW WATER ☐ SURFICIAL DEP. ☐ BEDROCK			**COVER** ☐ OPEN ☐ SHRUB ☐ TREED		

STAND DESCRIPTION:

	LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (up to 4 sp) (>> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1	CANOPY			Jug nig > ACE N NEG
2	SUB-CANOPY			" < "
3	UNDERSTOREY			RHUS TYP > CORN RACE = ROSA MULT
4	GRD. LAYER			BROM INER = POA PRAT > SOLI CAN

HT CODES: 1 = >25 m 2 = 10<HT ≤ 25 m 3 = 2<HT ≤ 10 m 4 = 1<HT ≤ 2 m 5 = 0.5<HT ≤ 1 m 6 = 0.2<HT ≤ 0.5 m 7 = HT<0.2 m

CVR CODES 0= NONE 1= 0% < CVR ≤ 10% 2= 10 < CVR ≤ 25% 3= 25 < CVR ≤ 60% 4= CVR > 60%

STAND COMPOSITION:	BA:

SIZE CLASS ANALYSIS:		< 10		10 - 24		25 - 50		> 50
	O		K					
STANDING SNAGS:		< 10		10 - 24		25 - 50		> 50
DEADFALL / LOGS:		< 10		10 - 24		25 - 50		> 50

ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE :		PIONEER		YOUNG		MID-AGE		MATURE		OLD GROWTH

SOIL ANALYSIS:

TEXTURE:	DEPTH TO MOTTLES / GLEY	g =	G=
MOISTURE:	DEPTH OF ORGANICS:		(cm)
HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK:		(cm)

COMMUNITY CLASSIFICATION:

		ELC CODE
COMMUNITY CLASS:		
COMMUNITY SERIES:		
ECOSITE:		
VEGETATION TYPE:		CUM1-1
INCLUSION		
COMPLEX		

Notes:

ELC STAND CHARACTERISTICS	SITE:
	POLYGON:
	DATE:
	SURVEYOR(S):

COMMUNITY PROFILE DIAGRAM

DISTURBANCE (CIRCLE ALL THAT APPLY)				
LOGGING/SUGAR BUSH	GAPS IN FOREST CANOPY	LIVESTOCK	INVASIVE SP./ GARDEN PLANTS	TRACKS/TRAILS/REC. USE
DUMPING	EARTH DISPLACEMENT	NOISE	DISEASE/DEATH OF TREES/HERBS	WIND THROW
DEER BROWSING	BEAVER ACTIVITY	FLOODING	FIRE/ICE DAMAGE	OTHER

Notes:

AW-LW6

ELC

SOILS ONTARIO

SITE:
POLYGON:
DATE:
SURVEYOR(S):

Slope UTM

	P/A	PP	Dr	Position	Aspect	%	Type	Class	Z	EASTING	NORTHING
1											
2											
3											
4											
5											

SOIL	1	2	3	4	5
TEXTURE x HORIZON					
A TEXTURE					
COURSE FRAGMENTS					
B TEXTURE					
COURSE FRAGMENTS					
C TEXTURE					
COURSE FRAGMENTS					
EFFECTIVE TEXTURE					
SURFACE STONINESS					
SURFACE ROCKINESS					
DEPTH TO / OF					
MOTTLES					
GLEY					
BEDROCK					
WATER TABLE					
CARBONATES					
DEPTH OF ORGANICS					
PORE SIZE DISC #1					
PORE SIZE DISC #2					
MOISTURE REGIME					
SOIL SURVEY MAP					
LEGEND CLASS					

ELC PLANT SPECIES LIST

SITE: Tank CREEK
POLYGON: 3
DATE: July 15 2020
SURVEYOR(S): KB ND

LAYERS: 1 = CANOPY 2 = SUB-CANOPY 3 = UNDERSTOREY 4 = GROUND (GRD.) LAYER

ABUNDANCE CODES: R = RARE O = OCCASIONAL A = ABUNDANT D = DOMINANT

SPECIES CODE	LAYER 1	2	3	4	COL.
JUGLANS NIG					
FRA PEN					
ACER NEG					
ROSA WIL					
RHUS TYP					
V RIP					
CORN RACE					
V. ALBA CAN					
SALI LUCI					

SPECIES CODE	LAYER 1	2	3	4	COL.
BROM INER					
DACT GLOM					
FOR PRA					
PHLE PRAT					
SOLI CAN					
POT ERECT					
SYMPHE					
HYPERICT					
CIRS ARV					
LIN VULG					
SONCH ARV					
DIP FULL					

Page ..... of .....

ELC
COMMUNITY DESCRIPTION & CLASSIFICATION

SITE: Tuck creek		POLYGON: 4	
SURVEYOR(S): KB JS	DATE: June 25/20	TIME: start	
		finish	
UTMZ:	UTME:	UTMN:	

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
☐ TERRESTRIAL	☐ ORGANIC	☐ LACUSTRINE	☐ NATURAL	☐ PLANKTON	☐ LAKE
☐ WETLAND	☐ MINERAL SOIL	☐ RIVERINE	☐ CULTURAL	☐ SUBMERGED	☐ POND
☐ AQUATIC	☐ PARENT MIN.	☐ BOTTOMLAND		☐ FLOATING-LVD.	☐ RIVER
	☐ ACIDIC BEDRK.	☐ TERRACE		☐ GRAMINOID	☐ STREAM
	☐ BASIC BEDRK.	☐ VALLEY SLOPE		☐ FORB	☐ MARSH
	☐ CARB. BEDRK.	☐ TABLELAND		☐ LICHEN	☐ SWAMP
SITE		☐ ROLL. UPLAND		☐ BRYOPHYTE	☐ FEN
		☐ CLIFF		☐ DECIDUOUS	☐ BOG
☐ OPEN WATER		☐ TALUS	COVER	☐ CONIFEROUS	☐ BARREN
☐ SHALLOW WATER		☐ CREVICE / CAVE		☐ MIXED	☐ MEADOW
☑ SURFICIAL DEP.		☐ ALVAR	☐ OPEN		☐ PRAIRIE
☐ BEDROCK		☐ ROCKLAND	☐ SHRUB		☐ THICKET
		☐ BEACH / BAR	☐ TREED		☐ SAVANNAH
		☐ SAND DUNE			☐ WOODLAND
		☐ BLUFF			☐ FOREST
					☐ PLANTATION

STAND DESCRIPTION:

	LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (up to 4 sp) (>> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1	CANOPY			SALI ALB > JUGL NIG
2	SUB-CANOPY			
3	UNDERSTOREY			
4	GRD. LAYER			

HT CODES: 1 = >25 m 2 = 10<HT≤25 m 3 = 2<HT<10 m 4 = 1<HT≤2 m 5 = 0.5<HT≤1 m 6 = 0.2<HT≤0.5 m 7 = HT<0.2 m

CVR CODES 0= NONE 1= 0% < CVR ≤ 10% 2= 10 < CVR ≤ 25% 3= 25 < CVR ≤ 60% 4= CVR > 60%

STAND COMPOSITION:	BA:

SIZE CLASS ANALYSIS:		< 10		10 - 24		25 - 50		> 50
STANDING SNAGS:		< 10		10 - 24		25 - 50		> 50
DEADFALL / LOGS:		< 10		10 - 24		25 - 50		> 50

ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE :		PIONEER		YOUNG		MID-AGE		MATURE		OLD GROWTH

SOIL ANALYSIS:

TEXTURE:	DEPTH TO MOTTLES / GLEY	g =	G=
MOISTURE:	DEPTH OF ORGANICS:		(cm)
HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK:		(cm)

COMMUNITY CLASSIFICATION:

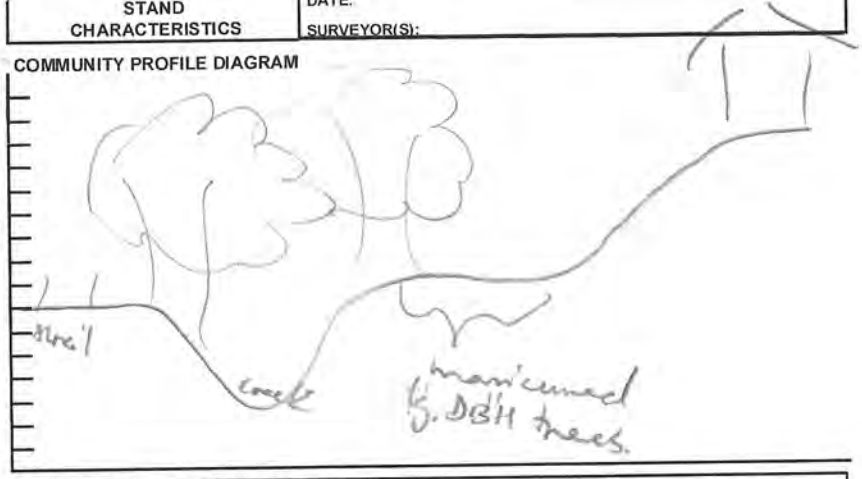
		ELC CODE
COMMUNITY CLASS:		
COMMUNITY SERIES:		
ECOSITE:		
VEGETATION TYPE:		FOD7-3
☐ INCLUSION		
☐ COMPLEX		

Notes:

ELC
STAND CHARACTERISTICS

SITE:	
POLYGON:	
DATE:	
SURVEYOR(S):	

COMMUNITY PROFILE DIAGRAM



DISTURBANCE (CIRCLE ALL THAT APPLY)				
LOGGING/SUGAR BUSH	GAPS IN FOREST CANOPY	LIVESTOCK	INVASIVE SP./ GARDEN PLANTS	TRACKS/TRAILS/REC. USE
DUMPING	EARTH DISPLACEMENT	NOISE	DISEASE/DEATH OF TREES/HERBS	WIND THROW
DEER BROWSING	BEAVER ACTIVITY	FLOODING	FIRE/ICE DAMAGE	OTHER

Notes:

Seasonal

FOD7-3

SALI ALB >

JUGL NIG

ELC
SOILS ONTARIO

SITE:
POLYGON:
DATE:
SURVEYOR(S):

	P/A	PP	Dr	Position	Aspect	Slope %	Type	Class	Z	UTM EASTING	UTM NORTHING
1											
2											
3											
4											
5											

SOIL	1	2	3	4	5
TEXTURE x HORIZON					
A TEXTURE					
COURSE FRAGMENTS					
B TEXTURE					
COURSE FRAGMENTS					
C TEXTURE					
COURSE FRAGMENTS					
EFFECTIVE TEXTURE					
SURFACE STONINESS					
SURFACE ROCKINESS					
DEPTH TO / OF					
MOTTLES					
GLEY					
BEDROCK					
WATER TABLE					
CARBONATES					
DEPTH OF ORGANICS					
PORE SIZE DISC #1					
PORE SIZE DISC #2					
MOISTURE REGIME					
SOIL SURVEY MAP					
LEGEND CLASS					

ELC
PLANT SPECIES LIST

SITE: Tuck Creek
POLYGON: 4
DATE: June 25 2020
SURVEYOR(S): KB JS

LAYERS: 1 = CANOPY 2 = SUB-CANOPY 3 = UNDERSTOREY 4 = GROUND (GRD.) LAYER

ABUNDANCE CODES: R = RARE O = OCCASIONAL A = ABUNDANT D = DOMINANT

SPECIES CODE	LAYER 1	2	3	4	COL.
JUGL NIG					
SALI ALB					
FRAX AME					
POP DEL					
SALIX FRAG					
CALT SPEC					
JUR VIR					
VIB OPU OP					
ROSA WIL					
VIT RIP					
GALI VERS					
CORN SER					

SPECIES CODE	LAYER 1	2	3	4	COL.
SOLI CAN					
ACER NEG					
POA PRAT					
ERIG ANN					
ALLI PET					
PHALARIS					
IMP CAP					
IRIS SP.					
CAREX SP					X
SWAMP LAND					
DECI SHR					
LYTH SOL					
RAN ACRI					
WEEDED					

ELC COMMUNITY DESCRIPTION & CLASSIFICATION	SITE: Tuck Creek		POLYGON: 5	
	SURVEYOR(S): KB JS	DATE: June 25/20	TIME: start	
	UTMZ:	UTME:	UTMN:	finish

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
☐ TERRESTRIAL ☐ WETLAND ☐ AQUATIC	☐ ORGANIC ☐ MINERAL SOIL ☐ PARENT MIN. ☐ ACIDIC BEDRK. ☐ BASIC BEDRK. ☐ CARB. BEDRK.	☐ LACUSTRINE ☐ RIVERINE ☐ BOTTOMLAND ☐ TERRACE ☐ VALLEY SLOPE ☐ TABLELAND ☐ ROLL. UPLAND ☐ CLIFF ☐ TALUS ☐ CREVICE / CAVE ☐ ALVAR ☐ ROCKLAND ☐ BEACH / BAR ☐ SAND DUNE ☐ BLUFF	☐ NATURAL ☐ CULTURAL	☐ PLANKTON ☐ SUBMERGED ☐ FLOATING-LVD. ☐ GRAMINOID ☐ FORB ☐ LICHEN ☐ BRYOPHYTE ☐ DECIDUOUS ☐ CONIFEROUS ☐ MIXED	☐ LAKE ☐ POND ☐ RIVER ☐ STREAM ☐ MARSH ☐ SWAMP ☐ FEN ☐ BOG ☐ BARREN ☐ MEADOW ☐ PRAIRIE ☐ THICKET ☐ SAVANNAH ☐ WOODLAND ☐ FOREST ☐ PLANTATION
SITE ☐ OPEN WATER ☐ SHALLOW WATER ☑ SURFICIAL DEP. ☐ BEDROCK			**COVER** ☐ OPEN ☐ SHRUB ☐ TREED		

STAND DESCRIPTION:

	LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (up to 4 sp) (>> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1	CANOPY			
2	SUB-CANOPY			
3	UNDERSTOREY			
4	GRD. LAYER			

HT CODES: 1 = >25 m 2 = 10<HT ≤25 m 3 = 2<HT ≤10 m 4 = 1<HT ≤2 m 5 = 0.5<HT ≤1 m 6 = 0.2<HT ≤0.5 m 7 = HT<0.2 m

CVR CODES 0= NONE 1= 0% < CVR ≤ 10% 2= 10 < CVR ≤ 25% 3= 25 < CVR ≤ 60% 4= CVR > 60%

STAND COMPOSITION:	BA:

SIZE CLASS ANALYSIS:		< 10		10 - 24		25 - 50		> 50
STANDING SNAGS:		< 10		10 - 24		25 - 50		> 50
DEADFALL / LOGS:		< 10		10 - 24		25 - 50		> 50

ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE :		PIONEER		YOUNG		MID-AGE		MATURE		OLD GROWTH

SOIL ANALYSIS:

TEXTURE:	DEPTH TO MOTTLES / GLEY	g =	G=
MOISTURE:	DEPTH OF ORGANICS:		(cm)
HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK:		(cm)

COMMUNITY CLASSIFICATION:

		ELC CODE
COMMUNITY CLASS:		
COMMUNITY SERIES:		
ECOSITE:		
VEGETATION TYPE:		FOD7
☐ INCLUSION		
☐ COMPLEX		

Notes:

ELC STAND CHARACTERISTICS	SITE:
	POLYGON:
	DATE:
	SURVEYOR(S):

COMMUNITY PROFILE DIAGRAM

DISTURBANCE (CIRCLE ALL THAT APPLY)				
LOGGING/SUGAR BUSH	GAPS IN FOREST CANOPY	LIVESTOCK	INVASIVE SP./ GARDEN PLANTS	TRACKS/TRAILS/REC. USE
DUMPING	EARTH DISPLACEMENT	NOISE	DISEASE/DEATH OF TREES/HERBS	WIND THROW
DEER BROWSING	BEAVER ACTIVITY	FLOODING	FIRE/ICE DAMAGE	OTHER

Notes:

Trail

FOD 7

ELC

SOILS ONTARIO

SITE:
POLYGON:
DATE:
SURVEYOR(S):

Slope UTM

	P/A	PP	Dr	Position	Aspect	%	Type	Class	Z	EASTING	NORTHING
1											
2											
3											
4											
5											

SOIL	1	2	3	4	5
TEXTURE x HORIZON					
A TEXTURE					
COURSE FRAGMENTS					
B TEXTURE					
COURSE FRAGMENTS					
C TEXTURE					
COURSE FRAGMENTS					
EFFECTIVE TEXTURE					
SURFACE STONINESS					
SURFACE ROCKINESS					
DEPTH TO / OF					
MOTTLES					
GLEY					
BEDROCK					
WATER TABLE					
CARBONATES					
DEPTH OF ORGANICS					
PORE SIZE DISC #1					
PORE SIZE DISC #2					
MOISTURE REGIME					
SOIL SURVEY MAP					
LEGEND CLASS					

ELC

PLANT SPECIES LIST

SITE: Tuck Creek
POLYGON: 5
DATE: June 25 2020
SURVEYOR(S): KB JS

LAYERS: 1 = CANOPY 2 = SUB-CANOPY 3 = UNDERSTOREY 4 = GROUND (GRD.) LAYER

ABUNDANCE CODES: R = RARE O = OCCASIONAL A = ABUNDANT D = DOMINANT

SPECIES CODE	LAYER 1	2	3	4	COL.
JUGL NIG	D	A	O	R	
FRAX PEN					
ACER NEG					
CELT OCC					
POP BAL					
ACER SAC					
OSTR VIR					
ULM AME					

ELC COMMUNITY DESCRIPTION & CLASSIFICATION	SITE: Tuck Creek		POLYGON: 6	
	SURVEYOR(S): KB JS	DATE: June 26/20	TIME: start	
	UTMZ:	UTME:	UTMN:	finish

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
☐ TERRESTRIAL ☐ WETLAND ☐ AQUATIC	☐ ORGANIC ☐ MINERAL SOIL ☐ PARENT MIN. ☐ ACIDIC BEDRK. ☐ BASIC BEDRK. ☐ CARB. BEDRK.	☐ LACUSTRINE ☐ RIVERINE ☐ BOTTOMLAND ☐ TERRACE ☐ VALLEY SLOPE ☐ TABLELAND ☐ ROLL. UPLAND ☐ CLIFF ☐ TALUS ☐ CREVICE / CAVE ☐ ALVAR ☐ ROCKLAND ☐ BEACH / BAR ☐ SAND DUNE ☐ BLUFF	☐ NATURAL ☐ CULTURAL	☐ PLANKTON ☐ SUBMERGED ☐ FLOATING-LVD. ☐ GRAMINOID ☐ FORB ☐ LICHEN ☐ BRYOPHYTE ☐ DECIDUOUS ☐ CONIFEROUS ☐ MIXED	☐ LAKE ☐ POND ☐ RIVER ☐ STREAM ☐ MARSH ☐ SWAMP ☐ FEN ☐ BOG ☐ BARREN ☐ MEADOW ☐ PRAIRIE ☐ THICKET ☐ SAVANNAH ☐ WOODLAND ☐ FOREST ☐ PLANTATION
SITE ☐ OPEN WATER ☐ SHALLOW WATER ☑ SURFICIAL DEP. ☐ BEDROCK			**COVER** ☐ OPEN ☐ SHRUB ☐ TREED		

STAND DESCRIPTION:

	LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (up to 4 sp) (>> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1	CANOPY			
2	SUB-CANOPY			
3	UNDERSTOREY			
4	GRD. LAYER			

HT CODES: 1 = >25 m 2 = 10<HT≤25 m 3 = 2<HT≤10 m 4 = 1<HT≤2 m 5 = 0.5<HT≤1 m 6 = 0.2<HT≤0.5 m 7 = HT<0.2 m

CVR CODES 0= NONE 1= 0% < CVR ≤ 10% 2= 10 < CVR ≤ 25% 3= 25 < CVR ≤ 60% 4= CVR > 60%

STAND COMPOSITION:	BA:

SIZE CLASS ANALYSIS:		< 10		10 - 24		25 - 50		> 50
STANDING SNAGS:		< 10		10 - 24		25 - 50		> 50
DEADFALL / LOGS:		< 10		10 - 24		25 - 50		> 50

ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE :		PIONEER		YOUNG		MID-AGE		MATURE		OLD GROWTH

SOIL ANALYSIS:

TEXTURE:	DEPTH TO MOTTLES / GLEY	g =	G=
MOISTURE:	DEPTH OF ORGANICS:		(cm)
HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK:		(cm)

COMMUNITY CLASSIFICATION:

		ELC CODE
COMMUNITY CLASS:		
COMMUNITY SERIES:		
ECOSITE:		
VEGETATION TYPE:		FOD 4
INCLUSION		
COMPLEX		

Notes:

ELC STAND CHARACTERISTICS	SITE:
	POLYGON:
	DATE:
	SURVEYOR(S):

COMMUNITY PROFILE DIAGRAM

DISTURBANCE (CIRCLE ALL THAT APPLY)				
LOGGING/SUGAR BUSH	GAPS IN FOREST CANOPY	LIVESTOCK	INVASIVE SP./ GARDEN PLANTS	TRACKS/TRAILS/REC. USE
DUMPING	EARTH DISPLACEMENT	NOISE	DISEASE/DEATH OF TREES/HERBS	WIND THROW
DEER BROWSING	BEAVER ACTIVITY	FLOODING	FIRE/ICE DAMAGE	OTHER

Notes:

Check NO's reg list

ELC

SOILS ONTARIO

SITE:
POLYGON:
DATE:
SURVEYOR(S):

Slope UTM

	P/A	PP	Dr	Position	Aspect	%	Type	Class	Z	EASTING	NORTHING
1											
2											
3											
4											
5											

FOD4

close by Jewellery pond

SOIL	1	2	3	4	5
TEXTURE x HORIZON					
A TEXTURE					
COURSE FRAGMENTS					
B TEXTURE					
COURSE FRAGMENTS					
C TEXTURE					
COURSE FRAGMENTS					
EFFECTIVE TEXTURE					
SURFACE STONINESS					
SURFACE ROCKINESS					
DEPTH TO / OF					
MOTTLES					
GLEY					
BEDROCK					
WATER TABLE					
CARBONATES					
DEPTH OF ORGANICS					
PORE SIZE DISC #1					
PORE SIZE DISC #2					
MOISTURE REGIME					
SOIL SURVEY MAP					
LEGEND CLASS					

ELC PLANT SPECIES LIST

SITE: Tuck Creek
POLYGON: 6
DATE: June 15 2020
SURVEYOR(S): KB JS.

LAYERS: 1 = CANOPY 2 = SUB-CANOPY 3 = UNDERSTOREY 4 = GROUND (GRD.) LAYER

ABUNDANCE CODES: R = RARE O = OCCASIONAL A = ABUNDANT D = DOMINANT

SPECIES CODE	LAYER 1	2	3	4	COL.
THU OCC					
LARV LAR					
PRUN SER					
ACER SAC					
ULMUS					
FRAX SP					
horse chestnut				C	

This should say 7 (i skipped 7 when delineating the polygons in the field so I swapped this one to be polygon 7 and forgot to correct the front of the sheet)

ELC COMMUNITY DESCRIPTION & CLASSIFICATION

SITE: Trail creek | POLYGON: 15

SURVEYOR(S): KB NB | DATE: July 15/20 | TIME: start / finish

UTMZ: | UTME: | UTMN:

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
☐ TERRESTRIAL ☐ WETLAND ☐ AQUATIC	☐ ORGANIC ☐ MINERAL SOIL ☐ PARENT MIN. ☐ ACIDIC BEDRK. ☐ BASIC BEDRK. ☐ CARB. BEDRK.	☐ LACUSTRINE ☐ RIVERINE ☐ BOTTOMLAND ☐ TERRACE ☐ VALLEY SLOPE ☐ TABLELAND ☐ ROLL. UPLAND ☐ CLIFF ☐ TALUS ☐ CREVICE / CAVE ☐ ALVAR ☐ ROCKLAND ☐ BEACH / BAR ☐ SAND DUNE ☐ BLUFF	☐ NATURAL ☐ CULTURAL	☐ PLANKTON ☐ SUBMERGED ☐ FLOATING-LVD. ☐ GRAMINOID ☐ FORB ☐ LICHEN ☐ BRYOPHYTE ☐ DECIDUOUS ☐ CONIFEROUS ☐ MIXED	☐ LAKE ☐ POND ☐ RIVER ☐ STREAM ☐ MARSH ☐ SWAMP ☐ FEN ☐ BOG ☐ BARREN ☐ MEADOW ☐ PRAIRIE ☐ THICKET ☐ SAVANNAH ☐ WOODLAND ☐ FOREST ☐ PLANTATION
SITE			**COVER**		
☐ OPEN WATER ☑ SHALLOW WATER ☐ SURFICIAL DEP. ☐ BEDROCK			☐ OPEN ☐ SHRUB ☐ TREED		

STAND DESCRIPTION

	LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (up to 4 sp) (>> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1	CANOPY			
2	SUB-CANOPY			
3	UNDERSTOREY			
4	GRD. LAYER			Grasses = FORBS

HT CODES: 1 = >25 m 2 = 10<HT ≤25 m 3 = 2<HT ≤10 m 4 = 1<HT ≤2 m 5 = 0.5<HT ≤1 m 6 = 0.2<HT ≤0.5 m 7 = HT<0.2 m

CVR CODES 0= NONE 1= 0% < CVR ≤ 10% 2= 10 < CVR ≤ 25% 3= 25 < CVR ≤ 60% 4= CVR > 60%

STAND COMPOSITION: | BA:

SIZE CLASS ANALYSIS:		< 10		10 - 24		25 - 50		> 50
STANDING SNAGS:		< 10		10 - 24		25 - 50		> 50
DEADFALL / LOGS:		< 10		10 - 24		25 - 50		> 50

ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE :		PIONEER		YOUNG		MID-AGE		MATURE		OLD GROWTH

SOIL ANALYSIS

TEXTURE:	DEPTH TO MOTTLES / GLEY	g =	G=
MOISTURE:	DEPTH OF ORGANICS:		(cm)
HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK:		(cm)

COMMUNITY CLASSIFICATION:

		ELC CODE
COMMUNITY CLASS:		
COMMUNITY SERIES:		
ECOSITE:		
VEGETATION TYPE:		CUM1-1
☐ INCLUSION		
☐ COMPLEX		

Notes:

ELC STAND CHARACTERISTICS

SITE:

POLYGON:

DATE:

SURVEYOR(S):

COMMUNITY PROFILE DIAGRAM

DISTURBANCE (CIRCLE ALL THAT APPLY)				
LOGGING/SUGAR BUSH	GAPS IN FOREST CANOPY	LIVESTOCK	INVASIVE SP./ GARDEN PLANTS	TRACKS/TRAILS/REC. USE
DUMPING	EARTH DISPLACEMENT	NOISE	DISEASE/DEATH OF TREES/HERBS	WIND THROW
DEER BROWSING	BEAVER ACTIVITY	FLOODING	FIRE/ICE DAMAGE	OTHER

Notes:

Could not reach polygon

ELC
SOILS ONTARIO

SITE:
POLYGON:
DATE:
SURVEYOR(S):

	P/A	PP	Dr	Position	Aspect	Slope %	Type	Class	Z	UTM EASTING	UTM NORTHING
1											
2											
3											
4											
5											

SOIL	1	2	3	4	5
TEXTURE x HORIZON					
A TEXTURE					
COURSE FRAGMENTS					
B TEXTURE					
COURSE FRAGMENTS					
C TEXTURE					
COURSE FRAGMENTS					
EFFECTIVE TEXTURE					
SURFACE STONINESS					
SURFACE ROCKINESS					
DEPTH TO / OF					
MOTTLES					
GLEY					
BEDROCK					
WATER TABLE					
CARBONATES					
DEPTH OF ORGANICS					
PORE SIZE DISC #1					
PORE SIZE DISC #2					
MOISTURE REGIME					
SOIL SURVEY MAP					
LEGEND CLASS					

ELC
PLANT SPECIES LIST

SITE: Tuck Creek
POLYGON: F
DATE: July 15 2020
SURVEYOR(S): KB ND

LAYERS: 1 = CANOPY 2 = SUB-CANOPY 3 = UNDERSTOREY 4 = GROUND (GRD.) LAYER
ABUNDANCE CODES: R = RARE O = OCCASIONAL A = ABUNDANT D = DOMINANT

SPECIES CODE	LAYER 1	2	3	4	COL.
JUGLNIG					
ULM AME					
SALI ALB					
POP TRE					
POP BALS					
PRUN AV					
LONI SP					
VIT RIP					
CLEMVIR					
LONITAT					
~~LONI MAC~~					
ROSA MUL					
RHUS TYP					
RHAM CAT					
CORN RAC					

SPECIES CODE	LAYER 1	2	3	4	COL.
IRIS SP					
POA PRAT					
BROM INE					
CIR ARV					
SOLI CAN					
PAST SAT					
DAUCCAR					
VICIA CRA					
INDIAN HEMP					
DIP FUL					

CUM 1-1

orange

GAR VAR

ELC COMMUNITY DESCRIPTION & CLASSIFICATION	SITE: Trek Creek	POLYGON: 8	
	SURVEYOR(S): KB JS ND	DATE:	TIME: start / finish
	UTMZ:	UTME:	UTMN:

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
☐ TERRESTRIAL ☐ WETLAND ☐ AQUATIC	☐ ORGANIC ☐ MINERAL SOIL ☐ PARENT MIN. ☐ ACIDIC BEDRK. ☐ BASIC BEDRK. ☐ CARB. BEDRK.	☐ LACUSTRINE ☐ RIVERINE ☐ BOTTOMLAND ☐ TERRACE ☐ VALLEY SLOPE ☐ TABLELAND ☐ ROLL. UPLAND ☐ CLIFF ☐ TALUS ☐ CREVICE / CAVE ☐ ALVAR ☐ ROCKLAND ☐ BEACH / BAR ☐ SAND DUNE ☐ BLUFF	☐ NATURAL ☐ CULTURAL	☐ PLANKTON ☐ SUBMERGED ☐ FLOATING-LVD. ☐ GRAMINOID ☐ FORB ☐ LICHEN ☐ BRYOPHYTE ☐ DECIDUOUS ☐ CONIFEROUS ☐ MIXED	☐ LAKE ☐ POND ☐ RIVER ☐ STREAM ☐ MARSH ☐ SWAMP ☐ FEN ☐ BOG ☐ BARREN ☐ MEADOW ☐ PRAIRIE ☐ THICKET ☐ SAVANNAH ☐ WOODLAND ☐ FOREST ☐ PLANTATION
SITE ☐ OPEN WATER ☐ SHALLOW WATER ☑ SURFICIAL DEP ☐ BEDROCK			**COVER** ☐ OPEN ☐ SHRUB ☐ TREED		

STAND DESCRIPTION:

	LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (up to 4 sp) (>> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1	CANOPY			
2	SUB-CANOPY			
3	UNDERSTOREY			
4	GRD. LAYER			

HT CODES: 1 = >25 m 2 = 10<HT≤25 m 3 = 2<HT≤10 m 4 = 1<HT≤2 m 5 = 0.5<HT≤1 m 6 = 0.2<HT≤0.5 m 7 = HT<0.2 m

CVR CODES 0= NONE 1= 0% < CVR ≤ 10% 2= 10 < CVR ≤ 25% 3= 25 < CVR ≤ 60% 4= CVR > 60%

STAND COMPOSITION:	BA:

SIZE CLASS ANALYSIS:	☐	< 10	☐	10 - 24	☐	25 - 50	☐	> 50
STANDING SNAGS:	☐	< 10	☐	10 - 24	☐	25 - 50	☐	> 50
DEADFALL / LOGS:	☐	< 10	☐	10 - 24	☐	25 - 50	☐	> 50

ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE :		PIONEER		YOUNG		MID-AGE		MATURE		OLD GROWTH

SOIL ANALYSIS:

TEXTURE:	DEPTH TO MOTTLES / GLEY	g =	G=
MOISTURE:	DEPTH OF ORGANICS:		(cm)
HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK:		(cm)

COMMUNITY CLASSIFICATION:

		ELC CODE
COMMUNITY CLASS:		
COMMUNITY SERIES:		
ECOSITE:		
VEGETATION TYPE:		FOD 7
☐ INCLUSION		
☐ COMPLEX		

Notes:

ELC STAND CHARACTERISTICS	SITE:
	POLYGON:
	DATE:
	SURVEYOR(S):

COMMUNITY PROFILE DIAGRAM

DISTURBANCE (CIRCLE ALL THAT APPLY)				
LOGGING/SUGAR BUSH	GAPS IN FOREST CANOPY	LIVESTOCK	INVASIVE SP./ GARDEN PLANTS	TRACKS/TRAILS/REC. USE
DUMPING	EARTH DISPLACEMENT	NOISE	DISEASE/DEATH OF TREES/HERBS	WIND THROW
DEER BROWSING	BEAVER ACTIVITY	FLOODING	FIRE/ICE DAMAGE	OTHER

Notes:

ELC

SOILS ONTARIO

SITE:
POLYGON:
DATE:
SURVEYOR(S):

Slope UTM

	P/A	PP	Dr	Position	Aspect	%	Type	Class	Z	EASTING	NORTHING
1											
2											
3											
4											
5											

SOIL	1	2	3	4	5
TEXTURE x HORIZON					
A TEXTURE					
COURSE FRAGMENTS					
B TEXTURE					
COURSE FRAGMENTS					
C TEXTURE					
COURSE FRAGMENTS					
EFFECTIVE TEXTURE					
SURFACE STONINESS					
SURFACE ROCKINESS					
DEPTH TO / OF					
MOTTLES					
GLEY					
BEDROCK					
WATER TABLE					
CARBONATES					
DEPTH OF ORGANICS					
PORE SIZE DISC #1					
PORE SIZE DISC #2					
MOISTURE REGIME					
SOIL SURVEY MAP					
LEGEND CLASS					

Rotate

GEUM CANA
RAN ACR RECURV
Symp OFF

ELC PLANT SPECIES LIST

SITE: Tuckcreek
POLYGON: 8
DATE: July 15
SURVEYOR(S): KB ND; KB BS

LAYERS: 1 = CANOPY 2 = SUB-CANOPY 3 = UNDERSTOREY 4 = GROUND (GRD.) LAYER
ABUNDANCE CODES: R = RARE O = OCCASIONAL A = ABUNDANT D = DOMINANT

SPECIES CODE	LAYER 1	2	3	4	COL.
FRAX NVE					
FRAX PEN					
JUGL NIG					
PRUNUS					
ACER PLAT					
ACER SAC					
ACER NEG					
SAL LUCID					
ACER SAC					
SOLI DUL					
G. Bragweed					
PLAN MAJ					
Unknown					
Viola sp.					
Unknown herb					
AMB ARTE					
DAUT Carota					
Wild onion					
ERIGANN					
LAR SIBI					
LYS CIL					
ACER NEG					
CAREX BLAN					
RUDB LACI					
ART VUL					
POA SP					
SALIX SP					
RHUS CAR					
RUBUS OCC					
HIERACIUM SP					
VIT RIP					
CRAT SP.					

SPECIES CODE	LAYER 1	2	3	4	COL.
LYM SIL					
Grasses					
POPO PELT					
VIBE sp					A
ACER SAC					
Unknown herb					
ALLI PEC					
JUNC TEN					
POA PRAT					
ONLE HEX					
Impatiens					
CIRL LUT					
VIBE ROB					
SYMP LAE					
ARIS THI					
HESP MAT					
RHOE LYL					
Nipple wort					
RAN ACR					
Sol. Seal					
LOBE INF					
POA PALU					
MYO SCORP					
wild onion					
VERT DIO (VIRG)					
LEONARD					
LYTH SAL					
ARCT LAP					
RIBES HIRT					
ERIGANN					
PILE PUM					
LIN OFF					
SOLI CAN					

Page ..... of .....

Water Cross

ELC COMMUNITY DESCRIPTION & CLASSIFICATION

SITE: Tuck Creek		POLYGON: 9	
SURVEYOR(S): July 15 2020 JKB ND	DATE:	TIME: start	
		finish	
UTMZ: 17	UTME:	UTMN:	

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
☐ TERRESTRIAL ☐ WETLAND ☐ AQUATIC	☐ ORGANIC ☐ MINERAL SOIL ☐ PARENT MIN. ☐ ACIDIC BEDRK. ☐ BASIC BEDRK. ☐ CARB. BEDRK.	☐ LACUSTRINE ☐ RIVERINE ☐ BOTTOMLAND ☐ TERRACE ☐ VALLEY SLOPE ☐ TABLELAND ☐ ROLL. UPLAND ☐ CLIFF ☐ TALUS ☐ CREVICE / CAVE ☐ ALVAR ☐ ROCKLAND ☐ BEACH / BAR ☐ SAND DUNE ☐ BLUFF	☐ NATURAL ☐ CULTURAL	☐ PLANKTON ☐ SUBMERGED ☐ FLOATING-LVD. ☐ GRAMINOID ☐ FORB ☐ LICHEN ☐ BRYOPHYTE ☐ DECIDUOUS ☐ CONIFEROUS ☐ MIXED	☐ LAKE ☐ POND ☐ RIVER ☐ STREAM ☐ MARSH ☐ SWAMP ☐ FEN ☐ BOG ☐ BARREN ☐ MEADOW ☐ PRAIRIE ☐ THICKET ☐ SAVANNAH ☐ WOODLAND ☐ FOREST ☐ PLANTATION
SITE ☐ OPEN WATER ☑ SHALLOW WATER ☐ SURFICIAL DEP. ☐ BEDROCK			**COVER** ☐ OPEN ☐ SHRUB ☐ TREED		

STAND DESCRIPTION:

	LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (up to 4 sp) (>> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1	CANOPY			QUER RUB > ACER SOG
2	SUB-CANOPY			
3	UNDERSTOREY			
4	GRD. LAYER			

HT CODES: 1 = >25 m 2 = 10<HT≤25 m 3 = 2<HT≤10 m 4 = 1<HT≤2 m 5 = 0.5<HT≤1 m 6 = 0.2<HT≤0.5 m 7 = HT<0.2 m

CVR CODES 0= NONE 1= 0% < CVR ≤ 10% 2= 10 < CVR ≤ 25% 3= 25 < CVR ≤ 60% 4= CVR > 60%

STAND COMPOSITION:	BA:

SIZE CLASS ANALYSIS:		< 10		10 - 24		25 - 50		> 50
STANDING SNAGS:		< 10		10 - 24		25 - 50		> 50
DEADFALL / LOGS:		< 10		10 - 24		25 - 50		> 50

ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE :		PIONEER		YOUNG		MID-AGE		MATURE		OLD GROWTH

SOIL ANALYSIS:

TEXTURE:	DEPTH TO MOTTLES / GLEY	g =	G=
MOISTURE:	DEPTH OF ORGANICS:		(cm)
HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK:		(cm)

COMMUNITY CLASSIFICATION:

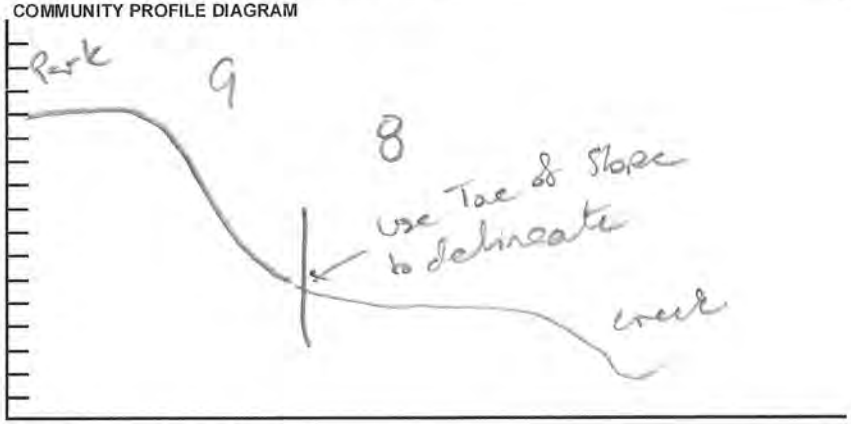
		ELC CODE
COMMUNITY CLASS:		
COMMUNITY SERIES:		
ECOSITE:		
VEGETATION TYPE:		FODS-3
☐ INCLUSION		
☐ COMPLEX		

Notes:

ELC STAND CHARACTERISTICS

SITE:	
POLYGON:	
DATE:	
SURVEYOR(S):	

COMMUNITY PROFILE DIAGRAM



DISTURBANCE (CIRCLE ALL THAT APPLY)				
LOGGING/SUGAR BUSH	GAPS IN FOREST CANOPY	LIVESTOCK	INVASIVE SP./ GARDEN PLANTS	TRACKS/TRAILS/REC. USE
DUMPING	EARTH DISPLACEMENT	NOISE	DISEASE/DEATH OF TREES/HERBS	WIND THROW
DEER BROWSING	BEAVER ACTIVITY	FLOODING	FIRE/ICE DAMAGE	OTHER

Notes:

FOD

ELC
SOILS ONTARIO

SITE:
POLYGON:
DATE:
SURVEYOR(S):

Slope UTM

	P/A	PP	Dr	Position	Aspect	%	Type	Class	Z	EASTING	NORTHING
1											
2											
3											
4											
5											

SOIL	1	2	3	4	5
TEXTURE x HORIZON					
A TEXTURE					
COURSE FRAGMENTS					
B TEXTURE					
COURSE FRAGMENTS					
C TEXTURE					
COURSE FRAGMENTS					
EFFECTIVE TEXTURE					
SURFACE STONINESS					
SURFACE ROCKINESS					
DEPTH TO / OF					
MOTTLES					
GLEY					
BEDROCK					
WATER TABLE					
CARBONATES					
DEPTH OF ORGANICS					
PORE SIZE DISC #1					
PORE SIZE DISC #2					
MOISTURE REGIME					
SOIL SURVEY MAP					
LEGEND CLASS					

Rock outcrop in clearing, boreal hardwoods; Ash present

Rock outcrop in clearing, boreal hardwoods; Ash present

Rock outcrop in clearing, boreal hardwoods; Ash present

ELC COMMUNITY DESCRIPTION & CLASSIFICATION	SITE: Tuck Creek		POLYGON: 10	
	SURVEYOR(S): KB ND	DATE: July 15/20	TIME: start	
			finish	
	UTMZ:	UTME:	UTMN:	

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
☐ TERRESTRIAL ☐ WETLAND ☐ AQUATIC	☐ ORGANIC ☐ MINERAL SOIL ☐ PARENT MIN. ☐ ACIDIC BEDRK. ☐ BASIC BEDRK. ☐ CARB. BEDRK.	☐ LACUSTRINE ☐ RIVERINE ☐ BOTTOMLAND ☐ TERRACE ☐ VALLEY SLOPE ☐ TABLELAND ☐ ROLL. UPLAND ☐ CLIFF ☐ TALUS ☐ CREVICE / CAVE ☐ ALVAR ☐ ROCKLAND ☐ BEACH / BAR ☐ SAND DUNE ☐ BLUFF	☐ NATURAL ☐ CULTURAL	☐ PLANKTON ☐ SUBMERGED ☐ FLOATING-LVD. ☐ GRAMINOID ☐ FORB ☐ LICHEN ☐ BRYOPHYTE ☐ DECIDUOUS ☐ CONIFEROUS ☐ MIXED	☐ LAKE ☐ POND ☐ RIVER ☐ STREAM ☐ MARSH ☐ SWAMP ☐ FEN ☐ BOG ☐ BARREN ☐ MEADOW ☐ PRAIRIE ☐ THICKET ☐ SAVANNAH ☐ WOODLAND ☐ FOREST ☐ PLANTATION
SITE ☐ OPEN WATER ☑ SHALLOW WATER ☐ SURFICIAL DEP. ☐ BEDROCK			**COVER** ☐ OPEN ☐ SHRUB ☐ TREED		

STAND DESCRIPTION:

	LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (up to 4 sp) (>> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1	CANOPY			Thuj occ > Acer SIL > SALI FRAG
2	SUB-CANOPY			Thuj occ > RHUS Typ
3	UNDERSTOREY			RHUS Typ
4	GRD. LAYER			POA PRAT = BROMINE > CIRS ARV

HT CODES: 1 = >25 m 2 = 10<HT≤25 m 3 = 2<HT≤10 m 4 = 1<HT≤2 m 5 = 0.5<HT≤1 m 6 = 0.2<HT≤0.5 m 7 = HT≤0.2 m

CVR CODES 0= NONE 1= 0% < CVR ≤ 10% 2= 10 < CVR ≤ 25% 3= 25 < CVR ≤ 60% 4= CVR > 60%

STAND COMPOSITION:	BA:

SIZE CLASS ANALYSIS:		< 10		10 - 24		25 - 50		> 50
STANDING SNAGS:		< 10		10 - 24		25 - 50		> 50
DEADFALL / LOGS:		< 10		10 - 24		25 - 50		> 50

ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE :		PIONEER		YOUNG		MID-AGE		MATURE		OLD GROWTH

SOIL ANALYSIS:

TEXTURE:	DEPTH TO MOTTLES / GLEY	g =	G=
MOISTURE:	DEPTH OF ORGANICS:		(cm)
HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK:		(cm)

COMMUNITY CLASSIFICATION:

		ELC CODE
COMMUNITY CLASS:		
COMMUNITY SERIES:		
ECOSITE:		
VEGETATION TYPE:		CUT/cum complex
☐ INCLUSION		
☐ COMPLEX		

Notes:

ELC STAND CHARACTERISTICS	SITE:
	POLYGON:
	DATE:
	SURVEYOR(S):

COMMUNITY PROFILE DIAGRAM

DISTURBANCE (CIRCLE ALL THAT APPLY)				
LOGGING/SUGAR BUSH	GAPS IN FOREST CANOPY	LIVESTOCK	INVASIVE SP./ GARDEN PLANTS	TRACKS/TRAILS/REC. USE
DUMPING	EARTH DISPLACEMENT	NOISE	DISEASE/DEATH OF TREES/HERBS	WIND THROW
DEER BROWSING	BEAVER ACTIVITY	FLOODING	FIRE/ICE DAMAGE	OTHER

Notes:

(wood PLC parking lot)

ELC SOILS ONTARIO	SITE: POLYGON: DATE: SURVEYOR(S):

Slope UTM

	P/A	PP	Dr	Position	Aspect	%	Type	Class	Z	EASTING	NORTHING
1											
2											
3											
4											
5											

SOIL	1	2	3	4	5
TEXTURE x HORIZON					
A TEXTURE					
COURSE FRAGMENTS					
B TEXTURE					
COURSE FRAGMENTS					
C TEXTURE					
COURSE FRAGMENTS					
EFFECTIVE TEXTURE					
SURFACE STONINESS					
SURFACE ROCKINESS					
DEPTH TO / OF					
MOTTLES					
GLEY					
BEDROCK					
WATER TABLE					
CARBONATES					
DEPTH OF ORGANICS					
PORE SIZE DISC #1					
PORE SIZE DISC #2					
MOISTURE REGIME					
SOIL SURVEY MAP					
LEGEND CLASS					

(Um) CUT complex

European skipper.

Cabbage white

2 spotted bumblebee

ELC PLANT SPECIES LIST	SITE: Tuck Creek POLYGON: 10 DATE: July 15 2020 SURVEYOR(S): KB ND

LAYERS: 1 = CANOPY 2 = SUB-CANOPY 3 = UNDERSTOREY 4 = GROUND (GRD.) LAYER

ABUNDANCE CODES: R = RARE O = OCCASIONAL A = ABUNDANT D = DOMINANT

SPECIES CODE	LAYER 1	2	3	4	COL.
THUJ OCC		R			
ACER PLA	R	R			
SALI FRAG	R	R			
GLED TRI		R	R		
ACER NEG	O	R			
JUGL NIG	O	O	O	R	
POP DEL	R				
TILI CORD	R	R			
ALEO ODE		R			
POP TRE					
ERIG RAPA					
DAU CAR					
ASPOFF					
garlic					
ACER NEG					
DSV					
CORN SER					
RUB IDEA			O		
RUB OCC			R		
SALIX EXIG			R		
RHUS TYP			O		
REMOVED					
SALI DIS					
ROSA MULT					
RHUS AROM					
PRUN VIR					
RHAM CAT			D		
VIB OPU					
VIT RIP					

SPECIES CODE	LAYER 1	2	3	4	COL.
ASCL SYR					
CIRS ARV					
POA PRAT					
BROM INE					
HESP MAT					
LEP VULG					
SOLI CAN					
ALL PET					
VICIA CRA					
DIPS FULL					
ARCT LAP					
L. cylindrica					
RUM CRISP					
SYMP LAN					
HYP PERF					
Lonicera tat					
W campion					
Phalaris					
Impatiens CAP					
wild parsnip					
Lapsana					
Equisetum sp					
GAL PAL					
LYTH SAL					
ERIGAN					
LOT CORN					
DAUCUS					
PART VIT					
TYPH ANG					
GER MUR					
CONV ARV					

Penny mustard

THLA ARV

ELC
COMMUNITY DESCRIPTION & CLASSIFICATION

SITE: Tuck Creek		POLYGON: 11	
SURVEYOR(S): KB ND	DATE: July 15/24	TIME: start	
		finish	
UTMZ:	UTME:	UTMN:	

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
☐ TERRESTRIAL ☐ WETLAND ☐ AQUATIC	☐ ORGANIC ☐ MINERAL SOIL ☐ PARENT MIN. ☐ ACIDIC BEDRK. ☐ BASIC BEDRK. ☐ CARB. BEDRK.	☐ LACUSTRINE ☐ RIVERINE ☐ BOTTOMLAND ☐ TERRACE ☐ VALLEY SLOPE ☐ TABLELAND ☐ ROLL. UPLAND ☐ CLIFF ☐ TALUS ☐ CREVICE / CAVE ☐ ALVAR ☐ ROCKLAND ☐ BEACH / BAR ☐ SAND DUNE ☐ BLUFF	☐ NATURAL ☐ CULTURAL	☐ PLANKTON ☐ SUBMERGED ☐ FLOATING-LVD. ☐ GRAMINOID ☐ FORB ☐ LICHEN ☐ BRYOPHYTE ☐ DECIDUOUS ☐ CONIFEROUS ☐ MIXED	☐ LAKE ☐ POND ☐ RIVER ☐ STREAM ☐ MARSH ☐ SWAMP ☐ FEN ☐ BOG ☐ BARREN ☐ MEADOW ☐ PRAIRIE ☐ THICKET ☐ SAVANNAH ☐ WOODLAND ☐ FOREST ☐ PLANTATION
SITE ☐ OPEN WATER ☑ SHALLOW WATER ☑ SURFICIAL DEP. ☐ BEDROCK			**COVER** ☐ OPEN ☐ SHRUB ☐ TREED		

STAND DESCRIPTION:

	LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (up to 4 sp) (>> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1	CANOPY			THUJ > PICE MAR > SALIX >
2	SUB-CANOPY			ABIE > THUJ
3	UNDERSTOREY			ABIE BAL > FRAX
4	GRD. LAYER			RUB PUB > Unidentified sp.

HT CODES: 1 = >25 m 2 = 10<HT≤25 m 3 = 2<HT≤10 m 4 = 1<HT≤2 m 5 = 0.5<HT≤1 m 6 = 0.2<HT≤0.5 m 7 = HT<0.2 m

CVR CODES 0= NONE 1= 0% < CVR ≤ 10% 2= 10 < CVR ≤ 25% 3= 25 < CVR ≤ 60% 4= CVR > 60%

STAND COMPOSITION:	BA:

SIZE CLASS ANALYSIS:		< 10		10 - 24		25 - 50		> 50
STANDING SNAGS:		< 10		10 - 24		25 - 50		> 50
DEADFALL / LOGS:		< 10		10 - 24		25 - 50		> 50

ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE :		PIONEER		YOUNG		MID-AGE		MATURE		OLD GROWTH

SOIL ANALYSIS:

TEXTURE:	DEPTH TO MOTTLES / GLEY	g =	G=
MOISTURE:	DEPTH OF ORGANICS:		(cm)
HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK:		(cm)

COMMUNITY CLASSIFICATION:

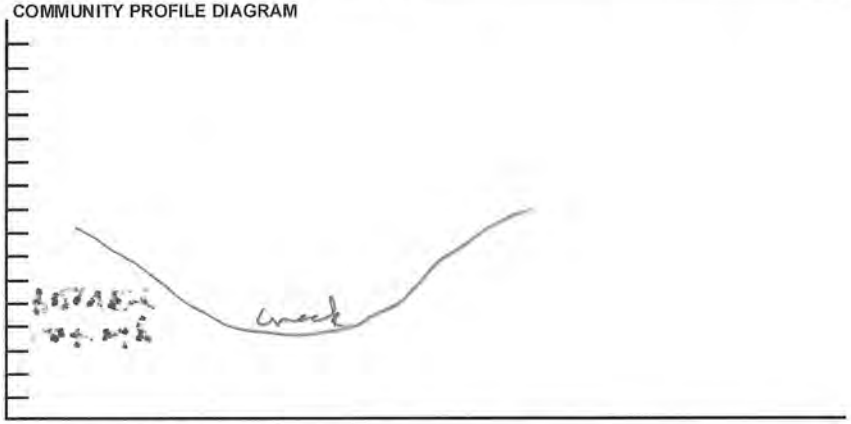
		ELC CODE
COMMUNITY CLASS:		
COMMUNITY SERIES:		
ECOSITE:		
VEGETATION TYPE:		FOD 7 –
☐ INCLUSION		
☐ COMPLEX		

Notes:

ELC
STAND CHARACTERISTICS

SITE:	
POLYGON:	
DATE:	
SURVEYOR(S):	

COMMUNITY PROFILE DIAGRAM



DISTURBANCE (CIRCLE ALL THAT APPLY)				
LOGGING/SUGAR BUSH	GAPS IN FOREST CANOPY	LIVESTOCK	INVASIVE SP./ GARDEN PLANTS	TRACKS/TRAILS/REC. USE
DUMPING	EARTH DISPLACEMENT	NOISE	DISEASE/DEATH OF TREES/HERBS	WIND THROW
DEER BROWSING	BEAVER ACTIVITY	FLOODING	FIRE/ICE DAMAGE	OTHER

Notes:

Gerbose

EAB

wraith don beware EAB dieback

NOCA - carrying nest material

HOFI Grackles
CEWA Deer

Edge of WBNV
Lowland PMRG

E Fork Trail
Ebony Jewel
wing

WAVEE

MALLARD

Acer Plat becomes more dominant ~~after~~ further South.

Fish Present (Fish or Crow?)
Width & stretch ROC PSED Dam.

ELC SOILS ONTARIO	SITE:
	POLYGON:
	DATE:
	SURVEYOR(S):

Slope UTM

	P/A	PP	Dr	Position	Aspect	%	Type	Class	Z	EASTING	NORTHING
1											
2											
3											
4											
5											

SOIL	1	2	3	4	5
TEXTURE x HORIZON					
A TEXTURE					
COURSE FRAGMENTS					
B TEXTURE					
COURSE FRAGMENTS					
C TEXTURE					
COURSE FRAGMENTS					
EFFECTIVE TEXTURE					
SURFACE STONINESS					
SURFACE ROCKINESS					
DEPTH TO / OF					
MOTTLES					
GLEY					
BEDROCK					
WATER TABLE					
CARBONATES					
DEPTH OF ORGANICS					
PORE SIZE DISC #1					
PORE SIZE DISC #2					
MOISTURE REGIME					
SOIL SURVEY MAP					
LEGEND CLASS					

ELC PLANT SPECIES LIST	SITE: Tuck Creek
	POLYGON: 16
	DATE: July 15 2010
	SURVEYOR(S): KB ND

LAYERS: 1 = CANOPY 2 = SUB-CANOPY 3 = UNDERSTOREY 4 = GROUND (GRD.) LAYER

ABUNDANCE CODES: R = RARE O = OCCASIONAL A = ABUNDANT D = DOMINANT

SPECIES CODE	LAYER 1	2	3	4	COL.
JUGL NIG					
FRAX AME					
CATAL SPE					
ULM AME					
MORUS ALB					
ROBPSEU					
ACER PLAT					
ACER NEG					
SORB EURO					
SYM JE					
HYP PERF					
PYRUS AUS					
SOL DULC					
ACER PLAT					
SALIX WCRK					
QUER MAC		R			
URT DIO					
LAPS COM					
cat nip					
PRIVET					
Poison IVY					
MOR ALB					
RHAM CAT					
VITRIP					
CORN SER					
SALIX DIS					
PARTVIT					

SPECIES CODE	LAYER 1	2	3	4	COL.
PHAL ARUN					
ALLI PET					
DACT GLOM					
bulbic					
IMP CAP					
SONCAN					
TYPH LAT					
ARCT MIN					
LIRSARV					
Clearings					
SOL DULC					
LEUM VUL					
RUM CRISP					
LAPS COM					
ERIGERN					
Symphoricarpos					
LYTH SAL					
POA PRAT					
GLECHED					
HESP MAT					
Water marg.					L.O.D
TUSS FARF					
EQUI ARV					
Goldenrod.					
GLY STRI					
Sym Lanc.					
ABR TRI					
BIDEN SPRN					
TARA OFF					
DSV					
CAREX SP					X

- (GNV (Big))

ELC COMMUNITY DESCRIPTION & CLASSIFICATION	SITE: Tuck Creek		POLYGON: 12	
	SURVEYOR(S): KB ND	DATE: July 05/20	TIME: start	
			finish	
	UTMZ:	UTME:	UTMN:	

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
☐ TERRESTRIAL ☐ WETLAND ☐ AQUATIC	☐ ORGANIC ☐ MINERAL SOIL ☐ PARENT MIN. ☐ ACIDIC BEDRK. ☐ BASIC BEDRK. ☐ CARB. BEDRK.	☐ LACUSTRINE ☐ RIVERINE ☐ BOTTOMLAND ☐ TERRACE ☐ VALLEY SLOPE ☐ TABLELAND ☐ ROLL. UPLAND ☐ CLIFF ☐ TALUS ☐ CREVICE / CAVE ☐ ALVAR ☐ ROCKLAND ☐ BEACH / BAR ☐ SAND DUNE ☐ BLUFF	☐ NATURAL ☐ CULTURAL	☐ PLANKTON ☐ SUBMERGED ☐ FLOATING-LVD. ☐ GRAMINOID ☐ FORB ☐ LICHEN ☐ BRYOPHYTE ☐ DECIDUOUS ☐ CONIFEROUS ☐ MIXED	☐ LAKE ☐ POND ☐ RIVER ☐ STREAM ☐ MARSH ☐ SWAMP ☐ FEN ☐ BOG ☐ BARREN ☐ MEADOW ☐ PRAIRIE ☐ THICKET ☐ SAVANNAH ☐ WOODLAND ☐ FOREST ☐ PLANTATION
SITE			**COVER**		
☐ OPEN WATER ☒ SHALLOW WATER ☐ SURFICIAL DEP. ☐ BEDROCK			☐ OPEN ☐ SHRUB ☐ TREED		

STAND DESCRIPTION:

	LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (up to 4 sp) (>> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1	CANOPY			ACER NEG > Jug! Nig
2	SUB-CANOPY			
3	UNDERSTOREY			
4	GRD. LAYER			Phal arun > ALLI PET

HT CODES: 1 = >25 m 2 = 10<HT≤25 m 3 = 2<HT≤10 m 4 = 1<HT≤2 m 5 = 0.5<HT≤1 m 6 = 0.2<HT≤0.5 m 7 = HT<0.2 m

CVR CODES 0= NONE 1= 0% < CVR ≤ 10% 2= 10 < CVR ≤ 25% 3= 25 < CVR ≤ 60% 4= CVR > 60%

STAND COMPOSITION:	BA:

SIZE CLASS ANALYSIS:		< 10		10 - 24		25 - 50		> 50
	O		O		R			
STANDING SNAGS:		< 10		10 - 24		25 - 50		> 50
DEADFALL / LOGS:		< 10		10 - 24		25 - 50		> 50

ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE :		PIONEER		YOUNG		MID-AGE		MATURE		OLD GROWTH

SOIL ANALYSIS:

TEXTURE:	DEPTH TO MOTTLES / GLEY	g =	G=
MOISTURE:	DEPTH OF ORGANICS:		(cm)
HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK:		(cm)

COMMUNITY CLASSIFICATION:

		ELC CODE
COMMUNITY CLASS:		
COMMUNITY SERIES:		
ECOSITE:		
VEGETATION TYPE:		CUW1
INCLUSION		
COMPLEX		

Notes:

ELC STAND CHARACTERISTICS	SITE:
	POLYGON:
	DATE:
	SURVEYOR(S):

COMMUNITY PROFILE DIAGRAM

DISTURBANCE (CIRCLE ALL THAT APPLY)				
LOGGING/SUGAR BUSH	GAPS IN FOREST CANOPY	LIVESTOCK	INVASIVE SP./ GARDEN PLANTS	TRACKS/TRAILS/REC. USE
DUMPING	EARTH DISPLACEMENT	NOISE	DISEASE/DEATH OF TREES/HERBS	WIND THROW
DEER BROWSING	BEAVER ACTIVITY	FLOODING	FIRE/ICE DAMAGE	OTHER

Notes:

EOYA

Similar to Wood PLC Polygon but more trees

FOD7/trem Cover complex

Use Sp. list from Wood PLC polygon w greater Canopy Cover

ELC SOILS ONTARIO	SITE:
	POLYGON:
	DATE:
	SURVEYOR(S):

	P/A	PP	Dr	Position	Aspect	Slope %	Type	Class	Z	UTM EASTING	UTM NORTHING
1											
2											
3											
4											
5											

SOIL	1	2	3	4	5
TEXTURE x HORIZON					
A TEXTURE					
COURSE FRAGMENTS					
B TEXTURE					
COURSE FRAGMENTS					
C TEXTURE					
COURSE FRAGMENTS					
EFFECTIVE TEXTURE					
SURFACE STONINESS					
SURFACE ROCKINESS					
DEPTH TO / OF					
MOTTLES					
GLEY					
BEDROCK					
WATER TABLE					
CARBONATES					
DEPTH OF ORGANICS					
PORE SIZE DISC #1					
PORE SIZE DISC #2					
MOISTURE REGIME					
SOIL SURVEY MAP					
LEGEND CLASS					

ELC PLANT SPECIES LIST	SITE: Twin Creek
	POLYGON: 12
	DATE: July 15 2020
	SURVEYOR(S): KB ND

LAYERS: 1 = CANOPY 2 = SUB-CANOPY 3 = UNDERSTOREY 4 = GROUND (GRD.) LAYER

ABUNDANCE CODES: R = RARE O = OCCASIONAL A = ABUNDANT D = DOMINANT

SPECIES CODE	LAYER 1	2	3	4	COL.
ACER NEG					
FRAX SP					
JUGL NIG					
LONI TAT					
VI RIP					

SPECIES CODE	LAYER 1	2	3	4	COL.
PINU STRO					
ALLI PET					

ELC COMMUNITY DESCRIPTION & CLASSIFICATION	SITE: Tuck creek		POLYGON: 13	
	SURVEYOR(S): KB ND	DATE: July 15/20	TIME: start	
	UTMZ:	UTME:	UTMN:	finish

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
☐ TERRESTRIAL ☐ WETLAND ☐ AQUATIC	☐ ORGANIC ☐ MINERAL SOIL ☐ PARENT MIN. ☐ ACIDIC BEDRK. ☐ BASIC BEDRK. ☐ CARB. BEDRK.	☐ LACUSTRINE ☐ RIVERINE ☐ BOTTOMLAND ☐ TERRACE ☐ VALLEY SLOPE ☐ TABLELAND ☐ ROLL. UPLAND ☐ CLIFF ☐ TALUS ☐ CREVICE / CAVE ☐ ALVAR ☐ ROCKLAND ☐ BEACH / BAR ☐ SAND DUNE ☐ BLUFF	☐ NATURAL ☐ CULTURAL	☐ PLANKTON ☐ SUBMERGED ☐ FLOATING-LVD. ☐ GRAMINOID ☐ FORB ☐ LICHEN ☐ BRYOPHYTE ☐ DECIDUOUS ☐ CONIFEROUS ☐ MIXED	☐ LAKE ☐ POND ☐ RIVER ☐ STREAM ☐ MARSH ☐ SWAMP ☐ FEN ☐ BOG ☐ BARREN ☐ MEADOW ☐ PRAIRIE ☐ THICKET ☐ SAVANNAH ☐ WOODLAND ☐ FOREST ☐ PLANTATION
SITE ☐ OPEN WATER ☐ SHALLOW WATER ☑ SURFICIAL DEP. ☐ BEDROCK			**COVER** ☐ OPEN ☐ SHRUB ☐ TREED		

STAND DESCRIPTION:

	LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (up to 4 sp) (>> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1	CANOPY	1	1-2	Rhodomint.
2	SUB-CANOPY			T
3	UNDERSTOREY			RHUS Typh = LONI RUBE > PRIVET
4	GRD. LAYER			Carex sp > SOLI SP.

HT CODES: 1 = >25 m 2 = 10<HT ≤25 m 3 = 2<HT ≤10 m 4 = 1<HT ≤2 m 5 = 0.5<HT ≤1 m 6 = 0.2<HT ≤0.5 m 7 = HT<0.2 m

CVR CODES 0= NONE 1= 0% < CVR ≤ 10% 2= 10 < CVR ≤ 25% 3= 25 < CVR ≤ 60% 4= CVR > 60%

STAND COMPOSITION:	BA:

SIZE CLASS ANALYSIS:		< 10		10 - 24		25 - 50		> 50
	O		R		R			
STANDING SNAGS:		< 10		10 - 24		25 - 50		> 50
DEADFALL / LOGS:		< 10		10 - 24		25 - 50		> 50

ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE :		PIONEER		YOUNG		MID-AGE		MATURE		OLD GROWTH
			✓							

SOIL ANALYSIS:

TEXTURE:	DEPTH TO MOTTLES / GLEY	g =	G=
MOISTURE:	DEPTH OF ORGANICS:		(cm)
HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK:		(cm)

COMMUNITY CLASSIFICATION:

		ELC CODE
COMMUNITY CLASS:		
COMMUNITY SERIES:		
ECOSITE:		
VEGETATION TYPE:		CUT 1
☐ INCLUSION		
☐ COMPLEX		

Notes:

ELC STAND CHARACTERISTICS	SITE: Tuck CREEK
	POLYGON: 103
	DATE:
	SURVEYOR(S):

COMMUNITY PROFILE DIAGRAM

DISTURBANCE (CIRCLE ALL THAT APPLY)				
LOGGING/SUGAR BUSH	GAPS IN FOREST CANOPY	LIVESTOCK	INVASIVE SP./ GARDEN PLANTS	TRACKS/TRAILS/REC. USE
DUMPING	EARTH DISPLACEMENT	NOISE	DISEASE/DEATH OF TREES/HERBS	WIND THROW
DEER BROWSING	BEAVER ACTIVITY	FLOODING	FIRE/ICE DAMAGE	OTHER

Notes:

ELC

SOILS ONTARIO

SITE:

POLYGON:

DATE:

SURVEYOR(S):

Slope UTM

	P/A	PP	Dr	Position	Aspect	%	Type	Class	Z	EASTING	NORTHING
1											
2											
3											
4											
5											

SOIL	1	2	3	4	5
TEXTURE x HORIZON					
A TEXTURE					
COURSE FRAGMENTS					
B TEXTURE					
COURSE FRAGMENTS					
C TEXTURE					
COURSE FRAGMENTS					
EFFECTIVE TEXTURE					
SURFACE STONINESS					
SURFACE ROCKINESS					
DEPTH TO / OF					
MOTTLES					
GLEY					
BEDROCK					
WATER TABLE					
CARBONATES					
DEPTH OF ORGANICS					
PORE SIZE DISC #1					
PORE SIZE DISC #2					
MOISTURE REGIME					
SOIL SURVEY MAP					
LEGEND CLASS					

clear cutting LWT1

ELC

PLANT SPECIES LIST

SITE: Tuck Creek

POLYGON: [redacted] 13

DATE: July 15 2020

SURVEYOR(S): KB ND

LAYERS: 1 = CANOPY 2 = SUB-CANOPY 3 = UNDERSTOREY 4 = GROUND (GRD.) LAYER

ABUNDANCE CODES: R = RARE O = OCCASIONAL A = ABUNDANT D = DOMINANT

SPECIES CODE	LAYER 1	2	3	4	COL.
FRAX NIGR					
~~ACER SAC~~					
JUGL NIG					
QUER RUB					
ACER NEG					
VIBU RUF					
ROB PSEU					
SALI NIG					
CORN RACE					
ROSA BLAN					
PRUN VIR					
RUBUS OCC					
LONI TAT					
PART VIT					
LONI RAC					
VITIS RIP					
RHAM CAT					
PRUN SER					
PRUN SER					

SPECIES CODE	LAYER 1	2	3	4	COL.
POA PRAT					
GALA CANA					
SYMP LAEVE					
VICIA CRAC					
SOLI CAN					
ELYM VIR					
TOX RAD					
POA PRAT					
SOLI ALT					
PHLE PRAT					
HORD ARV					
BROM INER					
GEUM VRB					
SYMP LAEVE					
PHLEUM PRA					
DIP FULL					
MEDI LUP					
DAU CAR					
CIRS ARV					
LYS CIL					
BROM INER					
~~HEST~~					

ELC COMMUNITY DESCRIPTION & CLASSIFICATION	SITE: Tuck Creek		POLYGON: 14	
	SURVEYOR(S): KB ND	DATE: July 15/20	TIME: start	
	UTMZ:	UTME:	UTMN:	finish

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
☐ TERRESTRIAL ☐ WETLAND ☐ AQUATIC	☐ ORGANIC ☐ MINERAL SOIL ☐ PARENT MIN. ☐ ACIDIC BEDRK. ☐ BASIC BEDRK. ☐ CARB. BEDRK.	☐ LACUSTRINE ☐ RIVERINE ☐ BOTTOMLAND ☐ TERRACE ☐ VALLEY SLOPE ☐ TABLELAND ☐ ROLL. UPLAND ☐ CLIFF ☐ TALUS ☐ CREVICE / CAVE ☐ ALVAR ☐ ROCKLAND ☐ BEACH / BAR ☐ SAND DUNE ☐ BLUFF	☐ NATURAL ☐ CULTURAL	☐ PLANKTON ☐ SUBMERGED ☐ FLOATING-LVD ☐ GRAMINOID ☐ FORB ☐ LICHEN ☐ BRYOPHYTE ☐ DECIDUOUS ☐ CONIFEROUS ☐ MIXED	☐ LAKE ☐ POND ☐ RIVER ☐ STREAM ☐ MARSH ☐ SWAMP ☐ FEN ☐ BOG ☐ BARREN ☐ MEADOW ☐ PRAIRIE ☐ THICKET ☐ SAVANNAH ☐ WOODLAND ☐ FOREST ☐ PLANTATION
SITE ☐ OPEN WATER ☐ SHALLOW WATER ☑ SURFICIAL DEP. ☐ BEDROCK			**COVER** ☐ OPEN ☐ SHRUB ☐ TREED		

STAND DESCRIPTION:

	LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (up to 4 sp) (>> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1	CANOPY			ACER NEG > SOLI SP > JUGL. NIG
2	SUB-CANOPY			ACER NEG = FRAX SP.
3	UNDERSTOREY			RHAM CAT = FRAX SP.
4	GRD. LAYER			

HT CODES: 1 = >25 m 2 = 10<HT≤25 m 3 = 2<HT≤10 m 4 = 1<HT≤2 m 5 = 0.5<HT≤1 m 6 = 0.2<HT≤0.5 m 7 = HT<0.2 m

CVR CODES 0= NONE 1= 0% < CVR ≤ 10% 2= 10 < CVR ≤ 25% 3= 25 < CVR ≤ 60% 4= CVR > 60%

STAND COMPOSITION:	BA:

SIZE CLASS ANALYSIS:	☐	< 10	☐	10 - 24	☐	25 - 50	☐	> 50
STANDING SNAGS:	☐	< 10	☐	10 - 24	☐	25 - 50	☐	> 50
DEADFALL / LOGS:	☐	< 10	☐	10 - 24	☐	25 - 50	☐	> 50

ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE :	☐	PIONEER	☐	YOUNG	☐	MID-AGE	☐	MATURE	☐	OLD GROWTH

SOIL ANALYSIS:

TEXTURE:	DEPTH TO MOTTLES / GLEY	g =	G=
MOISTURE:	DEPTH OF ORGANICS:		(cm)
HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK:		(cm)

COMMUNITY CLASSIFICATION:

		ELC CODE
COMMUNITY CLASS:		
COMMUNITY SERIES:		
ECOSITE:		
VEGETATION TYPE:		FOD 7
☐ INCLUSION		
☐ COMPLEX		

Notes:

ELC STAND CHARACTERISTICS	SITE:
	POLYGON:
	DATE:
	SURVEYOR(S):

COMMUNITY PROFILE DIAGRAM

DISTURBANCE (CIRCLE ALL THAT APPLY)				
LOGGING/SUGAR BUSH	GAPS IN FOREST CANOPY	LIVESTOCK	INVASIVE SP./ GARDEN PLANTS	TRACKS/TRAILS/REC. USE
DUMPING	EARTH DISPLACEMENT	NOISE	DISEASE/DEATH OF TREES/HERBS	WIND THROW
DEER BROWSING	BEAVER ACTIVITY	FLOODING	FIRE/ICE DAMAGE	OTHER

Notes:

ELC

SOILS ONTARIO

SITE:

POLYGON:

DATE:

SURVEYOR(S):

Slope UTM

	P/A	PP	Dr	Position	Aspect	%	Type	Class	Z	EASTING	NORTHING
1											
2											
3											
4											
5											

SOIL	1	2	3	4	5
TEXTURE x HORIZON					
A TEXTURE					
COURSE FRAGMENTS					
B TEXTURE					
COURSE FRAGMENTS					
C TEXTURE					
COURSE FRAGMENTS					
EFFECTIVE TEXTURE					
SURFACE STONINESS					
SURFACE ROCKINESS					
DEPTH TO / OF					
MOTTLES					
GLEY					
BEDROCK					
WATER TABLE					
CARBONATES					
DEPTH OF ORGANICS					
PORE SIZE DISC #1					
PORE SIZE DISC #2					
MOISTURE REGIME					
SOIL SURVEY MAP					
LEGEND CLASS					

F007

ELC

PLANT SPECIES LIST

SITE: Tuck Creek

POLYGON: 14

DATE: July 15 2020

SURVEYOR(S): KB ND

LAYERS: 1 = CANOPY 2 = SUB-CANOPY 3 = UNDERSTOREY 4 = GROUND (GRD.) LAYER

ABUNDANCE CODES: R = RARE O = OCCASIONAL A = ABUNDANT D = DOMINANT

SPECIES CODE	LAYER 1	2	3	4	COL.
JUGL NIG					
SALI ALB					
ACER NEG	A				
[illegible]					
TILI AME		R			
ACER SAC		R			
QUER RUB		R			
FRAX SP.	O	O	O	R	
SAM IANA					
LOBEL SER					
SPIR LAT.					
SALI PET					
RUB ODOR					
RUB IDA					
ROSA MULT					
VITIRIP					
RUBOCC					
LONI JAP					
PHYS TOM					
RHAM [illegible]					
SALI ERIO					

SPECIES CODE	LAYER 1	2	3	4	COL.
VERB URT					
IMP CAP					
BROM INE					
POA PRA					
HYP PERF					
DAUCAR					
WILD ONION					
ALFALFA					
CONV ARV					
CIRSARV					
ORCMIN					
DACT GLOM					
PART VIT					
SOLI CAN					
ERIGANN					
CIRC LUT					
PHAL ARUN					
DIP FULL					
ARCT LAP					
SYMPHOT					
IRIS SP.					
SYMPLANCE					
GEUM URB					
LYTH SAL					
HELP MAT					

Appendix C-2 –

Botanical Species List

Scientific Name	Common Name	CC	CW	ESA Status	SARA Status	COSEWIC	G-Rank	S-Rank	Regional Rarity Oldham 7E-4 (2017)	Halton Natural Areas Inventory (2006)	Native/Introduced
Acer negundo	Manitoba Maple	0	0				G5	S5	IC		native
Acer platanoides	Norway Maple		5				GNR	SNA	IC	I	introduced
Acer rubrum	Red Maple	4	0				G5	S5	C	I	native
Acer saccharinum	Silver Maple	5	-3				G5	S5	X		native
Acer saccharum	Sugar Maple	4	3				G5	S5	C		native
Aegopodium podagraria	Goutweed		0				GNR	SNA	IC	I	introduced
Aesculus hippocastanum	Horse Chestnut		5				GNR	SNA	IU	I	introduced
Ailanthus altissima	Tree-of-heaven		5				GNR	SNA	IR	I	introduced
Alliaria petiolata	Garlic Mustard		0				GNR	SNA	IC	I	introduced
Allium canadense	Canada Garlic	8	3				G5	S5	R	HU	native
Allium tricoccum	Wild Leek	7	3				G5	S4			native
Ambrosia artemisiifolia	Common Ragweed	0	3				G5	S5	C		native
Ambrosia trifida	Great Ragweed	0	0				G5	S5	U	HU	native
Anemonastrum canadense	Canada Anemone	3	-3				G5	S5	C		native
Apocynum cannabinum	Hemp Dogbane	3	0				G5	S5	U	HU	native
Arctium lappa	Great Burdock		3				GNR	SNA	IC	I	introduced
Arctium minus	Common Burdock		3				GNR	SNA	IC	I	introduced
Arisaema triphyllum	Jack-in-the-pulpit	5	-3				G5	S5	C		native
Asclepias syriaca	Common Milkweed	0	5				G5	S5	C		native
Asparagus officinalis	Garden Asparagus		3				G5?	SNA	IC	I	introduced
Barbarea vulgaris	Bitter Wintercress		0				GNR	SNA	IC	I	introduced
Bidens frondosa	Devil's Beggarticks	3	-3				G5	S5	C		native
Boehmeria cylindrica	False Nettle	4	-5				G5	S5	U		native
Brassica rapa	Field Mustard		5				GNR	SNA	IR	I	introduced
Bromus inermis	Smooth Brome		5				G5	SNA	IC	I	introduced
Calamagrostis canadensis	Bluejoint Reedgrass	4	-5				G5	S5	U		
Calystegia sepium	False Bindweed	2	0				G5	S5	C	HU	native
Cardamine concatenata	Cut-leaved Toothwort	6	3				G5	S5	U		native
Cardamine pensylvanica	Pennsylvania Bittercress	6	-3				G5	S5	R	HU	native
Carex blanda	Woodland Sedge	3	0				G5	S5	C		native
Carex vulpinoidea	Fox Sedge	3	-5				G5	S5	C		native
Carex sp.	Sedge Species										
Carya cordiformis	Bitternut Hickory	6	0				G5	S5	C		native
Carya glabra	Pignut Hickory	9	3				G5	S3		HR	native
Carya ovata	Shagbark Hickory	6	3				G5	S5	U		
Catalpa speciosa	Northern Catalpa		3				G4?	SNA	IR	I	introduced
Celtis occidentalis	Common Hackberry	8	0				G5	S4	R	HR	native
Chelidonium majus	Greater Celandine		5				GNR	SNA	IU	I	introduced
Circaea canadensis	Broad-leaved Enchanter's Nightshade	2	3				G5	S5	C		
Cirsium arvense	Creeping Thistle		3				G5	SNA	IC	I	introduced
Cirsium sp.	Thistle Species										
Claytonia virginica	Narrow-leaved Spring Beauty	5	3				G5	S5	C	HU	native

Scientific Name	Common Name	CC	CW	ESA Status	SARA Status	COSEWIC	G-Rank	S-Rank	Regional Rarity Oldham 7E-4 (2017)	Halton Natural Areas Inventory (2006)	Native/Introduced
Convolvulus arvensis	Field Bindweed		5				GNR	SNA	IC	I	introduced
Cornus alternifolia	Alternate-leaved Dogwood	6	3				G5	S5	C		native
Cornus racemosa	Gray Dogwood	2	0				G5	S5	C		native
Cornus sericea	Red-osier Dogwood	2	-3				G5	S5	C		native
Crataegus sp.	Hawthorn Species										
Dactylis glomerata	Orchard Grass		3				GNR	SNA	IC	I	introduced
Daucus carota	Wild Carrot		5				GNR	SNA	IC	I	introduced
Dipsacus fullonum	Common Teasel		3				GNR	SNA	IC	I	introduced
Echinocystis lobata	Wild Mock-cucumber	3	-3				G5	S5	C	I	native
Elymus virginicus	Virginia Wildrye	5	-3				G5	S5	C		
Equisetum arvense	Field Horsetail	0	0				G5	S5	C		native
Equisetum pratense	Meadow Horsetail	8	-3				G5	S5	R	HU	native
Erigeron annuus	Annual Fleabane	0	3				G5	S5	C		native
Erigeron philadelphicus	Philadelphia Fleabane	1	-3				G5	S5	C	I	
Erythronium americanum	Yellow Trout-lily	5	5				G5	S5	C		
Euonymus fortunei	Climbing Euonymus		5				GNR	SNA	IU	I	introduced
Euonymus obovatus	Running Strawberry Bush	6	5				G5	S4	C		native
Ficaria verna	Fig-root Buttercup		-3				GNR	SNA	IR	I	introduced
Fraxinus americana	White Ash	4	3				G5	S4	C		native
Fraxinus pennsylvanica	Green Ash	3	-3				G5	S4	C		native
Fraxinus sp.	Ash Species										
Galium aparine	Cleavers	4	3				G5	S5	U		native
Galium palustre	Marsh Bedstraw	5	-5				G5	S5	C		native
Geranium maculatum	Spotted Geranium	6	3				G5	S5	C		native
Geranium robertianum	Herb-Robert	2	3				G5	S5	C	I	native
Geum aleppicum	Yellow Avens	2	0				G5	S5	X		native
Geum canadense	White Avens	3	0				G5	S5	C		native
Geum urbanum	Wood Avens		5				G5	SNA	IX	I	introduced
Geum sp.	Avens Species										
Glechoma hederacea	Ground Ivy		3				GNR	SNA	IC	I	introduced
Glyceria striata var. striata	Fowl Mannagrass	3	-5				G5T5	S5			native
Hackelia virginiana	Virginia Stickseed	5	3				G5	S5	U	HU	native
Hemerocallis fulva	Orange Daylily		5				GNA	SNA	IC	I	introduced
Hesperis matronalis	Dame's Rocket		3				G4G5	SNA	IC	I	introduced
Hypericum perforatum ssp. perforatum	Common St. John's-wort		5				GNR	SNA		I	introduced
Impatiens capensis	Spotted Jewelweed	4	-3				G5	S5	C	I	native
Juglans nigra	Black Walnut	5	3				G5	S4?	C		native
Juncus tenuis	Path Rush	0	0				G5	S5	C		native
Juniperus virginiana	Eastern Red Cedar	4	3				G5	S5	U	HU	
Lapsana communis	Common Nipplewort		3				GNR	SNA	IU	I	introduced
Leonurus cardiaca ssp. cardiaca	Common Motherwort		5				GNRTNR	SNA		I	introduced
Ligustrum vulgare	European Privet		3				GNR	SNA	IU	I	introduced
Linaria vulgaris	Butter-and-eggs		5				GNR	SNA	IC	I	introduced

Scientific Name	Common Name	CC	CW	ESA Status	SARA Status	COSEWIC	G-Rank	S-Rank	Regional Rarity Oldham 7E-4 (2017)	Halton Natural Areas Inventory (2006)	Native/Introduced
Lithospermum officinale	European Gromwell		5				GNR	SNA	IU	I	introduced
Lonicera tatarica	Tatarian Honeysuckle		3				GNR	SNA	IC	I	introduced
Lonicera sp.	Honeysuckle Species										
Lotus corniculatus	Garden Bird's-foot Trefoil		3				GNR	SNA	IC	I	introduced
Lycopus americanus	American Water-horehound	4	-5				G5	S5	C		native
Lycopus europaeus	European Water-horehound		-5				GNR	SNA	IU	I	introduced
Lysimachia ciliata	Fringed Loosestrife	4	-3				G5	S5	C		native
Lysimachia nummularia	Creeping Jennie		-3				GNR	SNA	IC	I	introduced
Lythrum salicaria	Purple Loosestrife		-5				G5	SNA	IC	I	introduced
Maianthemum racemosum	Large False Solomon's Seal	4	3				G5	S5	C		native
Malus sp.	Apple Species										
Medicago lupulina	Black Medic		3				GNR	SNA	IC	I	introduced
Medicago sativa ssp. sativa	Alfalfa		5				GNRTNR	SNA	IC	I	introduced
Monarda fistulosa	Wild Bergamot	6	3				G5	S5	U		
Morus alba	White Mulberry		0				GNR	SNA	IC	I	introduced
Myosotis scorpioides	True Forget-me-not		-5				G5	SNA	IC	I	introduced
Nasturtium officinale	Watercress		-5				GNR	SNA	?		introduced
Nepeta cataria	Catnip		3				GNR	SNA	IC	I	introduced
Ostrya virginiana	Eastern Hop-hornbeam	4	3				G5	S5	C		native
Oxalis stricta	Upright Yellow Wood-sorrel	0	3				G5	S5	C		introduced
Parthenocissus tricuspidata	Boston-ivy		5				GNR	SNA			introduced
Parthenocissus vitacea	Thicket Creeper	4	3				G5	S5	C		native
Pastinaca sativa	Wild Parsnip		5				GNR	SNA	IC	I	introduced
Persicaria maculosa	Spotted Lady's-thumb		-3				G3G5	SNA	IC	I	introduced
Phalaris arundinacea	Reed Canary Grass	0	-3				G5	S5	C		
Phleum pratense	Common Timothy		3				GNR	SNA	IC	I	
Phragmites australis ssp. australis	European Reed		-3				G5T5	SNA	IC	I	introduced
Picea abies	Norway Spruce		5				G5	SNA	IX	I	introduced
Picea pungens	Blue Spruce		3				G5	SNA		-	introduced
Pilea pumila	Dwarf Clearweed	5	-3				G5	S5	U		native
Pinus strobus	Eastern White Pine	4	3				G5	S5	C		native
Plantago lanceolata	English Plantain		3				G5	SNA	IC	I	introduced
Plantago major	Common Plantain		3				G5	SNA	IC	I	introduced
Poa palustris	Fowl Bluegrass	5	-3				G5	S5	C		native
Poa pratensis	Kentucky Bluegrass	0	3				G5	S5		I	
Poa sp.	Bluegrass Species										
Podophyllum peltatum	May-apple	5	3				G5	S5	C		native
Polygonatum pubescens	Hairy Solomon's Seal	5	5				G5	S5	C		native
Populus balsamifera	Balsam Poplar	4	-3				G5	S5	C		native
Populus deltoides	Eastern Cottonwood	4	0				G5	S5	C		
Populus tremuloides	Trembling Aspen	2	0				G5	S5	C		native
Potentilla recta	Sulphur Cinquefoil		5				GNR	SNA	IC	I	introduced
Prunella vulgaris	Self-heal	0	0				G5	S5			

Scientific Name	Common Name	CC	CW	ESA Status	SARA Status	COSEWIC	G-Rank	S-Rank	Regional Rarity Oldham 7E-4 (2017)	Halton Natural Areas Inventory (2006)	Native/Introduced
Prunus avium	Sweet Cherry		5				GNR	SNA	IX	I	introduced
Prunus serotina	Black Cherry	3	3				G5	S5	C		
Prunus virginiana	Choke Cherry	2	3				G5	S5	C		
Quercus alba	White Oak	6	3				G5	S5	C		native
Quercus macrocarpa	Bur Oak	5	3				G5	S5	C		native
Quercus rubra	Northern Red Oak	6	3				G5	S5	C		native
Ranunculus acris	Tall Buttercup		0				G5	SNA	IC	I	introduced
Ranunculus recurvatus	Hooked Buttercup	4	-3				G5	S5	C		
Rhamnus cathartica	Common Buckthorn		0				GNR	SNA	IC	I	introduced
Rhus aromatica var. aromatica	Fragrant Sumac	8	5				G5T5	S4		HR	native
Rhus typhina	Staghorn Sumac	1	3				G5	S5	C		native
Ribes sp.	Gooseberry Species										
Robinia pseudoacacia	Black Locust		3				G5	SNA	IC	I	introduced
Rosa multiflora	Multiflora Rose		3				GNR	SNA	IC	I	introduced
Rubus idaeus	Common Red Raspberry	2	3				G5	S5			
Rubus occidentalis	Black Raspberry	2	5				G5	S5	C		native
Rubus odoratus	Purple-flowering Raspberry	3	5				G5	S5	C		native
Rudbeckia laciniata var. laciniata	Cut-leaved Coneflower	7	-3				G5T5	S5			native
Rumex crispus	Curly Dock		0				GNR	SNA	IC	HU	introduced
Salix alba	White Willow		-3				G5	SNA	IC	I	introduced
Salix babylonica	Weeping Willow									I	
Salix discolor	Pussy Willow	3	-3				G5	S5	C		native
Salix eriocephala	Heart-leaved Willow	4	-3				G5	S5	C		native
Salix euxina	Crack Willow		0				GNR	SNA	IC	I	introduced
Salix interior	Sandbar Willow	1	-3				GNR	S5	C		native
Salix lucida	Shining Willow	5	-3				G5	S5	R	HU	native
Salix matsudana	Corkscrew Willow						GNR	SNA	IR		introduced
Salix petiolaris	Meadow Willow	3	-3				G5	S5	C		native
Salix sp.	Willow Species										
Sambucus canadensis	Common Elderberry	5	-3				G5	S5	C		native
Sanguinaria canadensis	Bloodroot	5	3				G5	S5	C		native
Scilla siberica	Siberian Squill		5				GNR	SNA	IR	I	introduced
Securigera varia	Common Crown-vetch		5				GNR	SNA	IC	I	introduced
Silene latifolia	White Campion		5				GNR	SNA	IR	I	introduced
Solanum dulcamara	Bittersweet Nightshade		0				GNR	SNA	IC	I	introduced
Solidago altissima var. altissima	Eastern Tall Goldenrod	1	3				G--T5	S5			native
Solidago canadensis	Canada Goldenrod	1	3				G5	S5			
Solidago flexicaulis	Zigzag Goldenrod	6	3				G5	S5	C		native
Sonchus oleraceus	Common Sow-thistle		3				GNR	SNA	IU	I	introduced
Sorbus aucuparia	European Mountain-ash		5				G5	SNA	IC	I	introduced
Spiraea alba var. latifolia	Broad-leaved Meadowsweet	3	-3				G5T5	S5			native
Symphyotrichum lanceolatum ssp. lanceolatum var. lanceolatum	White Panicled Aster	3	-3				G5T5	S5			native

Scientific Name	Common Name	CC	CW	ESA Status	SARA Status	COSEWIC	G-Rank	S-Rank	Regional Rarity Oldham 7E-4 (2017)	Halton Natural Areas Inventory (2006)	Native/Introduced
Symphyotrichum lateriflorum var. lateriflorum	Calico Aster	3	0				G5T5	S5			native
Symphyotrichum novae-angliae	New England Aster	2	-3				G5	S5	C		native
Syringa reticulata	Japanese Tree Lilac						GNR	SNA	IR		
Taraxacum officinale	Common Dandelion		3				G5	SNA	IC	I	introduced
Thlaspi arvense	Field Penny-cress		5				GNR	SNA	IR	I	introduced
Thuja occidentalis	Eastern White Cedar	4	-3				G5	S5	C		native
Tilia americana	American Basswood	4	3				G5	S5	C		native
Tilia cordata	Little-leaf Linden		5				GNR	SNA	IR	I	introduced
Toxicodendron radicans var. rydbergii	Western Poison Ivy	2	0				G--T5	S5	C		native
Trifolium pratense	Red Clover		3				GNR	SNA	IC	I	introduced
Tussilago farfara	Colt's-foot		3				GNR	SNA	IC	I	introduced
Typha angustifolia	Narrow-leaved Cattail		-5				G5	SNA	IC	I	introduced
Typha latifolia	Broad-leaved Cattail	1	-5				G5	S5	C		native
Ulmus americana	American Elm	3	-3				G5	S5	C		native
Ulmus pumila	Siberian Elm		3				GNR	SNA	IC	I	introduced
Urtica dioica	Stinging Nettle	2	0				G5	S5			
Verbena urticifolia	White Vervain	4	0				G5	S5	C		native
Veronica officinalis	Common Speedwell		5				G5	SNA	IC	I	introduced
Viburnum lentago	Nannyberry	4	0				G5	S5	C		native
Viburnum opulus ssp. opulus	Cranberry Viburnum		-3				G5TNR	SNA	IC	I	introduced
Vicia cracca	Tufted Vetch		5				GNR	SNA	IC	I	introduced
Vinca minor	Periwinkle		5				GNR	SNA	IC	I	introduced
Vincetoxicum rossicum	European Swallow-wort		5				GNR	SNA	IC	I	introduced
Viola sororia	Woolly Blue Violet	4	0				G5	S5	U		native
Viola sp.	Violet Species										
Vitis riparia	Riverbank Grape	0	0				G5	S5	C		native
Xanthium strumarium	Rough Cocklebur	2	0				G5	S5	C		native
Iris sp.	Iris Species										
Carex sp	Sedge Species										
Gleditsia triacanthos var. inermis	Unarmed Honey-locust										
Helianthus sp	Sunflower Species										

LEGEND

Scientific Name and Common Name (NHIC, 2020)

Based on NHIC's species list for Ontario downloaded on May 29, 2019.

COSEWIC (NHIC, 2020)

Federal Rarity List (does not provide protection under any Act)

EXT Extinct - A species that no longer exists.

EXP Extirpated - A species no longer existing in the wild in Canada, but occurring elsewhere.

END Endangered - A species facing imminent extirpation or extinction.

THR Threatened - A species likely to become endangered if limiting factors are not reversed.

SC Special Concern (formerly vulnerable) - A species that may become a threatened or an endangered species because of a combination of biological characteristics and identified threats.

NAR Not At Risk - A species that has been evaluated and found to be not at risk of extinction given the current circumstances.

DD Data Deficient (formerly Indeterminate) - Available information is insufficient to resolve a species' eligibility for assessment or to permit an assessment of the species' risk of extinction.

Species on Schedule 1 of Species At Risk Act (SARA) (NHIC, 2020)

Federal Rarity List

EXP Extirpated - a species that no longer exists in the wild in Canada, but exists elsewhere in the wild.

END Endangered - a species that is facing imminent extirpation or extinction.

THR Threatened - a species that is likely to become an endangered species if nothing is done to reverse the factors leading to its extirpation or extinction.

SC Species of Special Concern - a species that may become a threatened or an endangered species because of a combination of biological characteristics and identified threats.

S-Ranks (NHIC, 2020)

Provincial Rarity List (does not provide protection under any Act)

S1 Critically Imperiled—Critically imperiled in the nation or state/province because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the state/province.

S2 Imperiled—Imperiled in the nation or state/province because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or state/province.

S3 Vulnerable—Vulnerable in the nation or state/province due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.

S4 Apparently Secure—Uncommon but not rare; some cause for long-term concern due to declines or other factors.

S5 Secure—Common, widespread, and abundant in the nation or state/province.

S#S# Range Rank —A numeric range rank (e.g., S2S3) is used to indicate any range of uncertainty about the status of the species or community. Ranges cannot skip more than one rank (e.g., SU is used rather than S1S4).

SX Apparently extirpated from Ontario, with little likelihood of rediscovery. Typically not seen in the province for many decades, despite searches at known historic sites.

SE Exotic; not believed to be a native component of Ontario's flora.

Species At Risk Ontario (SARO) (NHIC, 2020)

Provincial Rarity List (Species protected under ESA 2007 and listed in O reg. 230/08)

EXP Extirpated - A species no longer existing in the wild in Canada, but occurring elsewhere.

END Endangered - A species facing imminent extirpation or extinction.

THR Threatened - A species likely to become endangered if limiting factors are not reversed.

SC Special Concern - A species that may become a threatened or an endangered species because of a combination of biological characteristics and identified threats.

Exotic Status (NHIC, 2020)

If an element is known to occur as an exotic in Ontario, the status value assigned to the element is SE. A ? qualifier added to that value indicates uncertainty about whether it is exotic or native. Numeric ranks of 1 through 5 added to the exotic status indicate the element's abundance in Ontario, with 1 indicating the least abundance and 5 the most.

Coefficient of Conservatism and Coefficient of Wetness (NHIC, 2020)

CC = Coefficient of Conservatism. Rank of 0 to 10 based on plants degree of fidelity to a range of synecological parameters: (0-3) Taxa found in a variety of plant communities; (4-6) Taxa typically associated with a specific plant community but tolerate moderate disturbance; (7-8) Taxa associated with a plant community in an advanced successional stage that has undergone minor disturbance; (9-10) Taxa with a high fidelity to a narrow range of synecological parameters.

CW = Coefficient of Wetness. -Value between 5 and –5. A value of –5 is assigned to Obligate Wetland (OBL) and 5 to Obligate Upland (UPL), with intermediate values assigned to the remaining categories (Oldham et al., 1995).

Regional Rarity

Status in Carolinian Zone 7E-4 (Oldham, 2017)

I - Introduced; thought to have been present in the Carolinian Zone or individual CZ area prior to European settlement; believed to be deliberately or inadvertently introduced to the CZ by humans (followed by a status, below)
C - Common
U - uncommon
R - rare
H - Historic records only (generally >30 years)
X - present; status unknown or not specified in source lists
? - unconfirmed report
hyb - hybrid
Combined Status (Status overall in CZ) from Oldham 2017
H - Historic native in all CZ and no known records for at least 30 years in all areas where native and ranked (i.e. not X). Occasionally used for a native species known to be extirpated from its only known CZ location(s)
R - Rare native to the CZ and (a) rare (as defined in source lists; sometimes including "very uncommon") or historic (no records in > 30 years) in more than half of the CZ area (>6) in which it is native and ranked; or (b) if rare or historic in <6 areas it must be uncommon or common in no more than one
U - Uncommon native in the CZ and (a) listed as common in no more than one CZ area; and (b) not rare or historic in more than half of the CZ areas (>6) in which is it native and ranked
C - Common native in the CZ and (a) common in at least two CZ areas; and (b) not rare or historic in more than half of the CZ areas (>6) in which it is native and ranked
X - No status. Present and native in the CZ but no status assigned because of lack or information, often due to confusion with similar species **Native Status**
VASCAN database (Brouillet et al. 2010)

N = Native to Ontario
I = Introduced to Ontario

Halton Natural Areas Inventory (2006):

Conservation Halton (2006) Halton Natural Areas Inventory 2006: Volume 2 Species Checklists

HR rare in Halton - known from five (5) or fewer sites.
HU uncommon in Halton – known from six (6) to fifteen (15) sites.
H? requires further review – potentially rare or uncommon taxa requiring further review (e.g., nomenclature/taxonomy, native status, etc.).
HE apparently extirpated from Halton
I introduced in Halton

References

Brouillet L, Desmet P, Coursol F, Meades SJ, Favreau M, Anions M, Bélisle P, Gendreau C, Shorthouse D, and contributors (2010+). Database of Vascular Plants of Canada (VASCAN). Online at http://data.canadensys.net/vascan and http://www.gbif.org/dataset/3f8a1297-3259-4700-91fc-acc4170b27ce, released on 2010-12-10. Version [xx]. GBIF key: 3f8a1297-3259-4700-91fc-acc4170b27ce. Data paper ID: doi: http://doi.org/10.3897/phytokeys.25.3100 [accessed on [07/24/2019]]

Oldham, M.J. 2017. List of the Vascualr Plants of Ontario's Carolinian Zone (Ecoregion 7E). Carolinian Canada and Ontario Ministry of Natural Resources and Forestry. Peterborough, ON. 132 pp.

Natural Heritage Information Centre (NHIC) (2020). All Species. Available at: https://www.ontario.ca/page/get-natural-heritage-information

Appendix C-3 –

Bat Habitat Tree Information



CITY OF Burlington

Legend

- Study Area
- SAR/SOCC
- Potential Myotis Habitat
- Potential Perimyotis Habitat
- Potential Myotis and Perimyotis Habitat
- Erosion Area

Survey for leaf off bat habitat was completed for the entire study area and the survey for leaf on bat habitat was confined to the erosion areas.

Figure: 1-1 (1)

Potential Myotis and Perimyotis Habitat

Date: December 2020
Author: KB
Projection: UTM_Zone_17N
Source: City of Burlington, LIO

0 55 110
Metres

N



CITY OF Burlington

Legend

- Study Area
- SAR/SOCC
- Potential Myotis Habitat
- Potential Perimyotis Habitat
- Potential Myotis and Perimyotis Habitat
- Erosion Area

Survey for leaf off bat habitat was completed for the entire study area and the survey for leaf on bat habitat was confined to the erosion areas.

Figure: 1-1 (2)

Potential Myotis and Perimyotis Habitat

Date: December 2020
Author: KB
Projection: UTM_Zone_17N
Source: City of Burlington, LIO

0 55 110
Metres

N



CITY OF Burlington

Legend

- Study Area
- SAR/SOCC
- Potential Myotis Habitat
- Potential Perimyotis Habitat
- Potential Myotis and Perimyotis Habitat
- Erosion Area

Survey for leaf off bat habitat was completed for the entire study area and the survey for leaf on bat habitat was confined to the erosion areas.

Figure: 1-1 (3)

Potential Myotis and Perimyotis Habitat

Date: December 2020
Author: KB
Projection: UTM_Zone_17N
Source: City of Burlington, LIO

0 55 110
Metres

N



CITY OF Burlington

Legend

- Study Area
- SAR/SOCC
- Potential Myotis Habitat
- Potential Perimyotis Habitat
- Potential Myotis and Perimyotis Habitat
- Erosion Area

Survey for leaf off bat habitat was completed for the entire study area and the survey for leaf on bat habitat was confined to the erosion areas.

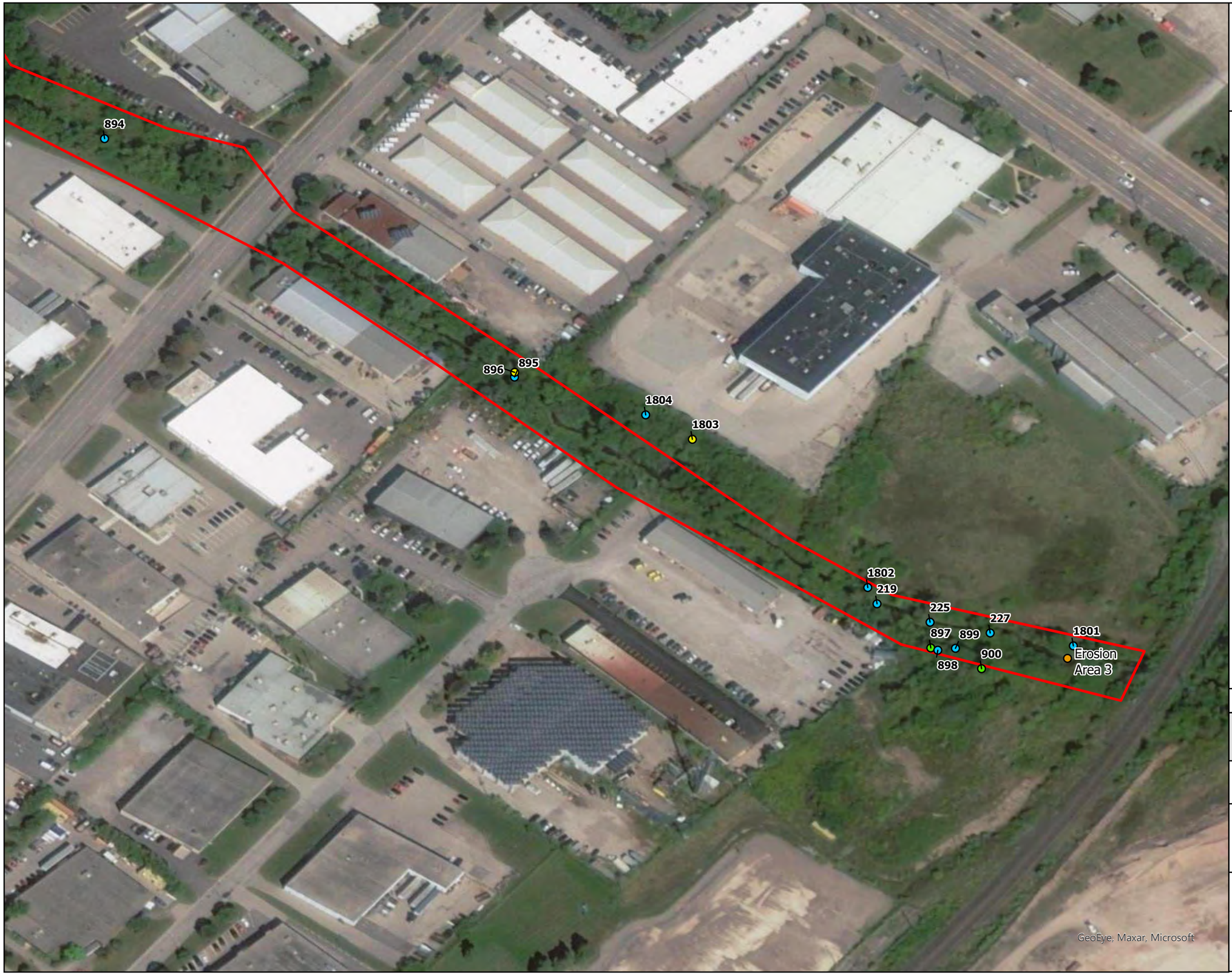
Figure: 1-1 (4)

Potential Myotis and Perimyotis Habitat

Date: December 2020
Author: KB
Projection: UTM_Zone_17N
Source: City of Burlington, LIO

0 55 110
Metres

N



CITY OF Burlington

Legend

- Study Area
- SAR/SOCC
- Potential Myotis Habitat
- Potential Perimyotis Habitat
- Potential Myotis and Perimyotis Habitat
- Erosion Area

Survey for leaf off bat habitat was completed for the entire study area and the survey for leaf on bat habitat was confined to the erosion areas.

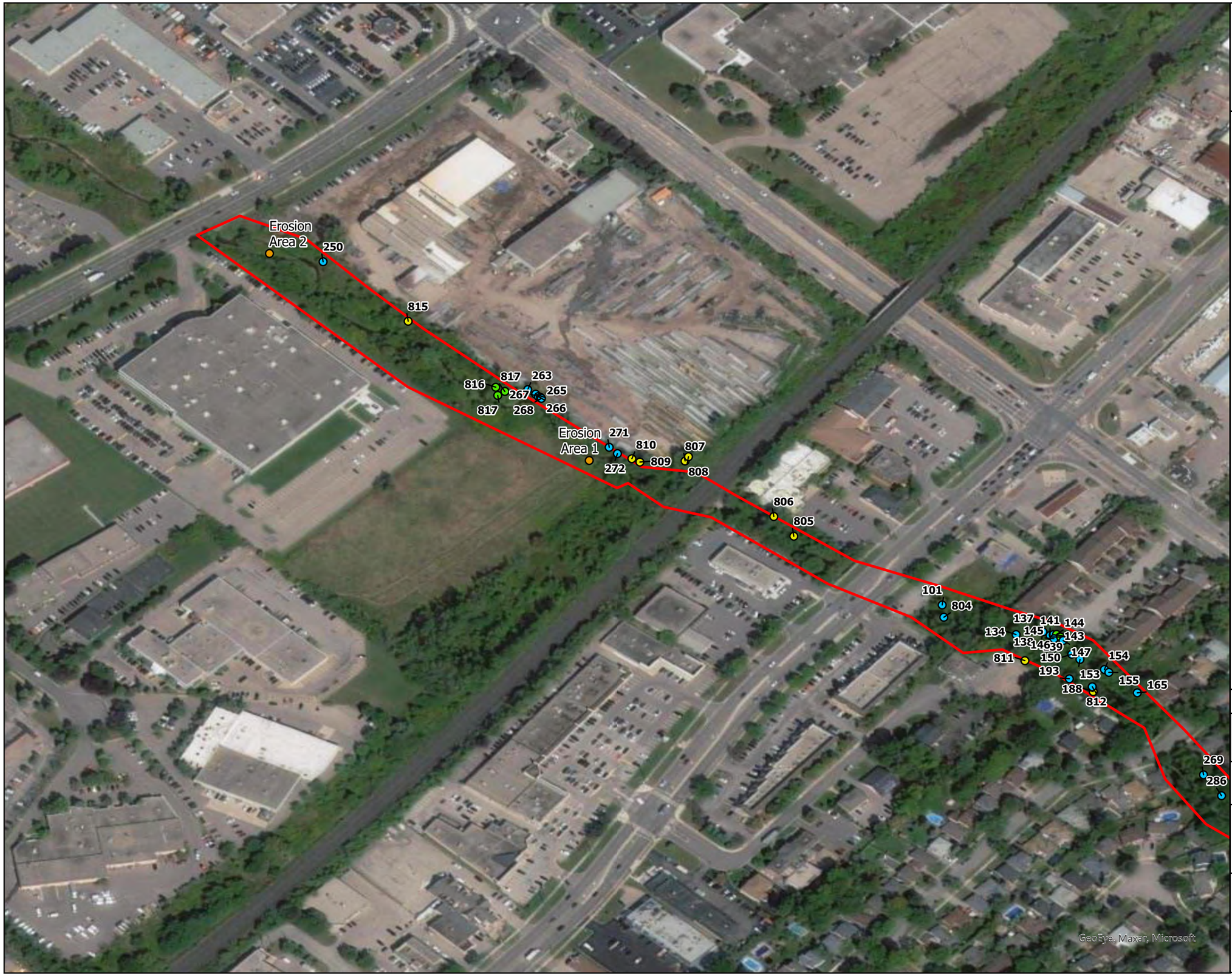
Figure: 1-1 (5)

Potential Myotis and Perimyotis Habitat

Date: December 2020
Author: KB
Projection: UTM_Zone_17N
Source: City of Burlington, LIO

0 55 110
Metres

N



CITY OF Burlington

Legend

- Study Area
- SAR/SOCC
- Potential Myotis Habitat
- Potential Perimyotis Habitat
- Potential Myotis and Perimyotis Habitat
- Erosion Area

Survey for leaf off bat habitat was completed for the entire study area and the survey for leaf on bat habitat was confined to the erosion areas.

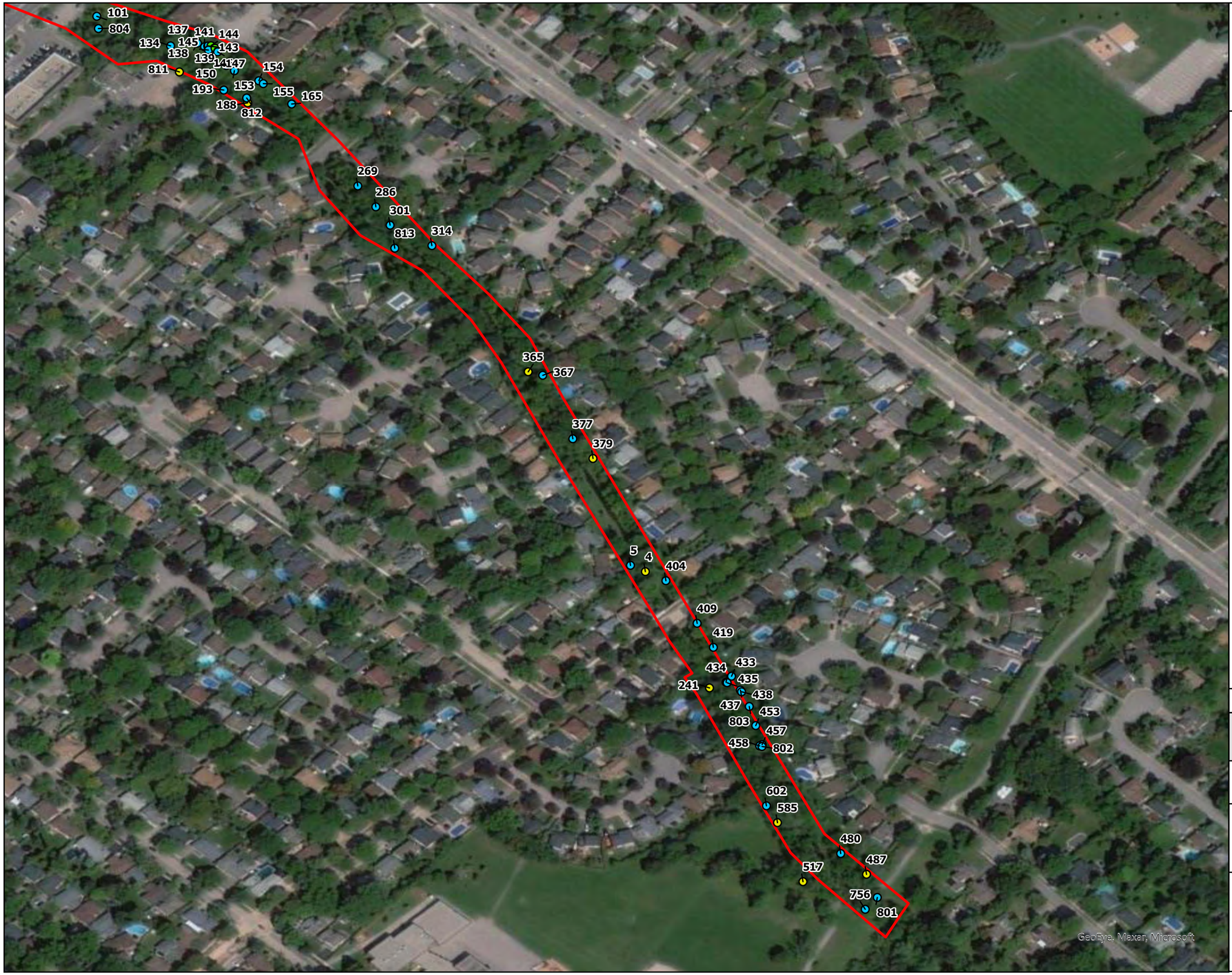
Figure: 1-1 (6)

Potential Myotis and Perimyotis Habitat

Date: December 2020
Author: KB
Projection: UTM_Zone_17N
Source: City of Burlington, LIO

0 85 170
Metres

N



CITY OF Burlington

Legend

- Study Area
- SAR/SOCC
- Potential Myotis Habitat
- Potential Perimyotis Habitat
- Potential Myotis and Perimyotis Habitat
- Erosion Area

Survey for leaf off bat habitat was completed for the entire study area and the survey for leaf on bat habitat was confined to the erosion areas.

Figure: 1-1 (7)

Potential Myotis and Perimyotis Habitat

Date: December 2020
Author: KB
Projection: UTM_Zone_17N
Source: City of Burlington, LIO

0 85 170
Metres

N

***Candidate Myotis* spp. and *Perimyotis subflavus* Maternity Roost Site Survey**										
Tag #	**Species**		**DBH (cm)**	***Myotis* or *Perimyotis* (M/P)**	**Tree Status (Live/Dead)**	**Cavity (Y/N)**	**Decay Class**	**Candidate Oak or Maple**	**Dead/Dying Leaf Clusters**	**Habitat Attributes/Notes**
	Botanical Name	**Common Name**								
4	*Salix sp.*	Willow species	55, 51, 40, 37	M	Live	Y	1	-	N	Potential *Myotis* habitat - cavities
5	*Acer platanoides*	Norway Maple	45, 42, 38	P	Live	N	-	Maple	Y	Potential *Perimyotis* habitat - two small leaf clumps, candidate tree species
101	*Fraxinus pennsylvanica*	Green Ash	11	P	Live	N	-	-	Y	Potential *Perimyotis* habitat - leaf cluster
134	*Salix sp.*	Willow species	50, 47	P	Live	N	-	-	Y	Potential *Perimyotis* habitat - stick/leaf clump
135	*Acer negundo*	Manitoba Maple	37	P	Live	N	-	Maple	N	Potential *Perimyotis* habitat - Size and species
137	*Acer saccharum*	Sugar Maple	42.5	P	Live	N	-	Maple	Y	Potential *Perimyotis* habitat - leaf cluster, candidate tree species
138	*Acer saccharum*	Sugar Maple	35	P	Live	N	-	Maple	N	Potential *Perimyotis* habitat - candidate tree species
139	*Acer saccharum*	Sugar Maple	25	P	Live	N	-	Maple	N	Potential *Perimyotis* habitat - candidate tree species
141	*Acer saccharum*	Sugar Maple	26	P	Live	N	-	Maple	N	Potential *Perimyotis* habitat - candidate tree species
143	*Acer saccharum*	Sugar Maple	31	P	Live	N	-	Maple	N	Potential *Perimyotis* habitat - candidate tree species
144	*Acer saccharum*	Sugar Maple	30	M/P	Live	Y	1	Maple	N	Potential *Myotis* habitat - Cavities; Potential *Perimyotis* habitat - candidate tree species
145	*Acer saccharum*	Sugar Maple	26	P	Live	N	-	Maple	N	Potential *Perimyotis* habitat - candidate tree species
146	*Acer saccharum*	Sugar Maple	35	M/P	Live	Y	2	Maple	N	Potential *Myotis* habitat - Small cavities, dead branches, peeling bark; Potential *Perimyotis* habitat - candidate tree species
147	*Acer saccharum*	Sugar Maple	44.5	P	Live	N	-	Maple	N	Potential *Perimyotis* habitat - candidate tree species
150	*Acer negundo*	Manitoba Maple	26	P	Live	N	-	Maple	Y	Potential *Perimyotis* habitat - leaf cluster, candidate tree species
153	*Quercus alba*	White Oak	19	P	Live	N	-	Oak	N	Potential *Perimyotis* habitat - candidate tree species
154	*Acer saccharum*	Sugar Maple	41	P	Live	N	-	Maple	N	Potential *Perimyotis* habitat - candidate tree species

155	*Acer saccharum*	Sugar Maple	45.5	P	Live	N	-	Maple	N	Potential *Perimyotis* habitat - candidate tree species
163	*Acer negundo*	Manitoba Maple	29	P	Live	N	-	Maple	N	Potential *Perimyotis* habitat - Size and species
165	*Acer saccharinum*	Silver Maple	72	P	Live	N	-	Maple	N	Potential *Perimyotis* habitat - candidate tree species
180	*Acer negundo*	Manitoba Maple	34	P	Live	N	-	Maple	N	Potential *Perimyotis* habitat - Size and species
188	*Prunus serotina*	Black Cherry	27, 25	M	Live	N	1	-	N	Potential *Myotis* habitat - flakey bark
193	*Ulmus americana*	American Elm	20.5	P	Live	N	-	-	Y	Potential *Perimyotis* habitat - stick clump
196	*Acer negundo*	Manitoba Maple	32	P	Live	N	-	Maple	N	Potential *Perimyotis* habitat - Size and species
197	*Acer negundo*	Manitoba Maple	31	P	Live	N	-	Maple	N	Potential *Perimyotis* habitat - Size and species
199	*Acer negundo*	Manitoba Maple	37,13	P	Live	N	-	Maple	N	Potential *Perimyotis* habitat - Size and species
200	*Acer saccharum*	Sugar Maple	31	P	Live	N	-	Maple	N	Potential *Perimyotis* habitat - Size and species
204	*Acer negundo*	Manitoba Maple	29	P	Live	N	-	Maple	N	Potential *Perimyotis* habitat - Size and species
208	*Acer negundo*	Manitoba Maple	49	P	Live	N	-	Maple	N	Potential *Perimyotis* habitat - Size and species
209	*Acer negundo*	Manitoba Maple	[36,(11,9)]	P	Live	N	-	Maple	N	Potential *Perimyotis* habitat - Size and species
210	*Acer negundo*	Manitoba Maple	24,22	P	Live	N	-	Maple	N	Potential *Perimyotis* habitat - Size and species
211	*Acer negundo*	Manitoba Maple	26	P	Live	N	-	Maple	N	Potential *Perimyotis* habitat - Size and species
219	*Acer negundo*	Manitoba Maple	[26,12]	P	Live	N	-	Maple	N	Potential *Perimyotis* habitat - Size and species
225	*Acer negundo*	Manitoba Maple	33	P	Live	N	-	Maple	N	Potential *Perimyotis* habitat - Size and species
227	*Acer negundo*	Manitoba Maple	28,11,10	P	Live	N	-	Maple	N	Potential *Perimyotis* habitat - Size and species
241	*Fraxinus americana*	White Ash	29, 18.5, 18, 17, 14, 10	M	Dead	N	3	-	N	Potential *Myotis* habitat - Flaking bark
250	*Acer saccharinum*	Silver Maple	[12(14,19,10,11)]	P	Live	N	-	Maple	N	Potential *Perimyotis* habitat - Size and species
263	*Acer negundo*	Manitoba Maple	25,25	P	Live	N	-	Maple	N	Potential *Perimyotis* habitat - Size and species
265	*Acer negundo*	Manitoba Maple	25	P	Live	N	-	Maple	N	Potential *Perimyotis* habitat - Size and species
266	*Acer negundo*	Manitoba Maple	20,11	P	Live	N	-	Maple	N	Potential *Perimyotis* habitat - Size and species
267	*Acer negundo*	Manitoba Maple	27,20	P	Live	N	-	Maple	N	Potential *Perimyotis* habitat - Size and species
268	*Acer negundo*	Manitoba Maple	25	P	Live	N	-	Maple	N	Potential *Perimyotis* habitat - Size and species
269	*Acer negundo*	Manitoba Maple	35	P	Live	N	-	Maple	N	Potential *Perimyotis* habitat - candidate tree species
271	*Acer negundo*	Manitoba Maple	[(45,30),27]	P	Live	N	-	Maple	N	Potential *Perimyotis* habitat - Size and species
272	*Acer negundo*	Manitoba Maple	29,18	P	Live	N	-	Maple	N	Potential *Perimyotis* habitat - Size and species
286	*Acer platanoides*	Norway Maple	26	P	Live	N	-	Maple	N	Potential *Perimyotis* habitat - candidate tree species

301	*Acer platanoides*	Norway Maple	25.5	P	Live	N	-	Maple	N	Potential *Perimyotis* habitat - candidate tree species
314	*Acer negundo*	Manitoba Maple	34, 8.5	P	Live	N	-	Maple	N	Potential *Perimyotis* habitat - candidate tree species
333	*Carya ovata*	Shagbark Hickory	20.5	M	Live	N	1	-	N	Potential Myotis habitat - Shaggy bark
338	*Prunus serotina*	Black Cherry	20	M	Dead	N	4	-	N	Potential Myotis habitat - Flaking bark on upper trunk stem
365	*Fraxinus americana*	White Ash	21.5	M	Dead	Y	3	-	N	Potential *Myotis* habitat - Long crack up trunk, peeling bark
367	*Acer saccharum*	Sugar Maple	48	P	Live	N	-	Maple	N	Potential *Perimyotis* habitat - candidate tree species
377	*Acer negundo*	Manitoba Maple	28, 16.5	P	Live	N	-	Maple	N	Potential *Perimyotis* habitat - candidate tree species
379	*Salix babylonica*	Weeping Willow	96.5	M	Live	Y	1	-	N	Potential *Myotis* habitat - Multiple cavities, trunk possibly hollow
404	*Acer platanoides*	Norway Maple	23	P	Live	N	-	Maple	Y	Potential *Perimyotis* habitat - leaf cluster, candidate tree species
409	*Acer platanoides*	Norway Maple	28.5	P	Live	N	-	Maple	N	Potential *Perimyotis* habitat - candidate tree species
419	*Acer platanoides*	Norway Maple	26	P	Live	N	-	Maple	N	Potential *Perimyotis* habitat - candidate tree species
433	*Acer platanoides*	Norway Maple	26	P	Live	N	-	Maple	N	Potential *Perimyotis* habitat - candidate tree species
434	*Acer platanoides*	Norway Maple	34, 26.5, 11	P	Live	N	-	Maple	N	Potential *Perimyotis* habitat - candidate tree species
435	*Acer platanoides*	Norway Maple	29.5, 19, 5.5	P	Live	N	-	Maple	N	Potential *Perimyotis* habitat - candidate tree species
437	*Acer platanoides*	Norway Maple	50	P	Live	N	-	Maple	N	Potential *Perimyotis* habitat - candidate tree species
438	*Acer platanoides*	Norway Maple	25, 6	P	Live	N	-	Maple	N	Potential *Perimyotis* habitat - candidate tree species
453	*Acer platanoides*	Norway Maple	39	P	Live	N	-	Maple	N	Potential *Perimyotis* habitat - candidate tree species
457	*Acer negundo*	Manitoba Maple	28, 15	P	Live	N	-	Maple	N	Potential *Perimyotis* habitat - candidate tree species
458	*Acer negundo*	Manitoba Maple	30, 21.5, 10	P	Live	N	-	Maple	N	Potential *Perimyotis* habitat - candidate tree species
480	*Acer negundo*	Manitoba Maple	30.5	P	Live	N	-	Maple	N	Potential *Perimyotis* habitat - candidate tree species; Severe lean
487	*Fraxinus americana*	White Ash	25.5	M	Dead	N	3	-	N	Potential *Myotis* habitat - peeling bark
517	*Populus sp.*	Poplar species	30	M	Dead	N	4	-	N	Potential *Myotis* habitat - Flaking bark

585	*Fraxinus americana*	White Ash	48, 38	M	Dead	Y	3	-	N	Potential *Myotis* habitat - Knothole cavity
602	*Fraxinus americana*	White Ash	50.5	P	Live	N	-	-	Y	Potential *Perimyotis* habitat - leaf cluster (squirrel nest)
756	*Acer platanoides*	Norway Maple	14	P	Live	N	-	Maple	Y	Potential *Perimyotis* habitat - leaf cluster (squirrel nest), candidate tree species
801	*Acer platanoides*	Norway Maple	55	P	Live	N	-	Maple	N	Potential *Perimyotis* habitat - candidate tree species; Some minor dead branches
802	*Acer negundo*	Manitoba Maple	25	P	Live	N	-	Maple	N	Potential *Perimyotis* habitat - candidate tree species; Small dead branches
803	*Acer platanoides*	Norway Maple	29	P	Live	N	-	Maple	N	Potential *Perimyotis* habitat - candidate tree species
804	*Salix sp.*	Willow species	33	P	Live	N	-	-	Y	Potential *Perimyotis* habitat - stick/leaf clump
805	*Robinia pseudoacacia*	Black Locust	21.5, 20, 9	M	Dead	N	3	-	N	Potential *Myotis* habitat - Flaking bark
806	*Salix sp.*	Willow species	97	M	Live	Y	1	-	N	Potential *Myotis* habitat - Cavities
807	*Salix sp.*	Willow species	85	M	Live	Y	2	-	N	Potential *Myotis* habitat - Cavities, large splits in branches (dropped limb)
808	*Salix sp.*	Willow species	80	M	Live	Y	1	-	N	Potential *Myotis* habitat - Cavities, cracked branches
809	*Salix sp.*	Willow species	100, 90, 60, 30	M	Live	Y	1	-	N	Potential *Myotis* habitat - Cavities, knarly bark, broken limb
810	*Salix sp.*	Willow species	75, 30, 25, 18, 15, 10	M	Live	N	1	-	N	Potential *Myotis* habitat - Flaking bark on secondary branches; No tag - steep slope, DBH approximate
811	*Salix sp.*	Willow species	128	M	Live	Y	1	-	N	Potential *Myotis* habitat - Cavities
812	*Rhamnus cathartica*	European Buckthorn	10	P	Live	N	-	-	Y	Potential *Perimyotis* habitat - stick clump
813	*Acer platanoides*	Norway Maple	10	P	Live	N	-	Maple	Y	Potential *Perimyotis* habitat - leaf cluster (squirrel nest), candidate tree species
815	*Fraxinus americana*	White Ash	26	M	Dead	N	4	-	N	Potential *Myotis* habitat - Flaking bark, 80% coverage
816	*Fraxinus americana*	White Ash	20	M/P	Dead	N	3	-	Y	Potential *Myotis* habitat - narrow crack up trunk; Potential *Perimyotis* habitat - leaf clump (squirrel nest)
817	*Acer negundo*	Manitoba Maple	34,12,11,25	M/P	Live	Y	1	Maple	N	Potential *Myotis* habitat - small cavity; Potential *Perimyotis* habitat - candidate tree species
818	*Carya ovata*	Shagbark Hickory	42	M	Live	N	1	-	N	Potential *Myotis* habitat - Shaggy bark
819	*Carya ovata*	Shagbark Hickory	43	M	Live	N	1	-	N	Potential *Myotis* habitat - Shaggy bark

820	*Acer negundo*	Manitoba Maple	48	M/P	Live	Y	2	Maple	N	Potential *Myotis* habitat - peeling bark, possible cavity; Potential *Perimyotis* habitat - candidate tree species
821	*Acer negundo*	Manitoba Maple	20, 19	P	Live	N	-	Maple	N	Potential *Perimyotis* habitat - stick cluster, candidate tree species
822	*Acer negundo*	Manitoba Maple	27	M/P	Live	N	2	Maple	N	Potential *Myotis* habitat - topped with peeling bark; Potential *Perimyotis* habitat - candidate tree species
823	*Quercus rubra*	Red Oak	71, 17	M/P	Live	Y	1	Oak	N	Potential *Myotis* habitat - at least two branch cavities, possibly hollow; Potential *Perimyotis* habitat - candidate tree species
824	*Carya ovata*	Shagbark Hickory	33	M	Live	N	1	-	N	Potential *Myotis* habitat - Shaggy bark
825	*Acer negundo*	Manitoba Maple	41	M/P	Live	Y	2	Maple	N	Potential *Myotis* habitat - multiple branch cavities, peeling bark; Potential *Perimyotis* habitat - candidate tree species
826	*Tilia americana*	Basswood	52	M	Live	Y	1	-	N	Potential *Myotis* habitat - multiple cavities
827	*Quercus rubra*	Red Oak	90	M/P	Live	Y	1	Oak	Y	Potential *Myotis* habitat - cavity, dead branch with peeling bark; Potential *Perimyotis* habitat - leaf clump (squirrel nest), candidate tree species
828	*Malus sp.*	Apple species	22, 20, 12, 10, 9	P	Live	N	-	-	Y	Potential *Perimyotis* habitat - leaf clump (squirrel nest)
829	*Salix sp.*	Willow species	35	P	Live	N	-	-	Y	Potential *Perimyotis* habitat - leaf clump (squirrel nest)
830	*Salix sp.*	Willow species	39	P	Live	N	-	-	Y	Potential *Perimyotis* habitat - leaf clump (squirrel nest)
831	*Carya glauca*	Pignut Hickory	35	M	Live	Y	1	-	N	Potential *Myotis* habitat - knothole cavity
832	*Carya ovata*	Shagbark Hickory	39	M	Live	Y	2	-	N	Potential *Myotis* habitat - Shaggy bark, many dead braches cracks, flaking bark, cavities
833	*Carya ovata*	Shagbark Hickory	35, 4.5, 3	M	Live	N	1	-	N	Potential *Myotis* habitat - Shaggy bark
834	*Prunus avium*	Sweet Cherry	27.5	P	Live	N	-	-	Y	Potential *Perimyotis* habitat - leaf clump (squirrel nest)
835	*Carya ovata*	Shagbark Hickory	24	M	Live	N	1	-	N	Potential *Myotis* habitat - Shaggy bark
836	*Fraxinus americana*	White Ash	44	P	Live	N	-	-	Y	Potential *Perimyotis* habitat - leaf clump (squirrel nest)
837	*Acer negundo*	Manitoba Maple	32	M	Dead	N	3	Maple	N	Potential *Myotis* habitat - 50% of bark peeling

838	*Salix sp.*	Willow species	36, 35, 29	M	Live	Y	1	-	N	Potential *Myotis* habitat - Cavity, dead branch with peeling bark
839	*Acer negundo*	Manitoba Maple	33, 32	P	Live	N	-	Maple	Y	Potential *Perimyotis* habitat - leaf clump (squirrel nest), candidate tree species
840	*Fraxinus americana*	White Ash	64	M	Dead	Y	3	-	N	Potential *Myotis* habitat - Cavity
841	*Fraxinus americana*	White Ash	47	M	Dead	Y	3	-	N	Potential *Myotis* habitat - Cavity
842	*Acer negundo*	Manitoba Maple	18	P	Live	N	-	Maple	Y	Potential *Perimyotis* habitat - leaf clump (squirrel nest), candidate tree species
843	*Acer platanoides*	Norway Maple	10	P	Live	N	-	Maple	Y	Potential *Perimyotis* habitat - leaf clump (squirrel nest), candidate tree species
844	*Carya ovata*	Shagbark Hickory	60	M	Live	Y	1	-	N	Potential *Myotis* habitat - Shaggy bark, cavity
845	*Carya ovata*	Shagbark Hickory	29, 20	M	Live	N	1	-	N	Potential *Myotis* habitat - Shaggy bark
846	*Prunus serotina*	Black Cherry	16	M	Live	N	1	-	N	Potential *Myotis* habitat - Shaggy bark
847	*Quercus rubra*	Red Oak	29	P	Live	N	-	Oak	Y	Potential *Perimyotis* habitat - leaf clump (squirrel nest), candidate tree species
848	*Salix sp.*	Willow species	45	M	Live	Y	2	-	N	Potential *Myotis* habitat - Large split near trunk base, cavity near top
849	*Fraxinus americana*	White Ash	26	M	Dead	Y	3	-	N	Potential *Myotis* habitat - Cavity
850	*Acer negundo*	Manitoba Maple	16.5, 11	M/P	Live	Y	1	Maple	N	Potential *Myotis* habitat - Cavity; Potential *Perimyotis* habitat - candidate tree species
851	*Ostrya virginiana*	Ironwood	23	P	Live	N	-	-	Y	Potential *Perimyotis* habitat - stick cluster
852	*Salix sp.*	Willow species	36	M	Live	Y	2	-	N	Potential *Myotis* habitat - Large split with cavity
853	*Acer negundo*	Manitoba Maple	25.5	M/P	Live	Y	1	Maple	N	Potential *Myotis* habitat - Damage and cavity; Potential *Perimyotis* habitat - candidate tree species
854	*Prunus avium*	Sweet Cherry	44	M	Live	Y	1	-	N	Potential *Myotis* habitat - Cavity
855	*Prunus serotina*	Black Cherry	24	M	Dead	N	3	-	N	Potential *Myotis* habitat - Peeling bark
856	*Carya ovata*	Shagbark Hickory	19	M	Live	N	1	-	N	Potential *Myotis* habitat - Shaggy bark
857	*Quercus alba*	White Oak	55.5	M/P	Live	N	1	Oak	N	Potential *Myotis* habitat - Shaggy bark; Potential *Perimyotis* habitat - candidate tree species
858	*Carya ovata*	Shagbark Hickory	41	M	Live	N	1	-	N	Potential *Myotis* habitat - Shaggy bark
859	*Crataegus sp.*	Hawthorn species	26.5	M	Live	Y	1	-	N	Potential *Myotis* habitat - Cavity
860	*Fraxinus americana*	White Ash	24.5	M	Dead	N	3	-	N	Potential *Myotis* habitat - Peeling bark
861	*Acer negundo*	Manitoba Maple	31	M	Live	Y	1	Maple	N	Potential *Myotis* habitat - Small knothole cavity
862	*Acer negundo*	Manitoba Maple	29.5	M	Live	Y	2	Maple	N	Potential *Myotis* habitat - Cavity in trunk split, possible habitation by a squirrel
863	*Carya ovata*	Shagbark Hickory	32.5	M	Live	N	1	-	N	Potential *Myotis* habitat - Shaggy bark

864	*Acer platanoides*	Norway Maple	24.5	P	Live	N	-	Maple	Y	Potential *Perimyotis* habitat - leaf clump (squirrel nest), candidate tree species
865	*Carya ovata*	Shagbark Hickory	21	M	Live	N	1	-	N	Potential *Myotis* habitat - Shaggy bark
866	*Carya ovata*	Shagbark Hickory	24	M	Live	N	1	-	N	Potential *Myotis* habitat - Shaggy bark
867	*Carya ovata*	Shagbark Hickory	27	M	Live	N	1	-	N	Potential *Myotis* habitat - Shaggy bark
868	*Carya cordiformis*	Bitternut Hickory	30, 30	M	Live	Y	2	-	N	Potential *Myotis* habitat - Peeling bark, cavities
869	*Carya ovata*	Shagbark Hickory	25, 23	M	Live	N	1	-	N	Potential *Myotis* habitat - Shaggy bark
870	*Populus sp.*	Poplar species	20	M	Live	Y	1	-	N	Potential *Myotis* habitat - Cavity
871	*Tilia americana*	Basswood	27	M	Live	Y	1	-	N	Potential *Myotis* habitat - Cavity
872	*Quercus rubra*	Red Oak	82, 60, 36, 34	M	Live	Y	1	Oak	N	Potential *Myotis* habitat - Small cavities
873	*Fraxinus americana*	White Ash	34	M	Dead	Y	3	-	N	Potential *Myotis* habitat - Peeling bark, small cavity, trunk possibly hollow
874	*Acer negundo*	Manitoba Maple	34, 32	M/P	Dead	N	3	Maple	N	Potential *Myotis* habitat - Loose, peeling bark; Potential *Perimyotis* habitat - candidate tree species
875	*Salix sp.*	Willow species	52, 48, 30	M	Dead	Y	3	-	N	Potential *Myotis* habitat - Cavities
876	*Acer negundo*	Manitoba Maple	22, 19	M/P	Live	Y	2	Maple	N	Potential *Myotis* habitat - Small trunk cavity half-way up; Potential *Perimyotis* habitat - candidate tree species
877	*Acer negundo*	Manitoba Maple	50, 26	M/P	Live	Y	2	Maple	N	Potential *Myotis* habitat - Cavity, peeling bark at top; Potential *Perimyotis* habitat - candidate tree species
878	*Fraxinus americana*	White Ash	29	M	Dead	N	3	-	N	Potential *Myotis* habitat - Peeling bark
879	*Carya cordiformis*	Bitternut Hickory	20	M	Live	Y	2	-	N	Potential *Myotis* habitat - Cavity
880	*Salix sp.*	Willow species	37	P	Live	N	-	-	Y	Potential *Perimyotis* habitat - leaf clump (squirrel nest)
881	*Tilia americana*	Basswood	47	M	Live	Y	1	-	N	Potential *Myotis* habitat - Disease damage, cavities on second main leader
882	*Acer negundo*	Manitoba Maple	29	M/P	Live	Y	1	Maple	N	Potential *Myotis* habitat - Knothole cavities in crotch and on branch; Potential *Perimyotis* habitat - candidate tree species
883	*Salix sp.*	Willow species	48, 35	P	Live	N	-	-		Potential *Perimyotis* habitat - Raptor stick nest in high crotch, confirmed in use by breeding pair of Cooper's Hawks
884	*Salix sp.*	Willow species	58	P	Live	N	-	-	Y	Potential *Perimyotis* habitat - leaf clump (squirrel nest)

885	*Unknown*	Unknown	15	P	Live	N	-	-	Y	Potential *Perimyotis* habitat - leaf clump (squirrel nest)
886	*Fraxinus sp.*	Ash Species	22	M	Dead	N	3	-	N	Potential *Myotis* habitat - Loose, peeling bark
891	*Acer negundo*	Manitoba Maple	27	M	Dead	Y	3	Maple	N	Potential *Myotis* habitat - Multiple knothole cavities, slightly loose bark
892	*Salix sp.*	Willow species	70	M	Live	Y	1	-	N	Potential *Myotis* habitat - Knothole cavity
893	*Acer negundo*	Manitoba Maple	43	M/P	Live	Y	1	Maple	N	Potential *Myotis* habitat -: Knothole cavity Potential Perimyotis habitat - Size and species
894	*Acer negundo*	Manitoba Maple	13	P	Live	N	-	Maple	Y	Potential *Perimyotis* habitat - leaf clump (squirrel nest)
895	*Salix sp.*	Willow species	45	P	Live	N	-	-	Y	Potential *Perimyotis* habitat - leaf clump (squirrel nest)
896	*Salix sp.*	Willow species	49	M	Live	N	1	-	N	Potential *Myotis* habitat - Shaggy bark
897	*Acer negundo*	Manitoba Maple	70, 55, 40	M/P	Live	Y	1	Maple	N	Potential *Myotis* habitat - Multiple knothole cavities Potential *Perimyotis* habitat - candidate tree species
898	*Acer platanoides*	Norway Maple	19, 18, 11	P	Live	N	-	Maple	Y	Potential Perimyotis habitat - leaf clump (squirrel nest), candidate tree species
899	*Acer platanoides*	Norway Maple	27, 23	P	Live	N	-	Maple	Y	Potential Perimyotis habitat - leaf clump (squirrel nest), candidate tree species
900	*Acer negundo*	Manitoba Maple	59, 32	M/P	Live	Y	1	Maple	N	Potential *Myotis* habitat - Multiple cavities, loose bark Potential *Perimyotis* habitat - candidate tree species
1701	*Tilia americana*	Basswood	34, 10, 10, 6	M	Live	Y	2	-	N	Potential Myotis habitat - Cavities in trunk
1702	*Carya ovata*	Shagbark Hickory	37, 31, 16	M	Live	N	1	-	N	Potential Myotis habitat - Shaggy bark
1703	*Carya ovata*	Shagbark Hickory	24	M	Live	N	1	-	N	Potential Myotis habitat - Shaggy bark
1704	*Carya ovata*	Shagbark Hickory	28, 24	M	Live	N	1	-	N	Potential Myotis habitat - Shaggy bark
1705	*Juglans nigra*	Black Walnut	54	M	Live	Y	1	-	N	Potential Myotis habitat - Large trunk cavity
1706	*Acer negundo*	Manitoba Maple	30	M/P	Live	Y	1	Maple	Y	Potential *Myotis* habitat - Cavity at top of split Potential *Perimyotis* habitat - leaf cluster (squirrel nest), candidate tree species
1707	*Juglans nigra*	Black Walnut	35	P	Live	N	-	-	Y	Potential *Perimyotis* habitat - stick cluster (squirrel nest)
1708	*Fraxinus americana*	White Ash	29	P	Live	N	-	-	Y	Potential *Perimyotis* habitat - stick cluster (squirrel nest)
1709	*Juglans nigra*	Black Walnut	101	M	Live	Y	1	-	N	Potential Myotis habitat - Large cavity in main crotch

1710	*Juglans nigra*	Black Walnut	45	M	Live	Y	1	-	N	Potential Myotis habitat - Small knothole cavities in branch
1711	*Prunus serotina*	Black Cherry	98	M	Live	Y	1	-	N	Potential Myotis habitat - Trunk cavity
1712	*Juglans nigra*	Black Cherry	22.5	P	Live	N	-	-	Y	Potential *Perimyotis* habitat - stick cluster (squirrel nest)
1713	*Salix fragilis*	Crack Willow	92, 50, 31, 19, 16, 14, 10	P	Live	N	-	-	Y	Potential *Perimyotis* habitat - leaf cluster (squirrel nest)
1714	*Salix sp.*	Willow species	25, 22, 19, 18.5, 11, 10	P	Live	N	-	-	Y	Potential *Perimyotis* habitat - leaf cluster (squirrel nest)
1715	*Fraxinus americana*	White Ash	17	P	Live	N	-	-	Y	Potential *Perimyotis* habitat - leaf cluster (squirrel nest)
1716	*Salix fragilis*	Crack Willow	47, 42, 20, 17, 16, 15, 10, 8	M/P	Live	Y	1	-	Y	Potential *Myotis* habitat - Cavity in high branch Potential *Perimyotis* habitat - leaf cluster (squirrel nest)
1718	*Robinia pseudoacacia*	Black Locust	50	M	Live	Y	1	-	N	Potential Myotis habitat - Small trunk cavities
1719	*Robinia pseudoacacia*	Black Locust	41	M	Live	Y	1	-	N	Potential Myotis habitat - Small cavity in upper trunk
1720	*Robinia pseudoacacia*	Black Locust	36, 31	M	Live	Y	1	-	N	Potential Myotis habitat - Cavities in both main stems
1721	*Salix fragilis*	Crack Willow	97, 95, 92, 86, 54	M/P	Live	Y	1	-	N	Potential *Myotis* habitat - Cracks and cavities in lower trunk, signs of animal use Potential *Perimyotis* habitat - Multiple leaf clusters (squirrel nest)
1722	*Salix babylonica*	Weeping Willow	139	P	Live	N	-	-	Y	Potential *Perimyotis* habitat - leaf cluster (squirrel nest) x2
1723	*Fraxinus americana*	White Ash	32	P	Live	N	-	-	Y	Potential *Perimyotis* habitat - leaf cluster (squirrel nest) x3
1724	*Acer platanoides*	Norway Maple	53	M/P	Live	N	2	Maple	Y	Potential *Myotis* habitat - Cracks and peeling bark Potential *Perimyotis* habitat - leaf cluster (squirrel nest), candidate tree species
1801	*Salix sp.*	Willow species	23	P	Live	N	-	-	Y	Potential *Perimyotis* habitat - leaf clump (squirrel nest)
1802	*Salix sp.*	Willow species	40, 30, 22, 20, 17	P	Live	N	-	-	Y	Potential *Perimyotis* habitat - leaf clump (squirrel nest)
1803	*Prunus avium*	Sweet Cherry	45	M	Dead	N	5	-	N	Potential *Myotis* habitat - Exfoliating bark, 30% remains
1804	*Prunus avium*	Sweet Cherry	36, 35, 32, 27	P	Live	N	-	-	Y	Potential *Perimyotis* habitat - leaf clump (squirrel nest)

1805	*Acer negundo*	Manitoba Maple	33, 28	M/P	Live	Y	2	Maple	N	Potential *Myotis* habitat - Two cracks with cavities Potential *Perimyotis* habitat - candidate tree species
1806	*Salix sp.*	Willow species	42	M	Live	Y	1	-	N	Potential Myotis habitat - Small cavities
1807	*Salix sp.*	Willow species	34, 32	M	Live	Y	1	-	N	Potential Myotis habitat - Healed crack in branch - cavity
1808	*Acer negundo*	Manitoba Maple	15.5	P	Live	N	-	Maple	Y	Potential Perimyotis habitat - leaf clump (squirrel nest), candidate tree species
1809	*Acer negundo*	Manitoba Maple	29, 25, 22, 18	M	Dead	Y	4	Maple	N	Potential *Myotis* habitat - Cavities, flaking bark, cracks;
1810	*Fraxinus americana*	White Ash	27	M	Dead	N	4	-	N	Potential *Myotis* habitat - Loose bark, 90% remains
1811	*Acer negundo*	Manitoba Maple	35, 34	M	Dead	N	4	Maple	N	Potential *Myotis* habitat - Exfoliating bark, 20% remains
1812	*Crataegus sp.*	Hawthorn species	11	P	Live	N	-	-	Y	Potential *Perimyotis* habitat - leaf clump (squirrel nest)
1812	*Crataegus sp.*	Hawthorn species	11	P	Live	N	-	-	Y	Potential *Perimyotis* habitat - stick cluster
1813	*Salix sp.*	Willow species	25, 13, 10	M	Live	Y	1	-	N	Potential Myotis habitat - Cavity
1814	*Juglans nigra*	Black Walnut	55	M	Live	Y	1	-	N	Potential Myotis habitat - Cavity inside crack
1815	*Juglans nigra*	Black Walnut	39, 29	M/P	Live	Y	2	-	N	Potential *Myotis* habitat - Top half of tree dead with cracks and cavity; Potential *Perimyotis* habitat - candidate tree species
1816	*Acer negundo*	Manitoba Maple	32	M	Live	Y	1	Maple	N	Potential Myotis habitat - Healed crack with cavity
1817	*Salix sp.*	Willow species	70	M	Live	Y	1	-	N	Potential Myotis habitat - Two knothole cavities
1818	*Salix sp.*	Willow species	65	M/P	Live	Y	2	-	N	Potential *Myotis* habitat - Top half of tree dead with peeling bark and cavities Potential *Perimyotis* habitat - candidate tree species
1819	*Acer negundo*	Manitoba Maple	27.5	P	Live	N	-	Maple	Y	Potential *Perimyotis* habitat - leaf clump (squirrel nest)
1820	*Salix sp.*	Willow species	50	M	Dead	Y	3	-	N	Potential Myotis habitat - knothole cavities
1821	*Fraxinus americana*	White Ash	76	P	Live	N	-	-	Y	Potential *Perimyotis* habitat - leaf clump (squirrel nest)
1822	*Salix sp.*	Willow species	50	M/P	Live	Y	1	-	Y	Potential *Myotis* habitat - Healed crack in cavity; Potential *Perimyotis* habitat - leaf clump (squirrel nest)

1823	*Salix sp.*	Willow species	39	P	Live	N	-	-	Y	Potential *Perimyotis* habitat - leaf clump (squirrel nest)
1824	*Populus deltoides*	Eastern Cottonwood	65	P	Live	N	-	-	Y	Potential *Perimyotis* habitat - leaf clump (squirrel nest)
1825	*Salix babylonica*	Weeping Willow	50, 30, 25	M/P	Live	Y	1	-	N	Potential *Myotis* habitat - Multiple trunk cavities Potential *Perimyotis* habitat - candidate tree species; Note: Landowner requested this tree be retained if possible
1826	*Acer saccharum*	Sugar Maple	60, 45	P	Live	N	-	Maple	N	Potential *Perimyotis* habitat - Size and species
1826	*Acer saccharum*	Sugar Maple	54,~50	M/P	Live	N	1	Maple	N	Potential Myotis habitat - Shaggy bark; Duck box installed on tree
1827	*Prunus serotina*	Black Cherry	54	M	Live	Y	1	-	N	Potential Myotis habitat - Trunk cavity
1828	*Salix sp.*	Willow species	70	M/P	Live	Y	1	-	N	Potential *Myotis* habitat - Large trunk cavity at base, miltiple small cavities in upper tree Potential *Perimyotis* habitat - candidate tree species
1829	*Acer saccharinum*	Silver Maple	88	P	Live	N	-	Maple	Y	Potential *Perimyotis* habitat - stick nest
1830	*Salix sp.*	Willow species	36, 20	M	Live	N	1	-	N	Potential Myotis habitat - Shaggy bark
1831	*Carya ovata*	Shagbark Hickory	35.5	M	Live	N	1	-	N	Potential Myotis habitat - Shaggy bark
1832	*Carya ovata*	Shagbark Hickory	35, 31	M	Live	Y	1	-	N	Potential Myotis habitat - Cavity mid-trunk
1833	*Tilia americana*	Basswood	24.5	M	Live	N	1	-	N	Potential Myotis habitat - Shaggy bark
1834	*Carya ovata*	Shagbark Hickory	40	M	Live	Y	1	-	N	Potential Myotis habitat - Several cavities on trunk
1835	*Ulmus americana*	American Elm	30	P	Live	N	-	-	Y	Potential *Perimyotis* habitat - leaf/stick clump (squirrel nest)
1836	*Acer negundo*	Manitoba Maple	19.5	M	Dead	N	4	Maple	N	Potential Myotis habitat - Long narrow cracks through trunk, peeling bark
1837	*Acer saccharum*	Sugar Maple	16.5	P	Live	N	-	Maple	Y	Potential *Perimyotis* habitat - leaf clump (squirrel nest)
1838	*Acer negundo*	Manitoba Maple	16.5	M	Dead	N	4	Maple	N	Potential Myotis habitat - Long side stem with peeling bark, main stump cut
1839	*Ulmus americana*	American Elm	60	M	Dead	Y	6	-	N	Potential Myotis habitat - Two small trunk cavities
1840	*Acer negundo*	Manitoba Maple	19, 17, 11, 10	M	Live	N	1	Maple	N	Potential Myotis habitat - Shaggy bark
1841	*Carya ovata*	Shagbark Hickory	19.5	M	Live	Y	2	-	N	Potential Myotis habitat - Several cavities in upper trunk and branches
1842	*Tilia americana*	Basswood	58, 7	M	Live	Y	1	-	N	Potential Myotis habitat - Small trunk cavity in wound

1843	*Tilia americana*	Basswood	42, 11	M	Dead	N	5	-	N	Potential Myotis habitat - Exfoliating bark, 50% remains
1844	*Prunus serotina*	Black Cherry	21	P	Live	N	-	-	Y	Potential *Perimyotis* habitat - leaf clump (squirrel nest)
1845	*Populus sp.*	Poplar species	25	M	Dead	N	5	-	N	Potential Myotis habitat - Exfoliating bark
1846	*Unknown*	Unknown	23	P	Live	N	-	-	Y	Potential *Perimyotis* habitat - leaf clump (squirrel nest)
1847	*Celtis occidentalis*	Hackberry	18.5	P	Live	N	-	-	Y	Potential *Perimyotis* habitat - leaf/stick clump (squirrel nest)
1848	*Fraxinus americana*	White Ash	26	M	Dead	N	4	-	N	Potential Myotis habitat - Exfoliating bark, 80% remaining
1849	*Prunus serotina*	Black Cherry	41.5	M	Dead	N	5	-	N	Potential Myotis habitat - Exfoliating bark, 30% remaining
1850	*Prunus serotina*	Black Cherry	33, 17	M	Live	Y	1	-	N	Potential Myotis habitat - Several small trunk cavities
1851	*Populus deltoides*	Eastern Cottonwood	95, 40	P	Live	N	-	-	Y	Potential *Perimyotis* habitat - leaf clump (squirrel nest)
1852	*Juglans nigra*	Black Walnut	42	P	Live	N	-	-	Y	Potential *Perimyotis* habitat - leaf clump (squirrel nest)
1853	*Juglans nigra*	Black Walnut	40	M/P	Live	Y	1	-	Y	Potential *Myotis* habitat - Trunk cavity Potential *Perimyotis* habitat - leaf clump
1854	*Salix fragilis*	Crack Willow	80, 65, 60	P	Live	N	-	-	Y	Potential *Perimyotis* habitat - leaf clump (squirrel nest)
1855	*Crataegus sp.*	Hawthorn species	27	M/P	Live	Y	1	-	Y	Potential *Myotis* habitat - Large knothole cavity in trunk Potential *Perimyotis* habitat - leaf clump
1856	*Juglans nigra*	Black Walnut	55, 53	P	Live	N	-	-	Y	Potential *Perimyotis* habitat - several stick nests (squirrel)
1857	*Salix sp.*	Willow species	60, 55, 50, 50, 30	M	Dead	Y	3	-	N	Potential Myotis habitat - Trunk Cavity
1858	*Fraxinus americana*	White Ash	36	M	Live	Y	2	-	N	Potential Myotis habitat - Multiple cavities, hollow trunk
1859	*Salix fragilis*	Crack Willow	100, 65, 50	M	Live	Y	2	-	N	Potential Myotis habitat - Small trunk cavity, cracks and cavities in branches
1860	*Salix fragilis*	Crack Willow	80, 70	M	Live	Y	2	-	N	Potential Myotis habitat - Multiple cavities, cracks
1861	*Salix fragilis*	Crack Willow	92, 75, 70	M/P	Live	Y	1	-	N	Potential *Myotis* habitat - Cavity high in tree Potential *Perimyotis* habitat - leaf clump
1862	*Salix fragilis*	Crack Willow	50	M	Live	Y	2	-	N	Potential Myotis habitat - Several small branch cavities
1863	*Salix fragilis*	Crack Willow	75, 60	M/P	Live	Y	2	-	Y	Potential *Myotis* habitat - Branch cavity

										Potential *Perimyotis* habitat - leaf clump (squirrel nest)
1864	*Salix fragilis*	Crack Willow	90, 85, 75, 70	M	Live	Y	2	-	N	Potential Myotis habitat - Small trunk knothole - squirrel occupied
1865	*Salix fragilis*	Crack Willow	100, 65, 25	P	Live	N	-	-	Y	Potential *Perimyotis* habitat - leaf clump (squirrel nest)
1866	*Salix fragilis*	Crack Willow	40, 37, 30	P	Live	N	-	-	Y	Potential *Perimyotis* habitat - leaf clump (squirrel nest)
1867	*Salix sp.*	Willow species	31	M	Live	Y	1	-	N	Potential Myotis habitat - Cavities
1868	*Salix fragilis*	Crack Willow	85, 43, 18	M	Live	Y	1	-	N	Potential Myotis habitat - Branch cavities and splits, potentially hollow
1869	*Salix fragilis*	Crack Willow	102	M	Live	N	1	-	N	Potential Myotis habitat - Shaggy bark
1871	*Carya ovata*	Shagbark Hickory	42	P	Live	N	-	-	Y	Potential *Perimyotis* habitat - leaf clump (squirrel nest)
1872	*Ostrya virginiana*	Ironwood	20, 13	M	Live	N	2	-	N	Potential Myotis habitat - Shaggy bark
1873	*Carya ovata*	Shagbark Hickory	32.5	M	Live	N	1	-	N	Potential Myotis habitat - Shaggy bark
1874	*Carya ovata*	Shagbark Hickory	33	M	Live	N	1	-	N	Potential Myotis habitat - Shaggy bark
1875	*Carya ovata*	Shagbark Hickory	51	M/P	Live	N	1	-	Y	Potential *Myotis* habitat - Split in branch Potential *Perimyotis* habitat - stick clump (squirrel nest)
1876	*Juglans nigra*	Black Walnut	50	P	Live	N	-	-	Y	Potential *Perimyotis* habitat - Stick nest (may be occupied by raptor)
1877	*Pinus strobus*	White Pine	81	M	Live	Y	1	-	N	Potential Myotis habitat - Small knothole cavity in trunk
1878	*Ostrya virginiana*	Ironwood	26	P	Live	N	-	-	Y	Potential Perimyotis habitat - leaf clump (squirrel nest), candidate tree species
1879	*Acer saccharum*	Sugar Maple	86	M	Live	N	1	Maple	N	Potential Myotis habitat - Shaggy bark
1880	*Carya ovata*	Shagbark Hickory	35.5	M	Live	N	1	-	N	Potential Myotis habitat - Shaggy bark
1881	*Carya ovata*	Shagbark Hickory	24.5	P	Live	N	-	-	Y	Potential *Perimyotis* habitat - leaf clump (squirrel nest)
1882	*Juglans nigra*	Black Walnut	57	M	Dead	Y	5	-	N	Potential Myotis habitat - Cavities, peeling bark
1883	*Unknown*	Unknown	30, 27, 26	M	Dead	N	4	-	N	Potential Myotis habitat - Loose bark, 30% remaining
1884	*Pinus strobus*	White Pine	60	M	Dead	Y	3	-	N	Potential Myotis habitat - multiple trunk cavities, likely hollow
1885	*Tilia americana*	Basswood	36.5, 4	M	Live	Y	2	-	N	Potential Myotis habitat - Small and large trunk cavities, possibly hollow
1886	*Tilia americana*	Basswood	44	M	Dead	Y	4	-	N	Potential Myotis habitat - Small trunk cavity, peeling bark
1887	*Acer negundo*	Manitoba Maple	42	M	Live	N	2	Maple	N	Potential Myotis habitat - Small trunk cavity, peeling bark

1888	*Acer negundo*	Manitoba Maple	26	M	Live	N	1	Maple	N	Potential Myotis habitat - Shaggy bark
1889	*Carya ovata*	Shagbark Hickory	33	M	Live	N	1	-	N	Potential Myotis habitat - Shaggy bark
1890	*Carya ovata*	Shagbark Hickory	32	M	Live	N	1	-	N	Potential Myotis habitat - Shaggy bark
1891	*Carya ovata*	Shagbark Hickory	50	M	Live	N	1	-	N	Potential Myotis habitat - Shaggy bark
1892	*Carya ovata*	Shagbark Hickory	45	M	Live	Y	1	-	N	Potential Myotis habitat - 3 small cavities high on main trunk and in crotches
1893	*Juglans nigra*	Black Walnut	60	M	Live	Y	1	-	N	Potential Myotis habitat - Cavities on main trunk
1894	*Juglans nigra*	Black Walnut	57	M/P	Live	N	2	-	N	Potential *Myotis* habitat - Peeling bark, top branches Potential *Perimyotis* habitat - candidate tree species
1895	*Acer negundo*	Manitoba Maple	53	M	Live	N	1	Maple	N	Potential Myotis habitat - Shaggy bark
1896	*Carya ovata*	Shagbark Hickory	38	M	Live	N	1	-	N	Potential Myotis habitat - Shaggy bark
1897	*Carya ovata*	Shagbark Hickory	26	M	Live	N	1	-	N	Potential Myotis habitat - Shaggy bark
1898	*Carya ovata*	Shagbark Hickory	38	M	Live	Y	1	-	N	Potential Myotis habitat - Shaggy bark, medium sized trunk cavity (animal occupied)
1899	*Carya ovata*	Shagbark Hickory	46	M	Live	N	1	-	N	Potential Myotis habitat - Shaggy bark
1900	*Carya ovata*	Shagbark Hickory	47	M	Live	Y	1	-	N	Potential *Myotis* habitat - cavities

Health Condition: G - Good; F - Fair; P - Poor; D – Dead

Decay Class: 1 - Healthy, live tree; 2 - Declining live tree, part of canopy lost; 3 - Very recently dead, bark intact, branches intact; 4 - Recently dead, bark peeling, only large branches intact; 5 - Older dead tree, 90% of bark lost, few branch stubs, broken top; 6 - Very old dead tree, advance decay, no branches, parts of the stem have rotted away.

Appendix C-4 –

Staff OSAP Certification

Certificate of Achievement

Graham Eby

Attended the

Ontario Stream Assessment Protocol Training Course

June 11-15, 2018

And has successfully completed the following level associated with the OSAP

Crew Leader

Certificate #18/TRCA/007/OSH-CL

Ontario

Toronto and Region Conservation Authority

Appendix C-5 –

Aquatic Habitat Assessment Field Data Sheets

Site Identification

Stream Name: TUCK CREEK | Stream Code: TUK | Date (yyyy-mm-dd): 2020-06-25

Site Code: TUK01 | Alternate Site Code: 01DS | Sample: 01 | Site Length (m): 45.0

Record using NAD83 datum

	Zone	Easting	Northing
Uncorr. UTM	17	599262.8	4800760.6
Corr. UTM	17		

OR Lat. / Long. — DD | MM | SS.sss

Source of Uncorrected UTM Coord.: GPS/DGPS ☐ GIS ☒ OBM ☐ Other

Source of CorrectedUTM Coordinates: FWIS ☐ Ortho-photos ☐ GIS ☐ Other

Name of Layer Used for Correction

Access Route

EAST ON NEW ST, NORTH ON ELWOOD, PARK NEAR PED CROSSING

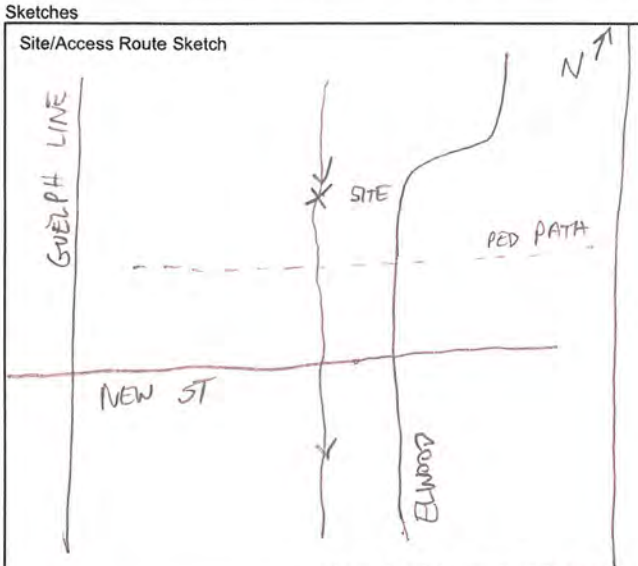
Site Description

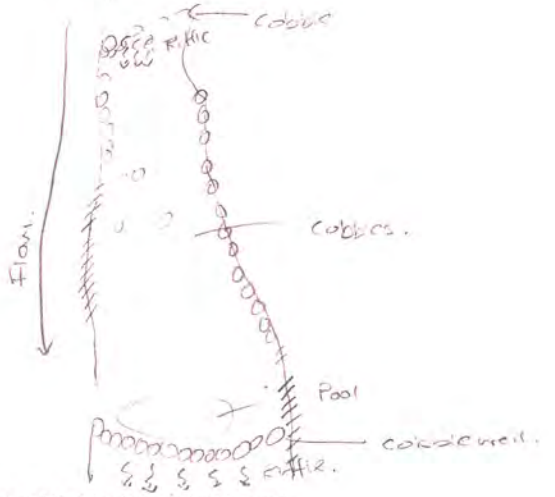
PARK ON ELWOOD, WALK WEST ON PED TRAIL, FOLLOW EASEMENT ON RIGHT BANK TO D/S END OF SITE

☐ **Site Was Unsampleable** - *add reason on reverse*

Sketches

Site/Access Route Sketch





Be sure to include enough detail in sketches to ensure that someone could find the site again; include a north arrow and the locations of all markers and noted features. The artist should also sign the sketches.

Photo No. | Photo Name | Photo Description

Comments

CONSTRUCTION D/S

Crew Leader (init. & last name): GEBY

Crew	Recorder	Entered	Verified	Corrected
ND				

Site Marker Details

SITE MARKER DESCRIPTION

	Bearing (D)	Distance (m)		Photo No.	Photo Name
Upstream Marker (measure from stake to site)	62	4.2	Upstream		
			Downstream		

Upstream Description

Pinkflag, staghorn sumac, right bank

	Bearing (D)	Distance (m)		Photo No.	Photo Name
Downstream Marker (measure from stake to site)	80	3.9	Upstream		
			Downstream		

Downstream Description

3rd most upstream spruce (biggest) right bank

Site is Unsampleable

- ☐ Stream dry
- ☐ Insufficient water to sample effectively
- ☐ Stream is no longer present at location (tiled or relocated, etc)
- ☐ Naturally unwadeable (i.e. > 1.5 m deep)
- ☐ Unwadeable due to ponding from a permanent barrier — What is the permanent barrier?
- ☐ Unwadeable due to ponding from temporary barrier (eg. beaver dam) — What is the temporary barrier?
- ☐ Landowner could not be contacted
- ☐ Landowner refused access
- ☐ Inaccessible for safety reasons *(add details in comments below)*
- ☐ Stream is wadeable but not appropriate for the intended sampling

Modules to have been used (e.g. S2.M1, S3.M1):

Comments

522 Elwood.
Lee. Brading → Noted that he and neighbours have never experienced flooding majority focus LAS of Bridge.
(905) 639 4289

Site Features

Mandatory Fields In Grey
Must be filled out for processing

Stream Code: TUK | Site Code: TUK01 | Sample: 01 | Date (mm-dd): 2020 06-25

Stream Name: TUCK CREEK - HYDRO CORR EA

For each landuse, check box that applies. Be sure to include comments explaining the particulars, including names and numbers of contacts

Site Features	Ongoing & Active	Historical Evidence	No Evidence but Reported	No Evidence	Unknown	Comments
Potential Point or Non-point Source Contaminant Sources	☒	☐	☐	☐	☐	Residential properties (lawns) on right bank, mowed up to top of bank (bank ↑)
Major Nutrient Sources Upstream	☒	☐	☐	☐	☐	Agriculture, Road crossing, residences
Channel Hardening or Straightening	☐	☒	☐	☐	☐	Historically straightened during road build
Adjacent Landuses that Destabilize Banks	☐	☐	☐	☒	☐	Organic lawn maintenance to top of bank. Erosion in residences.
Sediment Loading or Deprivation	☐	☐	☐	☒	☐	
Instream Habitat Modifications	☐	☒	☐	☐	☐	Rock weir in D/S end
Barriers and/or Dams in the Vicinity of the Site	☐	☐	☐	☒	☐	
High Fishing Pressure	☐	☐	☐	☒	☐	
Log Jam Deflectors	☐	☐	☐	☒	☐	
Springs or Seeps at the Site	☐	☐	☐	☒	☐	
Impervious Substrate Limiting Burrowing Depth of Fish	☐	☐	☐	☒	☐	
Fish Stocked Near Sample Site	☐	☐	☐	☒	☐	
Other Activities that Could Influence Biota or Habitat	☐	☐	☐	☒	☐	
Intensive Logging Activitties within the Riparian Zone	☐	☐	☐	☒	☐	

Sources of Information
Visual Immediate ☒ Visual Extended ☐ Interview ☐ Maps & Photos ☐

Temperatures
Time (24hr): :
Air Temp (°C): 18
Water Temp (°C):
Max Air Temp (°C): 24
Max. Water Temp (°C):
Source of Max. Air Temp:

Riparian Vegetation Community
Only check one box for each bank and zone.

Riparian Zone	Left Bank: None	Lawn	Crop-land	Mea-dow	Scrub-land	Forest	Wet-lands	Right Bank: None	Lawn	Crop-land	Mea-dow	Scrub-land	Forest	Wet-lands
1.5-10m	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐	☒	☐	☐
10-30m	☐	☐	☐	☐	☐	☒	☐	☐	☒	☐	☐	☐	☐	☐
30-100m	☐	☒	☐	☐	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐

Comments: CONSTRUCTION D/S

Crew Leader (initial & last name): G. BY

Crew Initials	Recorder	Ent/Scanned	Verified	Corrected
ND				

Channel Morphology

Mandatory Fields In Grey
Must be filled out for processing

Stream Name: TUCK CREEK

Date (mm-dd): 2020-06-25

Stream Code: TUK

Site Code: TUK01 (01DS)

Sample: 01

Transect No.: 01 of 10

Bearing (D): 340

Min. Width (m): > 3.0

Site Length (m): 45.0

Active Channel Width (m): 5.0

No. of Transects: 10

Transect Spacing (m): 5.0

Point Spacing (m): 0.83

Points per Transect: 6

Transect & Point Layout

Use this table to determine the number of transects & points required, given the minimum stream width.

Minimum Width (m)	No. Transects at Site	Points per Transect
> 3.0	10	6
1.5 - 3.0	12	5
1.0 - 1.49	15	3
< 1.0	20	2

Calculations:

Transect Spacing = Site Length / (No. of Transects - 1)

Point Spacing = Active Channel Width / Points per Transect

1st Point = Point Spacing / 2 (from left bank)

Point No.	Location (m)	Depth (mm)	Hydraulic Head (mm)	Point	Max. in Ring
1	0.42	110	0	7	220
2	1.25	85	5	55	150
3	2.09	85	0	4	180
4	2.91	55	0	25	170
5	3.74	10	0	0.10	190
6	4.57	70	0	40	200

Measure depth & hydraulic head to nearest 5 mm

Particle Sizes (mm)

Point No.	Unmeasurable	Quality	Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other	FL	AL	SS	MC	WC	GR	TR
1	☐	2	☐	☐	☒	☐	☐	☐	☒	☐	☒	☐	☐	☐	☐
2	☐	2	☐	☐	☒	☐	☐	☐	☒	☐	☒	☐	☐	☐	☐
3	☐	2	☐	☐	☒	☐	☐	☐	☒	☐	☒	☐	☐	☐	☐
4	☐	2	☐	☐	☒	☐	☐	☐	☒	☐	☒	☐	☐	☐	☐
5	☐	2	☐	☒	☐	☐	☐	☐	☒	☐	☒	☐	☐	☐	☐
6	☐	2	☐	☐	☒	☐	☐	☐	☒	☐	☒	☐	☐	☐	☐

Cover

Aquatic Vegetation Types Present

Bank Angle & Particle Median Diameters

(Bank to tape height; if a height is >2m use check box, else enter values in proper observation points)

	> 2 m	0 mm	250 mm	750 mm	1500 mm	Amount of Undercut (mm)	No. of Veg. Squares on Bank
Left Bank	Height ☐	910	845	810	0	230	0
	Substrate Diameters	170	0.10	210	0.01		
Right Bank	Height ☒	670	550	700	0	0	2
	Substrate Diameters	1111	1111	0.05	0.95		

Dominant Vegetation Type

(Check box of the dominant type within the 1 x 2 m area)

	None	Lawn	Crop-land	Mea-dow	Scrub-land	Forest	Wet-land
Left Bank	☐	☐	☐	☐	☒	☐	☐
Right Bank	☒	☐	☐	☐	☐	☐	☐

Table Codes

Particle Sizes:
Measure all particles between 2.00mm and 1000mm

Material	Size
Unconsolidated Clay	0.01
Consolidated Clay	0.011
Silt	0.05
Sand	0.10
Large Boulders	1001
Bedrock	1111

Cover Quality:
0 = No Cover
1 = Embedded Cover
2 = Unembedded Cover

Aquatic Vegetation Types
FL = Filamentous Algae
AL = Non-Filamentous
SS = Moss
MC = Macrophytes
WC = Watercress
GR = Grass
TR = Terrestrial Plants

Comments: CONSTRUCTION 7/5

Crew Leader (initial & last name): GEB4

Crew	Recorder	Ent/Scanned	Verified	Corrected
NB				

Channel Morphology

Mandatory Fields In Grey
Must be filled out for processing

Stream Name: TUCK

Date (mm-dd): 2020-06-25

Stream Code: TUK

Site Code: TUK02

Sample: 01

Transect No.: 02 of 10

Bearing (D): 340

Min. Width (m): 3.0

Site Length (m): 45.0

Active Channel Width (m): 5.2

No. of Transects: 10

Transect Spacing (m): 5.0

Point Spacing (m): 0.87

Points per Transect: 6

Transect & Point Layout

Use this table to determine the number of transects & points required, given the minimum stream width.

Minimum Width (m)	No. Transects at Site	Points per Transect
> 3.0	10	6
1.5 - 3.0	12	5
1.0 - 1.49	15	3
< 1.0	20	2

Calculations:

Transect Spacing = Site Length / (No. of Transects - 1)

Point Spacing = Active Channel Width / Points per Transect

1st Point = Point Spacing / 2 (from left bank)

Measure depth & hydraulic head to nearest 5 mm

Particle Sizes (mm)

Cover

Aquatic Vegetation Types Present

Point No.	Location (m)	Depth (mm)	Hydraulic Head (mm)	Point	Max. in Ring	Unmeasurable	Quality	Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other	FL	AL	SS	MC	WC	GR	TR
1	0.43	35	0	120	160	☐	2	☐	☐	☒	☐	☐	☐	☒	☐	☒	☐	☐	☐	☐
2	1.30	75	0	20	130	☐	2	☐	☐	☒	☐	☐	☐	☒	☐	☒	☐	☐	☐	☐
3	2.17	45	5	15	200	☐	2	☐	☒	☐	☐	☐	☐	☒	☐	☒	☐	☐	☐	☐
4	3.04	95	5	22	280	☐	1	☐	☐	☒	☐	☐	☐	☒	☐	☒	☐	☐	☐	☐
5	3.91	10	0	0.10	170	☐	2	☐	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
6	4.78	50	0	85	120	☐	1	☐	☒	☐	☐	☐	☐	☒	☐	☒	☐	☐	☐	☐

Bank Angle & Particle Median Diameters

(Bank to tape height; if a height is >2m use check box, else enter values in proper observation points)

		> 2 m	0 mm	250 mm	750 mm	1500 mm	Amount of Undercut (mm)	No. of Veg. Squares on Bank
Left Bank	Height	☒	1080	960	330	0	180	0
	Substrate Diameters		0.10	65	0.05	0.05		
Right Bank	Height	☒	390	370	290	0	0	0
	Substrate Diameters		0.10	1111	25	0.05		

Dominant Vegetation Type

(Check box of the dominant type within the 1 x 2 m area)

	None	Lawn	Crop-land	Meadow	Scrub-land	Forest	Wet-land
Left Bank	☐	☐	☐	☒	☐	☐	☐
Right Bank	☒	☐	☐	☐	☐	☐	☐

Table Codes

Particle Sizes:
Measure all particles between 2.00mm and 1000mm

Material	Size
Unconsolidated Clay	0.01
Consolidated Clay	0.011
Silt	0.05
Sand	0.10
Large Boulders	1001
Bedrock	1111

Cover Quality
0 = No Cover
1 = Embedded Cover
2 = Unembedded Cover

Aquatic Vegetation Types
FL = Filamentous Algae
AL = Non-Filamentous
SS = Moss
MC = Macrophytes
WC = Watercress
GR = Grass
TR = Terrestrial Plants

Comments

Crew Leader (initial & last name): GEH

Crew	Recorder	Ent/Scanned	Verified	Corrected
ND				

Channel Morphology

Mandatory Fields In Grey
Must be filled out for processing

Stream Name: TUCK

Stream Code: TUK

Site Code: TUK02

Sample: 01

Transect No.: 03 of 10

Bearing (D):

Min. Width (m): 3.0

No. of Transects: 10

Points per Transect: 6

Site Length (m): 45.0

Transect Spacing (m): 5.0

Active Channel Width (m): 5.6

Point Spacing (m): 0.93

Date (mm-dd): 2020-06-25

Transect & Point Layout		
Use this table to determine the number of transects & points required, given the minimum stream width.		
Minimum Width (m)	No. Transects at Site	Points per Transect
> 3.0	10	6
1.5 - 3.0	12	5
1.0 - 1.49	15	3
< 1.0	20	2

Calculations:

Transect Spacing = Site Length / (No. of Transects - 1)

Point Spacing = Active Channel Width / Points per Transect

1st Point = Point Spacing / 2 (from left bank)

Point No.	Location (m)	Depth (mm)	Hydraulic Head (mm)	Particle Sizes (mm) Point	Particle Sizes (mm) Max. in Ring
1	0.47	175	0	0.10	120
2	1.40	70	0	240	240
3	2.33	170	0	140	190
4	3.26	130	0	0.10	190
5	4.19	180	0	0.10	150
6	5.12	110	0	0.10	1111

Measure depth & hydraulic head to nearest 5 mm

Point No.	Unmeasurable	Quality	Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other	FL	AL	SS	MC	WC	GR	TR
1	☐	2	☐	☒	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐
2	☐	2	☐	☐	☒	☐	☐	☐	☒	☐	☒	☐	☐	☐	☐
3	☐	2	☐	☐	☒	☐	☐	☐	☒	☐	☒	☐	☐	☐	☐
4	☐	2	☐	☒	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐
5	☐	2	☐	☐	☒	☐	☐	☐	☒	☐	☒	☐	☐	☐	☐
6	☐	2	☐	☒	☐	☐	☐	☐	☒	☐	☒	☐	☐	☐	☐

Cover

Aquatic Vegetation Types Present

Bank Angle & Particle Median Diameters

(Bank to tape height; if a height is >2m use check box, else enter values in proper observation points)

	> 2 m	0 mm	250 mm	750 mm	1500 mm	Amount of Undercut (mm)	No. of Veg. Squares on Bank
Left Bank	Height ☒	1445	350	250		0	2
	Substrate Diameters	120	85	0.05	0.05		
Right Bank	Height ☐	1130	850	650	0	0	0
	Substrate Diameters	200	0.05	0.65	0.05		

Dominant Vegetation Type (Check box of the dominant type within the 1 x 2 m area)

	None	Lawn	Crop-land	Meadow	Scrub-land	Forest	Wet-land
Left Bank	☐	☐	☐	☐	☒	☐	☐
Right Bank	☐	☐	☐	☐	☒	☐	☐

Table Codes

Particle Sizes: *Measure all particles between 2.00mm and 1000mm*

Material	Size
Unconsolidated Clay	0.01
Consolidated Clay	0.011
Silt	0.05
Sand	0.10
Large Boulders	1001
Bedrock	1111

Cover Quality:
0 = No Cover
1 = Embedded Cover
2 = Unembedded Cover

Aquatic Vegetation Types:
FL = Filamentous Algae
AL = Non-Filamentous
SS = Moss
MC = Macrophytes
WC = Watercress
GR = Grass
TR = Terrestrial Plants

Comments

Crew Leader (initial & last name): GEBT

Crew	Recorder	Ent/Scanned	Verified	Corrected
MA				

Channel Morphology

Mandatory Fields In Grey
Must be filled out for processing

Stream Name: TUCK

Stream Code: TUK

Site Code: TUK02

Sample: 01

Transect No.: 04 of 10

Bearing (D):

Min. Width (m): 3.0

No. of Transects: 10

Points per Transect: 6

Site Length (m): 45.0

Transect Spacing (m): 5.0

Active Channel Width (m): 5.0

Point Spacing (m): 0.83

Date (mm-dd): 2020-06-25

Transect & Point Layout		
Use this table to determine the number of transects & points required, given the minimum stream width.		
Minimum Width (m)	No. Transects at Site	Points per Transect
> 3.0	10	6
1.5 - 3.0	12	5
1.0 - 1.49	15	3
< 1.0	20	2

Calculations:

Transect Spacing = Site Length / (No. of Transects - 1)

Point Spacing = Active Channel Width / Points per Transect

1st Point = Point Spacing / 2 (from left bank)

Point No.	Location (m)	Measure depth & hydraulic head to nearest 5 mm: Depth (mm)	Hydraulic Head (mm)	Particle Sizes (mm): Point	Max. in Ring
1	0.42	75	0	210	210
2	1.25	110	0	10	170
3	2.08	130	0	0.10	290
4	2.91	105	0	25	170
5	3.74	15	0	200	200
6	4.57	10	0	0.10	150

Point No.	Cover: Unmeasurable	Quality	Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other	Aquatic Vegetation Types Present: FL	AL	SS	MC	WC	GR	TR
1	☐	2	☐	☒	☐	☐	☐	☐	☒	☐	☒	☐	☐	☐	☐
2	☐	2	☐	☐	☒	☐	☐	☐	☒	☐	☒	☐	☐	☐	☐
3	☐	1	☐	☐	☒	☐	☐	☐	☒	☐	☒	☐	☐	☐	☐
4	☐	1	☐	☐	☒	☐	☐	☐	☒	☐	☒	☐	☐	☐	☐
5	☐	1	☐	☐	☒	☐	☐	☐	☒	☐	☒	☐	☐	☐	☐
6	☐	2	☐	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Bank Angle & Particle Median Diameters
(Bank to tape height; if a height is >2m use check box, else enter values in proper observation points)

	> 2 m	0 mm	250 mm	750 mm	1500 mm	Amount of Undercut (mm)	No. of Veg. Squares on Bank
Left Bank Height	☒	480	405	250	0	0	8
Left Bank Substrate Diameters		140	0.10	0.05	0.05		
Right Bank Height	☒	540	530	490	0	90	0
Right Bank Substrate Diameters		60	35	240	0.05		

Dominant Vegetation Type (Check box of the dominant type within the 1 x 2 m area)

	None	Lawn	Crop-land	Meadow	Scrub-land	Forest	Wet-land
Left Bank	☐	☐	☐	☒	☐	☐	☐
Right Bank	☐	☐	☐	☐	☒	☐	☐

Table Codes

Particle Sizes: *Measure all particles between 2.00mm and 1000mm*

Material	Size
Unconsolidated Clay	0.01
Consolidated Clay	0.011
Silt	0.05
Sand	0.10
Large Boulders	1001
Bedrock	1111

Cover Quality:
0 = No Cover
1 = Embedded Cover
2 = Unembedded Cover

Aquatic Vegetation Types:
FL = Filamentous Algae
AL = Non-Filamentous
SS = Moss
MC = Macrophytes
WC = Watercress
GR = Grass
TR = Terrestrial Plants

Comments: Lots of caddisflies + scudst snails + leeches + fish

Crew Leader (initial & last name): GSH

Crew	Recorder	Ent/Scanned	Verified	Corrected
NA				

Channel Morphology

Mandatory Fields In Grey
Must be filled out for processing

Stream Name: TUCK

Date (mm-dd): 2026-06-25

Stream Code: TUC

Site Code: TUK02

Sample: 01

Transect No.: 05 of 10

Bearing (D):

Min. Width (m): 3.6

Site Length (m): 45.0

Active Channel Width (m): 5.6

No. of Transects: 10

Transect Spacing (m): 5.0

Point Spacing (m): 0.93

Points per Transect: 6

Transect & Point Layout		
Use this table to determine the number of transects & points required, given the minimum stream width.		
Minimum Width (m)	No. Transects at Site	Points per Transect
> 3.0	10	6
1.5 - 3.0	12	5
1.0 - 1.49	15	3
< 1.0	20	2

Calculations:

Transect Spacing = Site Length / (No. of Transects - 1)

Point Spacing = Active Channel Width / Points per Transect

1st Point = Point Spacing / 2 (from left bank)

Point No.	Location (m)	Depth (mm)	Hydraulic Head (mm)	Particle Size Point	Particle Size Max. in Ring
1	0.47	80	0	0.10	230
2	1.40	80	0	110	350
3	2.33	85	0	25	170
4	3.26	85	0	60	150
5	4.19	90	0	0.10	180
6	5.12	10	0	1111	1111

Measure depth & hydraulic head to nearest 5 mm

Particle Sizes (mm)

Point No.	Cover: Unmeasurable	Quality	Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other	Aquatic Vegetation Types Present: FL	AL	SS	MC	WC	GR	TR
1	☐	2	☐	☐	☒	☒	☐	☐	☒	☐	☒	☐	☐	☐	☐
2	☐	2	☐	☐	☒	☒	☐	☐	☒	☐	☒	☐	☐	☐	☐
3	☐	2	☐	☒	☐	☐	☐	☐	☒	☐	☒	☐	☐	☐	☐
4	☐	2	☐	☒	☐	☒	☐	☐	☒	☐	☒	☐	☐	☐	☐
5	☐	2	☐	☒	☐	☐	☐	☐	☒	☐	☒	☐	☐	☐	☐
6	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☒	☐	☐	☐	☐

Cover

Aquatic Vegetation Types Present

Bank Angle & Particle Median Diameters

(Bank to tape height; if a height is >2m use check box, else enter values in proper observation points)

	> 2 m	0 mm	250 mm	750 mm	1500 mm	Amount of Undercut (mm)	No. of Veg. Squares on Bank
Left Bank	Height ☒	1176	920	110	0	270	2
	Substrate Diameters	0.10	160	0.05	0-05		
Right Bank	Height ☐	620	1060	210	0	110	6
	Substrate Diameters	260	0.05	0.05	0.05		

Dominant Vegetation Type (Check box of the dominant type within the 1 x 2 m area)

	None	Lawn	Crop-land	Meadow	Scrub-land	Forest	Wet-land
Left Bank	☐	☐	☐	☐	☐	☐	☐
Right Bank	☐	☐	☐	☒	☐	☐	☐

Table Codes

Particle Sizes
Measure all particles between 2.00mm and 1000mm

Material	Size
Unconsolidated Clay	0.01
Consolidated Clay	0.011
Silt	0.05
Sand	0.10
Large Boulders	1001
Bedrock	1111

Cover Quality
0 = No Cover
1 = Embedded Cover
2 = Unembedded Cover

Aquatic Vegetation Types
FL = Filamentous Algae
AL = Non-Filamentous
SS = Moss
MC = Macrophytes
WC = Watercress
GR = Grass
TR = Terrestrial Plants

Comments

Crew Leader (initial & last name): CSY

Crew	Recorder	Ent/Scanned	Verified	Corrected
NO				

Channel Morphology

Mandatory Fields In Grey
Must be filled out for processing

Stream Name: TUCK

Date (mm-dd): 2020-06-25

Stream Code: TUR

Site Code: TUK02

Sample: 01 | Transect No.: 06 of 10 | Bearing (D):

Min. Width (m): 3.0 | Site Length (m): 45.0 | Active Channel Width (m): 5.2

No. of Transects: 10 | Transect Spacing (m): 5.0 | Point Spacing (m): 0.87

Points per Transect: 6

Transect & Point Layout

Use this table to determine the number of transects & points required, given the minimum stream width.

Minimum Width (m)	No. Transects at Site	Points per Transect
> 3.0	10	6
1.5 - 3.0	12	5
1.0 - 1.49	15	3
< 1.0	20	2

Calculations:

Transect Spacing = Site Length / (No. of Transects - 1)

Point Spacing = Active Channel Width / Points per Transect

1st Point = Point Spacing / 2 (from left bank)

Point No.	Location (m)	Measure depth & hydraulic head to nearest 5 mm: Depth (mm)	Hydraulic Head (mm)	Particle Sizes (mm): Point	Max. in Ring
1	0.43	25	5	1111	1111
2	1.30	60	0	25	170
3	2.17	35	0	20	150
4	3.04	10	0	30	170
5	3.91	150	5	5	170
6	4.78	5	0	0.10	150

Cover

Point No.	Unmeasurable	Quality	Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other
1	☐	☐	☐	☐	☐	☐	☐	☐
2	☐	2	☐	☐	☒	☐	☐	☐
3	☐	2	☐	☒	☐	☐	☐	☐
4	☐	2	☐	☒	☐	☐	☐	☐
5	☐	2	☐	☒	☐	☐	☐	☐
6	☐	2	☐	☐	☒	☐	☐	☐

Aquatic Vegetation Types Present

Point No.	FL	AL	SS	MC	WC	GR	TR
1	☐	☐	☐	☐	☐	☐	☐
2	☒	☐	☒	☐	☐	☐	☐
3	☒	☐	☒	☐	☐	☐	☐
4	☐	☐	☐	☐	☐	☐	☐
5	☒	☐	☒	☐	☐	☐	☐
6	☐	☐	☐	☐	☐	☐	☐

Bank Angle & Particle Median Diameters
(Bank to tape height; if a height is >2m use check box, else enter values in proper observation points)

	> 2 m	0 mm	250 mm	750 mm	1500 mm	Amount of Undercut (mm)	No. of Veg. Squares on Bank
Left Bank	Height ☒	1110	930	170	0	120	0
	Substrate Diameters	160	170	0.05	0.05		
Right Bank	Height ☐	430	250	100	0	0	5
	Substrate Diameters	110	0.05	0.05	0.05		

Dominant Vegetation Type
(Check box of the dominant type within the 1 x 2 m area)

	None	Lawn	Crop-land	Meadow	Scrub-land	Forest	Wet-land
Left Bank	☐	☐	☐	☐	☐	☐	☐
Right Bank	☐	☐	☐	☒	☐	☐	☐

Table Codes

Particle Sizes:
Measure all particles between 2.00mm and 1000mm

Material	Size
Unconsolidated Clay	0.01
Consolidated Clay	0.011
Silt	0.05
Sand	0.10
Large Boulders	1001
Bedrock	1111

Cover Quality
0 = No Cover
1 = Embedded Cover
2 = Unembedded Cover

Aquatic Vegetation Types
FL = Filamentous Algae
AL = Non-Filamentous
SS = Moss
MC = Macrophytes
WC = Watercress
GR = Grass
TR = Terrestrial Plants

Comments

Crew Leader (initial & last name): GERT

Crew	Recorder	Ent/Scanned	Verified	Corrected
ND				

Channel Morphology

Mandatory Fields In Grey
Must be filled out for processing

Stream Name: TUCK

Date (mm-dd): 2020-08-25

Stream Code: TUK

Site Code: TUK02

Sample: 01

Transect No.: 07 of 10

Bearing (D):

Min. Width (m): 3.0

Site Length (m): 45.6

Active Channel Width (m): 4.4

No. of Transects: 10

Transect Spacing (m): 5.0

Point Spacing (m): 0.73

Points per Transect: 6

Transect & Point Layout

Use this table to determine the number of transects & points required, given the minimum stream width.

Minimum Width (m)	No. Transects at Site	Points per Transect
> 3.0	10	6
1.5 - 3.0	12	5
1.0 - 1.49	15	3
< 1.0	20	2

Calculations:

Transect Spacing = Site Length / (No. of Transects - 1)

Point Spacing = Active Channel Width / Points per Transect

1st Point = Point Spacing / 2 (from left bank)

Point No.	Location (m)	Measure depth & hydraulic head to nearest 5 mm: Depth (mm)	Hydraulic Head (mm)	Particle Sizes (mm): Point	Max. in Ring
1	0.37	135	0	1111	1111
2	1.10	110	0	190	190
3	1.33	110	0	210	210
4	2.56	80	0	5	160
5	3.29	120	0	30	130
6	4.02	55	0	5	250

Cover

Unmeasurable	Quality	Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other
	2		X				
	2			X			
	2			X			
	1			X			
	2			X			

Aquatic Vegetation Types Present

FL	AL	SS	MC	WC	GR	TR
X		X				
X		X				
X		X				
X		X				

Bank Angle & Particle Median Diameters

(Bank to tape height; if a height is >2m use check box, else enter values in proper observation points)

	Height / Substrate Diameters	> 2 m	0 mm	250 mm	750 mm	1500 mm	Amount of Undercut (mm)	No. of Veg. Squares on Bank
Left Bank	Height	☐	1060	290	110	0	220	0
	Substrate Diameters		1111	0.05	0.05	0.05		
Right Bank	Height	☐	350	216	70	0	0	4
	Substrate Diameters		1111	150	90	0.05		

Dominant Vegetation Type
(Check box of the dominant type within the 1 x 2 m area)

	None	Lawn	Crop-land	Meadow	Scrub-land	Forest	Wet-land
Left Bank	☐	☐	☐	☐	☐	☒	☐
Right Bank	☐	☐	☐	☒	☐	☐	☐

Table Codes

Particle Sizes:
Measure all particles between 2.00mm and 1000mm

Material	Size
Unconsolidated Clay	0.01
Consolidated Clay	0.011
Silt	0.05
Sand	0.10
Large Boulders	1001
Bedrock	1111

Cover Quality:
0 = No Cover
1 = Embedded Cover
2 = Unembedded Cover

Aquatic Vegetation Types:
FL = Filamentous Algae
AL = Non-Filamentous
SS = Moss
MC = Macrophytes
WC = Watercress
GR = Grass
TR = Terrestrial Plants

Comments:

Crew Leader (initial & last name): OEBY

Crew	Recorder	Ent/Scanned	Verified	Corrected
ND				

Channel Morphology

Mandatory Fields In Grey
Must be filled out for processing

Stream Name: TUCK

Date (mm-dd): 2020-06-25

Stream Code: TUK0

Site Code: TUK02

Sample: 01

Transect No.: 08 of 10

Bearing (D):

Min. Width (m): 3.0

Site Length (m): 45.0

Active Channel Width (m): 4.3

No. of Transects: 10

Transect Spacing (m): 5.0

Point Spacing (m): 0.72

Points per Transect: 6

Transect & Point Layout

Use this table to determine the number of transects & points required, given the minimum stream width.

Minimum Width (m)	No. Transects at Site	Points per Transect
> 3.0	10	6
1.5 - 3.0	12	5
1.0 - 1.49	15	3
< 1.0	20	2

Calculations:

Transect Spacing = Site Length / (No. of Transects - 1)

Point Spacing = Active Channel Width / Points per Transect

1st Point = Point Spacing / 2 (from left bank)

Point No.	Location (m)	Measure depth & hydraulic head to nearest 5 mm: Depth (mm)	Hydraulic Head (mm)	Particle Sizes (mm): Point	Max. in Ring
1	0.39	30	0	1111	1111
2	1.53	30	0	1111	1111
3	1.80	110	0	25	1[illegible]
4	2.52	170	0	1111	1111
5	3.24	170	0	0.10	130
6	3.96	150	0	0.10	110

Point No.	Cover: Unmeasurable	Quality	Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other	Aquatic Vegetation Types Present: FL	AL	SS	MC	WC	GR	TR
1	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
2	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
3	☐	2	☐	☒	☐	☐	☐	☐	☒	☐	☒	☐	☐	☐	☐
4	☐	☐	☐	☐	☐	☐	☐	☐	☒	☐	☒	☐	☐	☐	☐
5	☐	2	☐	☒	☐	☐	☐	☐	☒	☐	☒	☐	☐	☐	☐
6	☐	2	☐	☒	☐	☐	☐	☐	☒	☐	☒	☐	☐	☐	☐

Bank Angle & Particle Median Diameters
(Bank to tape height; if a height is >2m use check box, else enter values in proper observation points)

	> 2 m	0 mm	250 mm	750 mm	1500 mm	Amount of Undercut (mm)	No. of Veg. Squares on Bank
Left Bank	Height ☐	1240	310	170		310	0
	Substrate Diameters	1111	0.05	0.05	0.25		
Right Bank	Height ☒	430	360	165			0
	Substrate Diameters	120	5	0.05	0.05		

Dominant Vegetation Type
(Check box of the dominant type within the 1 x 2 m area)

	None	Lawn	Crop-land	Meadow	Scrub-land	Forest	Wet-land
Left Bank	☐	☐	☐	☐	☐	☒	☐
Right Bank	☐	☐	☐	☒	☐	☐	☐

Table Codes

Particle Sizes
Measure all particles between 2.00mm and 1000mm

Material	Size
Unconsolidated Clay	0.01
Consolidated Clay	0.011
Silt	0.05
Sand	0.10
Large Boulders	1001
Bedrock	1111

Cover Quality:
0 = No Cover
1 = Embedded Cover
2 = Unembedded Cover

Aquatic Vegetation Types
FL = Filamentous Algae
AL = Non-Filamentous
SS = Moss
MC = Macrophytes
WC = Watercress
GR = Grass
TR = Terrestrial Plants

Comments

Crew Leader (initial & last name): GEY

Crew	Recorder	Ent/Scanned	Verified	Corrected
[illegible]				

Channel Morphology

Mandatory Fields In Grey
Must be filled out for processing

Stream Name: TUCK

Date (mm-dd): 2020-06-25

Stream Code: TUK

Site Code: TUK02

Sample: 01

Transect No.: 09 of 10

Bearing (D):

Min. Width (m): 3.0

Site Length (m): 45.0

Active Channel Width (m): 9.2

No. of Transects: 10

Transect Spacing (m): 5.0

Point Spacing (m): 0.70

Points per Transect: 6

Transect & Point Layout Use this table to determine the number of transects & points required, given the minimum stream width.		
Minimum Width (m)	No. Transects at Site	Points per Transect
> 3.0	10	6
1.5 - 3.0	12	5
1.0 - 1.49	15	3
< 1.0	20	2

Calculations:

Transect Spacing = Site Length / (No. of Transects - 1)

Point Spacing = Active Channel Width / Points per Transect

1st Point = Point Spacing / 2 (from left bank)

Measure depth & hydraulic head to nearest 5 mm

Particle Sizes (mm)

Cover

Aquatic Vegetation Types Present

Point No.	Location (m)	Depth (mm)	Hydraulic Head (mm)	Particle Size: Point	Particle Size: Max. in Ring	Cover: Unmeasurable	Cover: Quality	Cover: Wood	Cover: Round Rock	Cover: Flat Rock	Cover: Macrophyte	Cover: Bank	Cover: Other	FL	AL	SS	MC	WC	GR	TR
1	0.35	45	0	1111	1111									X						
2	1.05	200	0	1111	1111									X						
3	1.75	190	0	1111	1111									X						
4	2.45	80	0	25	130		2		X					X						
5	3.15	40	0	35	230		2			X				X		X				
6	3.85	30	0	0.10	130		2			X										

Bank Angle & Particle Median Diameters

(Bank to tape height; if a height is >2m use check box, else enter values in proper observation points)

	> 2 m	0 mm	250 mm	750 mm	1500 mm	Amount of Undercut (mm)	No. of Veg. Squares on Bank
Left Bank	Height ☒	380	910	230	0	120	0
	Substrate Diameters	130	0.10	0.05	0.05		
Right Bank	Height ☒	445	400	280	0	0	0
	Substrate Diameters	0.10	230	35	0.05		

Dominant Vegetation Type

(Check box of the dominant type within the 1 x 2 m area)

	None	Lawn	Crop-land	Meadow	Scrub-land	Forest	Wet-land
Left Bank	☐	☐	☐	☐	☐	☐	☐
Right Bank	☐	☐	☐	☐	☐	☐	☐

Table Codes Particle Sizes: *Measure all particles between 2.00mm and 1000mm*	
Material	Size
Unconsolidated Clay	0.01
Consolidated Clay	0.011
Silt	0.05
Sand	0.10
Large Boulders	1001
Bedrock	1111

Cover Quality:
0 = No Cover
1 = Embedded Cover
2 = Unembedded Cover

Aquatic Vegetation Types:
FL = Filamentous Algae
AL = Non-Filamentous
SS = Moss
MC = Macrophytes
WC = Watercress
GR = Grass
TR = Terrestrial Plants

Comments

Crew Leader (initial & last name): GEB

Crew	Recorder	Ent/Scanned	Verified	Corrected
AD				

Channel Morphology

Mandatory Fields In Grey
Must be filled out for processing

Stream Name: TUCK

Date (mm-dd): 2020-06-25

Stream Code: TUK

Site Code: TUK02

Sample: 01

Transect No.: 10 of 10

Bearing (D):

Min. Width (m): 3.0

Site Length (m): 45.0

Active Channel Width (m): 3.1

No. of Transects: 10

Transect Spacing (m): 5.0

Point Spacing (m): 0.52

Points per Transect: 6

Transect & Point Layout

Use this table to determine the number of transects & points required, given the minimum stream width.

Minimum Width (m)	No. Transects at Site	Points per Transect
> 3.0	10	6
1.5 - 3.0	12	5
1.0 - 1.49	15	3
< 1.0	20	2

Calculations:

Transect Spacing = Site Length / (No. of Transects - 1)

Point Spacing = Active Channel Width / Points per Transect

1st Point = Point Spacing / 2 (from left bank)

Point No.	Location (m)	Depth (mm)	Hydraulic Head (mm)	Particle Size Point (mm)	Particle Size Max. in Ring (mm)	Unmeasurable	Quality	Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other	FL	AL	SS	MC	WC	GR	TR
1	0.26	25	0	150	150	☐	2	☐	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
2	0.78	30	0	15	140	☐	2	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
3	1.30	95	0	5	180	☐	2	☐	☒	☐	☐	☐	☐	☐	☐	☒	☐	☐	☐	☐
4	1.82	80	5	160	130	☐	2	☐	☒	☐	☐	☐	☐	☐	☐	☒	☐	☐	☐	☐
5	2.34	85	10	25	200	☐	2	☐	☐	☒	☐	☐	☐	☐	☐	☒	☐	☐	☐	☐
6	2.86	25	0	0.10	210	☐	2	☐	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Bank Angle & Particle Median Diameters
(Bank to tape height; if a height is >2m use check box, else enter values in proper observation points)

	> 2 m	0 mm	250 mm	750 mm	1500 mm	Amount of Undercut (mm)	No. of Veg. Squares on Bank
Left Bank	Height ☐	710	700	460	0	0	
	Substrate Diameters	140	0.10	150	120		
Right Bank	Height ☒	370	330	220	0		
	Substrate Diameters	140	210	160	120		

Dominant Vegetation Type
(Check box of the dominant type within the 1 x 2 m area)

	None	Lawn	Crop-land	Mea-dow	Scrub-land	Forest	Wet-land
Left Bank	☐	☐	☐	☐	☐	☐	☐
Right Bank	☐	☐	☐	☐	☐	☐	☐

Table Codes

Particle Sizes:
Measure all particles between 2.00mm and 1000mm

Material	Size
Unconsolidated Clay	0.01
Consolidated Clay	0.011
Silt	0.05
Sand	0.10
Large Boulders	1001
Bedrock	1111

Cover Quality
0 = No Cover
1 = Embedded Cover
2 = Unembedded Cover

Aquatic Vegetation Types
FL = Filamentous Algae
AL = Non-Filamentous
SS = Moss
MC = Macrophytes
WC = Watercress
GR = Grass
TR = Terrestrial Plants

Comments

Crew Leader (initial & last name): S EBT

Crew	Recorder	Ent/Scanned	Verified	Corrected
MD				

Site Identification

Stream Name: TUCK CREEK | Stream Code: TUK | Date (yyyy-mm-dd): 2020-06-25

Site Code: TUK02 | Alternate Site Code: 002 | Sample: 01 | Site Length (m): 45.8

*** Record using NAD83 datum

Uncorr. UTM — Zone: 17 | Easting: 598593.0 | Northing: 4801515.0 | OR → Lat. / Long. (DD MM SS.sss)

Corr. UTM — Zone: 1 | Easting: . | Northing: .

Source of Uncorrected UTM Coord.: GPS/DGPS ☐ | GIS ☒ | OBM ☐ | Other

Source of CorrectedUTM Coordinates: FWIS ☐ | Ortho-photos ☐ | GIS ☐ | Other | Name of Layer Used for Correction

Access Route

SOUTH ON WALKERS LINE FROM HWY 403, WEST ON HARVESTER, PARK BEHIND ABB INC.

13.8
17
17.8

Site Description

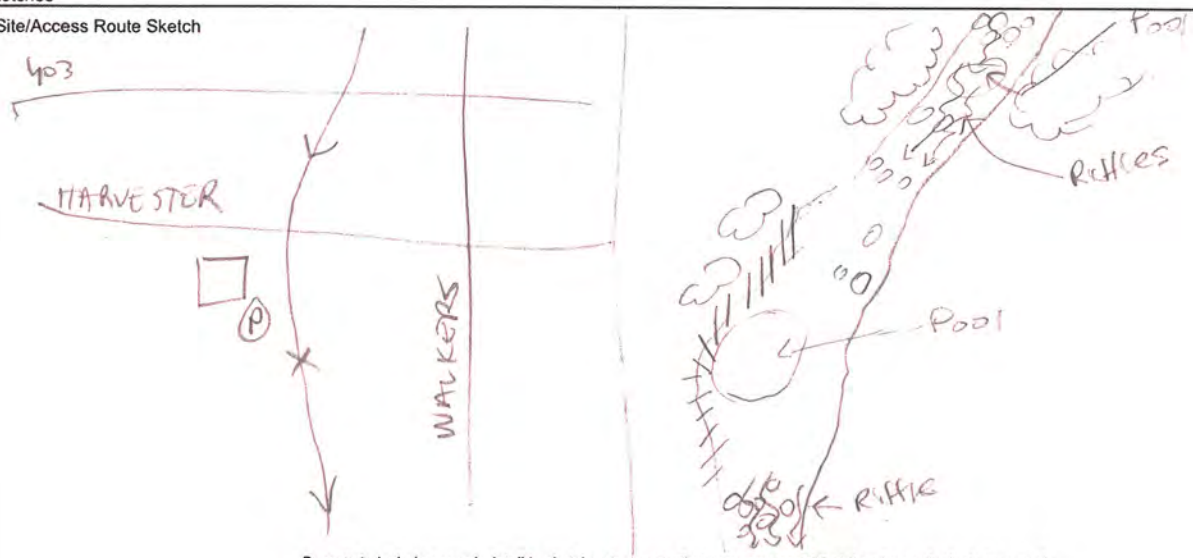
WALK EAST THROUGH FIELD TO CREEK, D/S END IS ~ 20 M U/S OF LARGE SW OUTFALL, ~ 70 m U/S OF RAILLINE

13.5
15.6
11.4
5.3

☐ **Site Was Unsampleable** - *add reason on reverse*

Sketches

Site/Access Route Sketch



Be sure to include enough detail in sketches to ensure that someone could find the site again; include a north arrow and the locations of all markers and noted features. The artist should also sign the sketches.

Photo No. | Photo Name | Photo Description

Comments

Degrading concrete block in channel, severe erosion on left bank

Crew Leader (init. & last name): GEB Y

Crew: ND | Recorder | Entered | Verified | Corrected

CEWA, Ebony Jewdwarg, AMGO, NOCA

Site Marker Details

SITE MARKER DESCRIPTION

	Bearing (D)	Distance (m)		Photo No.	Photo Name
Upstream Marker (measure from stake to site)	150	2.5	Upstream		
			Downstream		

Upstream Description

Pink flag on ash, right bank

	Bearing (D)	Distance (m)		Photo No.	Photo Name
Downstream Marker (measure from stake to site)	230	2.6	Upstream		
			Downstream		

Downstream Description

Small poplar, pink flag. Left bank

Site is Unsampleable

- ☐ Stream dry
- ☐ Insufficient water to sample effectively
- ☐ Stream is no longer present at location (tiled or relocated, etc)
- ☐ Naturally unwadeable (i.e. > 1.5 m deep)
- ☐ Unwadeable due to ponding from a permanent barrier — What is the permanent barrier?
- ☐ Unwadeable due to ponding from temporary barrier (eg. beaver dam) — What is the temporary barrier?
- ☐ Landowner could not be contacted
- ☐ Landowner refused access
- ☐ Inaccessible for safety reasons *(add details in comments below)*
- ☐ Stream is wadeable but not appropriate for the intended sampling

Modules to have been used (e.g. S2.M1, S3.M1):

Comments

Site Features

Mandatory Fields In Grey
Must be filled out for processing

Stream Code: TUK

Site Code: TUK02

Sample: 01

Date (mm-dd): 2010 06-25

Stream Name: Tuck Creek

For each landuse, check box that applies. Be sure to include comments explaining the particulars, including names and numbers of contacts

Site Features	Ongoing & Active	Historical Evidence	No Evidence but Reported	No Evidence	Unknown	Comments
Potential Point or Non-point Source Contaminant Sources	☒	☐	☐	☐	☐	Large 1500 storm sewer outlet inlets of circle, industrial
Major Nutrient Sources Upstream	☒	☐	☐	☐	☐	Industrial, roads, agriculture.
Channel Hardening or Straightening	☒	☐	☐	☐	☐	Corrugated metal
Adjacent Landuses that Destabilize Banks	☒	☐	☐	☐	☐	Industrial etc
Sediment Loading or Deprivation	☐	☐	☐	☒	☐	
Instream Habitat Modifications	☐	☒	☐	☐	☐	Concrete, poor engineering
Barriers and/or Dams in the Vicinity of the Site	☐	☐	☐	☒	☐	
High Fishing Pressure	☐	☐	☐	☒	☐	
Log Jam Deflectors	☐	☐	☐	☒	☐	
Springs or Seeps at the Site	☐	☐	☐	☒	☐	
Impervious Substrate Limiting Burrowing Depth of Fish	☒	☐	☐	☐	☐	Exposed [illegible]
Fish Stocked Near Sample Site	☐	☐	☐	☒	☐	
Other Activities that Could Influence Biota or Habitat	☐	☐	☐	☒	☐	
Intensive Logging Activitties within the Riparian Zone	☐	☐	☐	☒	☐	

Sources of Information
Visual Immediate ☒ Visual Extended ☐ Interview ☐ Maps & Photos ☒

Temperatures
Time (24hr): [illegible]
Air Temp (°C):
Water Temp (°C):
Max Air Temp (°C):
Max. Water Temp (°C):
Source of Max. Air Temp:

Riparian Vegetation Community
Only check one box for each bank and zone.

Dominant Vegetation Type

Riparian Zone	Left Bank None	Lawn	Crop-land	Mea-dow	Scrub-land	Forest	Wet-lands	Right Bank None	Lawn	Crop-land	Mea-dow	Scrub-land	Forest	Wet-lands
1.5-10m	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐	☐	☒	☐
10-30m	☐	☐	☐	☒	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐
30-100m	☐	☐	☐	☒	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐

Comments:

Crew Leader (initial & last name): K [illegible]

Crew Initials	Recorder	Ent/Scanned	Verified	Corrected
ND				

Channel Morphology

Stream Name: TUCK CREEK

Stream Code: TUK

Site Code: TUK02

Sample: 01 | Transect No.: 01 of 12 | Bearing (D): 290

Min. Width (m): 1.5 | Site Length (m): 48.3 | Active Channel Width (m): 3.8

No. of Transects: 12 | Transect Spacing (m): 4.16 | Point Spacing (m): 6.76

Points per Transect: 5

Mandatory Fields In Grey
Must be filled out for processing

Date (mm-dd): 2020-06-25

Transect & Point Layout

Use this table to determine the number of transects & points required, given the minimum stream width.

Minimum Width (m)	No. Transects at Site	Points per Transect
> 3.0	10	6
1.5 - 3.0	12	5
1.0 - 1.49	15	3
< 1.0	20	2

Calculations:

Transect Spacing = Site Length / (No. of Transects - 1)

Point Spacing = Active Channel Width / Points per Transect

1st Point = Point Spacing / 2 (from left bank)

Point No.	Location (m)	Measure depth & hydraulic head to nearest 5 mm: Depth (mm)	Hydraulic Head (mm)	Particle Sizes (mm): Point	Max. in Ring
1	0.38	45	0	0.10	130
2	1.14	35	0	230	230
3	1.90	45	5	5	170
4	2.66	35	0	80	110
5	3.42	30	0	70	560
6	.				

Cover

Unmeasurable	Quality	Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other
☐	2	☐	☐	☒	☒	☐	☐
☐	2	☐	☐	☒	☒	☐	☐
☐	2	☐	☐	☒	☐	☐	☐
☐	2	☐	☐	☒	☐	☐	☐
☐	2	☐	☒	☐	☐	☐	☐
☐		☐	☐	☐	☐	☐	☐

Aquatic Vegetation Types Present

FL	AL	SS	MC	WC	GR	TR
☒	☐	☐	☐	☐	☐	☐
☒	☐	☐	☐	☐	☐	☐
☒	☐	☐	☐	☐	☐	☐
☒	☐	☐	☐	☐	☐	☐
☐	☐	☐	☐	☐	☐	☐
☐	☐	☐	☐	☐	☐	☐

Bank Angle & Particle Median Diameters

(Bank to tape height; if a height is >2m use check box, else enter values in proper observation points)

	> 2 m	0 mm	250 mm	750 mm	1500 mm	Amount of Undercut (mm)	No. of Veg. Squares on Bank
Left Bank	Height ☒	480	440	275	0	0	3
	Substrate Diameters	10	60	0.05	0.05		
Right Bank	Height ☒	135	80	35	0	0	0
	Substrate Diameters	15	0.10	10	25		

Dominant Vegetation Type

(Check box of the dominant type within the 1 x 2 m area)

	None	Lawn	Crop-land	Mea-dow	Scrub-land	Forest	Wet-land
Left Bank	☐	☐	☐	☒	☐	☐	☐
Right Bank	☐	☐	☐	☐	☐	☐	☐

Table Codes

Particle Sizes

Measure all particles between 2.00mm and 1000mm

Material	Size
Unconsolidated Clay	0.01
Consolidated Clay	0.011
Silt	0.05
Sand	0.10
Large Boulders	1001
Bedrock	1111

Cover Quality
0 = No Cover
1 = Embedded Cover
2 = Unembedded Cover

Aquatic Vegetation Types
FL = Filamentous Algae
AL = Non-Filamentous
SS = Moss
MC = Macrophytes
WC = Watercress
GR = Grass
TR = Terrestrial Plants

Comments

Crew Leader (initial & last name): GEBY

Crew	Recorder	Ent/Scanned	Verified	Corrected
ND				

Channel Morphology

Mandatory Fields In Grey
Must be filled out for processing

Stream Name: TUCK CREEK

Date (mm-dd): 2020-06-25

Stream Code: TUC

Site Code: TUC02

Sample: 01

Transect No.: 02 of 12

Bearing (D): 285

Min. Width (m): 1.5

Site Length (m): 46.3

Active Channel Width (m): 3.3

No. of Transects: 12

Transect Spacing (m): 4.16

Point Spacing (m): 0.66

Points per Transect: 5

Transect & Point Layout		
Use this table to determine the number of transects & points required, given the minimum stream width.		
Minimum Width (m)	No. Transects at Site	Points per Transect
> 3.0	10	6
1.5 - 3.0	12	5
1.0 - 1.49	15	3
< 1.0	20	2

Calculations:

Transect Spacing = Site Length / (No. of Transects - 1)

Point Spacing = Active Channel Width / Points per Transect

1st Point = Point Spacing / 2 (from left bank)

Measure depth & hydraulic head to nearest 5 mm

Particle Sizes (mm)

Cover

Aquatic Vegetation Types Present

Point No.	Location (m)	Depth (mm)	Hydraulic Head (mm)	Particle Size: Point	Particle Size: Max. in Ring	Cover: Unmeasurable	Cover: Quality	Cover: Wood	Cover: Round Rock	Cover: Flat Rock	Cover: Macrophyte	Cover: Bank	Cover: Other	Aquatic Vegetation: FL	AL	SS	MC	WC	GR	TR
1	0.33	100	0	25	140	☐	2	☒	☐	☒	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐
2	0.99	135	0	0.10	210	☐	2	☐	☐	☒	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐
3	1.65	215	0	210	210	☐	2	☐	☐	☒	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐
4	2.31	160	0	0.10	15	☐	2	☐	☐	☐	☒	☐	☐	☒	☐	☐	☐	☐	☐	☐
5	2.97	80	0	0.10	25	☐	2	☐	☐	☐	☒	☐	☐	☒	☐	☐	☐	☐	☐	☐
6	.					☐		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Bank Angle & Particle Median Diameters

(Bank to tape height; if a height is >2m use check box, else enter values in proper observation points)

	> 2 m	0 mm	250 mm	750 mm	1500 mm	Amount of Undercut (mm)	No. of Veg. Squares on Bank
Left Bank	Height ☒	1680	360	110	0	540	0
	Substrate Diameters	180	0.05	0.05	0.05		
Right Bank	Height ☒	190	165	55	0	0	2
	Substrate Diameters	65	0.10	40	0.10		

Dominant Vegetation Type (Check box of the dominant type within the 1 x 2 m area)

	None	Lawn	Crop-land	Mea-dow	Scrub-land	Forest	Wet-land
Left Bank	☐	☐	☐	☐	☒	☐	☐
Right Bank	☐	☐	☐	☐	☐	☐	☐

Table Codes

Particle Sizes: *Measure all particles between 2.00mm and 1000mm*

Material	Size
Unconsolidated Clay	0.01
Consolidated Clay	0.011
Silt	0.05
Sand	0.10
Large Boulders	1001
Bedrock	1111

Cover Quality:
0 = No Cover
1 = Embedded Cover
2 = Unembedded Cover

Aquatic Vegetation Types:
FL = Filamentous Algae
AL = Non-Filamentous
SS = Moss
MC = Macrophytes
WC = Watercress
GR = Grass
TR = Terrestrial Plants

Comments

Crew Leader (initial & last name): GEBY

Crew	Recorder	Ent/Scanned	Verified	Corrected
ND				

Channel Morphology

Mandatory Fields In Grey
Must be filled out for processing

Stream Name: TUCK CREEK

Date (mm-dd): 2020-06-25

Stream Code: TUK

Site Code: TUK02

Sample: 01

Transect No.: 03 of 12

Bearing (D): 290

Min. Width (m): 1.5

Site Length (m): 48.3

Active Channel Width (m): 2.7

No. of Transects: 12

Transect Spacing (m): 4.16

Point Spacing (m): 0.54

Points per Transect: 5

Transect & Point Layout

Use this table to determine the number of transects & points required, given the minimum stream width.

Minimum Width (m)	No. Transects at Site	Points per Transect
> 3.0	10	6
1.5 - 3.0	12	5
1.0 - 1.49	15	3
< 1.0	20	2

Calculations:

Transect Spacing = Site Length / (No. of Transects - 1)

Point Spacing = Active Channel Width / Points per Transect

1st Point = Point Spacing / 2 (from left bank)

Point No.	Location (m)	Measure depth & hydraulic head to nearest 5 mm: Depth (mm)	Hydraulic Head (mm)	Particle Sizes (mm): Point	Max. in Ring
1	0.27	30	0	1111	1111
2	0.81	100	0	1111	1111
3	1.35	270	5	15	40
4	1.89	105	0	0.10	80
5	2.43	55	0	0.10	165
6	.				

Point No.	Cover: Unmeasurable	Quality	Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other	Aquatic Vegetation Types Present: FL	AL	SS	MC	WC	GR	TR
1	☐	2	☐	☐	☐	☒	☐	☐	☒	☐	☐	☐	☐	☐	☐
2	☐	2	☐	☐	☐	☒	☐	☐	☒	☐	☐	☐	☐	☐	☐
3	☐		☐	☐	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐
4	☐	2	☐	☐	☐	☒	☐	☐	☒	☐	☐	☐	☐	☐	☐
5	☐	2	☐	☐	☒	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐
6	☐		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Bank Angle & Particle Median Diameters
(Bank to tape height; if a height is >2m use check box, else enter values in proper observation points)

	> 2 m	0 mm	250 mm	750 mm	1500 mm	Amount of Undercut (mm)	No. of Veg. Squares on Bank
Left Bank	Height ☐	1720	1325	980	0	0	0
	Substrate Diameters	1111	1111	0.05	0.05		
Right Bank	Height ☐	450	390	180	0	0	5
	Substrate Diameters	0.10	0.10	0.10	45		

Dominant Vegetation Type
(Check box of the dominant type within the 1 x 2 m area)

	None	Lawn	Crop-land	Mea-dow	Scrub-land	Forest	Wet-land
Left Bank	☐	☐	☐	☐	☒	☐	☐
Right Bank	☐	☐	☐	☒	☐	☐	☐

Table Codes

Particle Sizes:
Measure all particles between 2.00mm and 1000mm

Material	Size
Unconsolidated Clay	0.01
Consolidated Clay	0.011
Silt	0.05
Sand	0.10
Large Boulders	1001
Bedrock	1111

Cover Quality
0 = No Cover
1 = Embedded Cover
2 = Unembedded Cover

Aquatic Vegetation Types
FL = Filamentous Algae
AL = Non-Filamentous
SS = Moss
MC = Macrophytes
WC = Watercress
GR = Grass
TR = Terrestrial Plants

Comments:

Crew Leader (initial & last name): CEOY

Crew	Recorder	Ent/Scanned	Verified	Corrected
ND				

Channel Morphology

Mandatory Fields In Grey
Must be filled out for processing

Stream Name: TUCK

Date (mm-dd): 2020-06-25

Stream Code: TUK

Site Code: TUC02

Sample: 02

Transect No.: 04 of 12

Bearing (D): 320

Min. Width (m): 1.5

Site Length (m): 48.3

Active Channel Width (m): 2.3

No. of Transects: 12

Transect Spacing (m): 4.16

Point Spacing (m): 0.46

Points per Transect: 5

Transect & Point Layout		
Use this table to determine the number of transects & points required, given the minimum stream width.		
Minimum Width (m)	No. Transects at Site	Points per Transect
> 3.0	10	6
1.5 - 3.0	12	5
1.0 - 1.49	15	3
< 1.0	20	2

Calculations:

Transect Spacing = Site Length / (No. of Transects - 1)

Point Spacing = Active Channel Width / Points per Transect

1st Point = Point Spacing / 2 (from left bank)

Point No.	Location (m)	Measure depth & hydraulic head to nearest 5 mm: Depth (mm)	Hydraulic Head (mm)	Particle Sizes (mm): Point	Max. in Ring
1	0.23	25	0	1111	1111
2	0.69	85	0	1111	1111
3	1.15	80	0	45	105
4	1.61	50	0	45	250
5	2.07	5	0	110	116
6	.				

Point No.	Cover: Unmeasurable	Quality	Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other	Aquatic Vegetation Types Present: FL	AL	SS	MC	WC	GR	TR
1	☐	2	☐	☐	☐	☒	☐	☐	☒	☐	☐	☐	☐	☐	☐
2	☐	2	☐	☐	☐	☒	☐	☐	☒	☐	☐	☐	☐	☐	☐
3	☐	1	☐	☒	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐
4	☐	1	☐	☐	☒	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐
5	☐	2	☐	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
6	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Bank Angle & Particle Median Diameters
(Bank to tape height; if a height is >2m use check box, else enter values in proper observation points)

	Height / Substrate Diameters	> 2 m	0 mm	250 mm	750 mm	1500 mm	Amount of Undercut (mm)	No. of Veg. Squares on Bank
Left Bank	Height	☐	1630	1480	1320	0	210	0
	Substrate Diameters		1111	1111	1111	0-05		
Right Bank	Height	☐	365	295	530	0	0	0
	Substrate Diameters		40	130	78	0-10		

Dominant Vegetation Type
(Check box of the dominant type within the 1 x 2 m area)

	None	Lawn	Crop-land	Mea-dow	Scrub-land	Forest	Wet-land
Left Bank	☐	☐	☐	☐	☐	☐	☐
Right Bank	☐	☐	☐	☐	☐	☐	☐

Table Codes

Particle Sizes: *Measure all particles between 2.00mm and 1000mm*

Material	Size
Unconsolidated Clay	0.01
Consolidated Clay	0.011
Silt	0.05
Sand	0.10
Large Boulders	1001
Bedrock	1111

Cover Quality:
0 = No Cover
1 = Embedded Cover
2 = Unembedded Cover

Aquatic Vegetation Types:
FL = Filamentous Algae
AL = Non-Filamentous
SS = Moss
MC = Macrophytes
WC = Watercress
GR = Grass
TR = Terrestrial Plants

Comments

Crew Leader (initial & last name): GEB

Crew	Recorder	Ent/Scanned	Verified	Corrected
ND				

Channel Morphology

Mandatory Fields In Grey
Must be filled out for processing

Stream Name: TUCK

Date (mm-dd): 2020-06-25

Stream Code: TUK

Site Code: TUK02

Sample: 01

Transect No.: 05 of 12

Bearing (D): 325

Min. Width (m): 1.5

Site Length (m): 48.3

Active Channel Width (m): 3.3

No. of Transects: 12

Transect Spacing (m): 4.16

Point Spacing (m): 0.66

Points per Transect: 5

Transect & Point Layout		
Use this table to determine the number of transects & points required, given the minimum stream width.		
Minimum Width (m)	No. Transects at Site	Points per Transect
> 3.0	10	6
1.5 - 3.0	12	5
1.0 - 1.49	15	3
< 1.0	20	2

Calculations:

Transect Spacing = Site Length / (No. of Transects - 1)

Point Spacing = Active Channel Width / Points per Transect

1st Point = Point Spacing / 2 (from left bank)

Measure depth & hydraulic head to nearest 5 mm

Point No.	Location (m)	Depth (mm)	Hydraulic Head (mm)	Particle Sizes (mm) Point	Particle Sizes (mm) Max. in Ring
1	0.33	340	0	1111	1111
2	0.99	330	0	1111	1111
3	1.65	255	0	0.10	250
4	2.31	200	0	210	395
5	2.97	150	0	185	185
6	.				

Cover

Unmeasurable	Quality	Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other
☐	2	☐	☐	☐	☒	☐	☐
☐	2	☐	☐	☐	☒	☐	☐
☐	2	☐	☐	☒	☒	☐	☐
☐	2	☐	☒	☐	☒	☐	☐
☐	2	☐	☐	☒	☒	☐	☐
☐	2	☐	☐	☐	☐	☐	☐

Aquatic Vegetation Types Present

FL	AL	SS	MC	WC	GR	TR
☒	☐	☐	☐	☐	☐	☐
☒	☐	☐	☐	☐	☐	☐
☒	☐	☐	☐	☐	☐	☐
☒	☐	☐	☐	☐	☐	☐
☒	☐	☐	☐	☐	☐	☐
☐	☐	☐	☐	☐	☐	☐

Bank Angle & Particle Median Diameters

(Bank to tape height; if a height is >2m use check box, else enter values in proper observation points)

		> 2 m	0 mm	250 mm	750 mm	1500 mm	Amount of Undercut (mm)	No. of Veg. Squares on Bank
Left Bank	Height	☐	680	765	650	0	30	0
	Substrate Diameters		0.10	0.10	35	0.05		
Right Bank	Height	☐	580	375	200	0	60	10
	Substrate Diameters		0.05	0.05	0.05	0.05		

Dominant Vegetation Type (Check box of the dominant type within the 1 x 2 m area)

	None	Lawn	Crop-land	Meadow	Scrub-land	Forest	Wet-land
Left Bank	☐	☐	☐	☐	☐	☐	☐
Right Bank	☐	☐	☐	☒	☐	☐	☐

Table Codes

Particle Sizes: *Measure all particles between 2.00mm and 1000mm*

Material	Size
Unconsolidated Clay	0.01
Consolidated Clay	0.011
Silt	0.05
Sand	0.10
Large Boulders	1001
Bedrock	1111

Cover Quality:
0 = No Cover
1 = Embedded Cover
2 = Unembedded Cover

Aquatic Vegetation Types:
FL = Filamentous Algae
AL = Non-Filamentous
SS = Moss
MC = Macrophytes
WC = Watercress
GR = Grass
TR = Terrestrial Plants

Comments

Crew Leader (initial & last name): GBY

Crew	Recorder	Ent/Scanned	Verified	Corrected
ND				

Channel Morphology

Mandatory Fields In Grey
Must be filled out for processing

Stream Name: TUCK

Date (mm-dd): 2020-06-25

Stream Code: TUK

Site Code: TUK02

Sample: DL

Transect No.: 06 of 12

Bearing (D): 320

Min. Width (m): 1.5

Site Length (m): 48.3

Active Channel Width (m): 3.4

No. of Transects: 12

Transect Spacing (m): 4.16

Point Spacing (m): 0.68

Points per Transect: 5

Transect & Point Layout		
Use this table to determine the number of transects & points required, given the minimum stream width.		
Minimum Width (m)	No.Transects at Site	Points per Transect
> 3.0	10	6
1.5 - 3.0	12	5
1.0 - 1.49	15	3
< 1.0	20	2

Calculations:

Transect Spacing = Site Length / (No. of Transects - 1)

Point Spacing = Active Channel Width / Points per Transect

1st Point = Point Spacing / 2 (from left bank)

Point No.	Location (m)	Depth (mm)	Hydraulic Head (mm)	Particle Size: Point	Particle Size: Max. in Ring	Cover: Unmeasurable	Cover: Quality	Cover: Wood	Cover: Round Rock	Cover: Flat Rock	Cover: Macrophyte	Cover: Bank	Cover: Other	Aquatic Vegetation Types Present: FL	AL	SS	MC	WC	GR	TR
1	0.34	120	0	1111	1111	☐	2	☐	☐	☐	☒	☒	☐	☒	☐	☐	☐	☐	☐	☐
2	1.02	280	0	0.10	1111	☐	2	☐	☐	☐	☒	☐	☐	☒	☐	☐	☐	☐	☐	☐
3	1.70	175	0	0.10	155	☐	2	☐	☐	☒	☒	☐	☐	☒	☐	☐	☐	☐	☐	☐
4	2.38	150	0	35	1111	☐	2	☐	☐	☐	☒	☐	☐	☐	☒	☐	☐	☐	☐	☐
5	3.06	60	0	90	250	☐	2	☐	☐	☒	☒	☐	☐	☒	☐	☐	☒	☐	☐	☐
6	.					☐		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Bank Angle & Particle Median Diameters
(Bank to tape height; if a height is >2m use check box, else enter values in proper observation points)

	> 2 m	0 mm	250 mm	750 mm	1500 mm	Amount of Undercut (mm)	No. of Veg. Squares on Bank
Left Bank	Height ☒	1540	905	655	0	310	0
	Substrate Diameters	45	0.05	0.05	0.05		
Right Bank	Height ☒	505	300	225	0	0	6
	Substrate Diameters	0.10	0.05	0.05	0.05		

Dominant Vegetation Type (Check box of the dominant type within the 1 x 2 m area)

	None	Lawn	Crop-land	Mea-dow	Scrub-land	Forest	Wet-land
Left Bank	☐	☐	☐	☐	☒	☐	☐
Right Bank	☐	☐	☐	☒	☐	☐	☐

Table Codes

Particle Sizes:
Measure all particles between 2.00mm and 1000mm

Material	Size
Unconsolidated Clay	0.01
Consolidated Clay	0.011
Silt	0.05
Sand	0.10
Large Boulders	1001
Bedrock	1111

Cover Quality:
0 = No Cover
1 = Embedded Cover
2 = Unembedded Cover

Aquatic Vegetation Types:
FL = Filamentous Algae
AL = Non-Filamentous
SS = Moss
MC = Macrophytes
WC = Watercress
GR = Grass
TR = Terrestrial Plants

Comments

Crew Leader (initial & last name): GEB

Crew	Recorder	Ent/Scanned	Verified	Corrected
ND				

Channel Morphology

Mandatory Fields In Grey
Must be filled out for processing

Stream Name: TUK CREEK

Date (mm-dd): 2020-06-25

Stream Code: TUK

Site Code: TUK02

Sample: 01

Transect No.: 07 of 12

Bearing (D): 330

Min. Width (m): 1.5

Site Length (m): 48.3

Active Channel Width (m): 2.7

No. of Transects: 12

Transect Spacing (m): 4.16

Point Spacing (m): 0.54

Points per Transect: 5

Transect & Point Layout

Use this table to determine the number of transects & points required, given the minimum stream width.

Minimum Width (m)	No. Transects at Site	Points per Transect
> 3.0	10	6
1.5 - 3.0	12	5
1.0 - 1.49	15	3
< 1.0	20	2

Calculations:

Transect Spacing = Site Length / (No. of Transects - 1)

Point Spacing = Active Channel Width / Points per Transect

1st Point = Point Spacing / 2 (from left bank)

Measure depth & hydraulic head to nearest 5 mm

Particle Sizes (mm)

Cover

Aquatic Vegetation Types Present

Point No.	Location (m)	Depth (mm)	Hydraulic Head (mm)	Point	Max. in Ring	Unmeasurable	Quality	Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other	FL	AL	SS	MC	WC	GR	TR
1	0.27	35	0	1111	1111	☐	2	☒	☐	☐	☒	☐	☐	☒	☐	☐	☐	☐	☐	☐
2	0.81	80	0	1111	1111	☐	2	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐
3	1.35	140	0	1111	1111	☐	2	☐	☐	☐	☒	☐	☐	☒	☐	☐	☐	☐	☐	☐
4	1.89	185	0	0.10	1111	☐	☐	☐	☐	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐
5	2.43	145		0.10	590	☐	2	☐	☒	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐
6	.					☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Bank Angle & Particle Median Diameters

(Bank to tape height; if a height is >2m use check box, else enter values in proper observation points)

	> 2 m	0 mm	250 mm	750 mm	1500 mm	Amount of Undercut (mm)	No. of Veg. Squares on Bank
Left Bank	Height ☐	1550	1260	120	0	490	6
	Substrate Diameters	1111	1111	0.05	0.05		
Right Bank	Height ☐	450	185	320	0	0	0
	Substrate Diameters	540	540	0.05	0.05		

Dominant Vegetation Type

(Check box of the dominant type within the 1 x 2 m area)

	None	Lawn	Crop-land	Mea-dow	Scrub-land	Forest	Wet-land
Left Bank	☐	☐	☐	☐	☒	☐	☐
Right Bank	☐	☐	☐	☐	☐	☐	☐

Table Codes

Particle Sizes:
Measure all particles between 2.00mm and 1000mm

Material	Size
Unconsolidated Clay	0.01
Consolidated Clay	0.011
Silt	0.05
Sand	0.10
Large Boulders	1001
Bedrock	1111

Cover Quality:
0 = No Cover
1 = Embedded Cover
2 = Unembedded Cover

Aquatic Vegetation Types:
FL = Filamentous Algae
AL = Non-Filamentous
SS = Moss
MC = Macrophytes
WC = Watercress
GR = Grass
TR = Terrestrial Plants

Comments

RWBB

Crew Leader (initial & last name): GE34

Crew	Recorder	Ent/Scanned	Verified	Corrected
ND				

Channel Morphology

Mandatory Fields In Grey
Must be filled out for processing

Stream Name: TUCK

Date (mm-dd): 2020-06-25

Stream Code: TUK

Site Code: TUK0C

Sample: 02

Transect No.: 03 of 12

Bearing (D): 350

Min. Width (m): 1.5

Site Length (m): 48.3

Active Channel Width (m): 1.6

No. of Transects: 12

Transect Spacing (m): 4.16

Point Spacing (m): 0.32

Points per Transect: 5

Transect & Point Layout

Use this table to determine the number of transects & points required, given the minimum stream width.

Minimum Width (m)	No. Transects at Site	Points per Transect
> 3.0	10	6
1.5 - 3.0	12	5
1.0 - 1.49	15	3
< 1.0	20	2

Calculations:

Transect Spacing = Site Length / (No. of Transects - 1)

Point Spacing = Active Channel Width / Points per Transect

1st Point = Point Spacing / 2 (from left bank)

Point No.	Location (m)	Depth (mm)	Hydraulic Head (mm)	Particle Size Point	Particle Size Max. in Ring	Cover Unmeasurable	Cover Quality	Cover Wood	Cover Round Rock	Cover Flat Rock	Cover Macrophyte	Cover Bank	Cover Other	Aquatic Vegetation Types Present FL	AL	SS	MC	WC	GR	TR
1	0.16	10	0	0.10	220	☐	2	☐	☐	☒	☒	☐	☐	☒	☐	☐	☒	☐	☐	☐
2	0.48	85	5	0.10	1111	☐	2	☐	☐	☒	☒	☐	☐	☒	☐	☐	☐	☐	☐	☐
3	6.89	25	0	3.10	3.10	☐	2	☐	☐	☒	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐
4	1.12	95	10	0.10	1111	☐	2	☐	☐	☐	☒	☐	☐	☒	☐	☐	☐	☐	☐	☐
5	1.94	90	0	0.10	1111	☐	2	☐	☐	☒	☒	☐	☐	☒	☐	☐	☐	☐	☐	☐
6	.					☐		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Bank Angle & Particle Median Diameters
(Bank to tape height; if a height is >2m use check box, else enter values in proper observation points)

	> 2 m	0 mm	250 mm	750 mm	1500 mm	Amount of Undercut (mm)	No. of Veg. Squares on Bank
Left Bank	Height ☐	530	460	270	0	0	2
	Substrate Diameters	0.10	330	195	40		
Right Bank	Height ☐	210	150	60	0	0	0
	Substrate Diameters	0.10	260	470	145		

Dominant Vegetation Type
(Check box of the dominant type within the 1 x 2 m area)

	None	Lawn	Crop-land	Mea-dow	Scrub-land	Forest	Wet-land
Left Bank	☐	☐	☐	☐	☒	☐	☐
Right Bank	☐	☐	☐	☐	☒	☐	☐

Table Codes

Particle Sizes:
Measure all particles between 2.00mm and 1000mm

Material	Size
Unconsolidated Clay	0.01
Consolidated Clay	0.011
Silt	0.05
Sand	0.10
Large Boulders	1001
Bedrock	1111

Cover Quality:
0 = No Cover
1 = Embedded Cover
2 = Unembedded Cover

Aquatic Vegetation Types:
FL = Filamentous Algae
AL = Non-Filamentous
SS = Moss
MC = Macrophytes
WC = Watercress
GR = Grass
TR = Terrestrial Plants

Comments:

Crew Leader (initial & last name): GEBT

Crew	Recorder	Ent/Scanned	Verified	Corrected
NT				

Channel Morphology

Mandatory Fields In Grey
Must be filled out for processing

Stream Name: TUCK CREEK

Stream Code: TUK

Site Code: TUK02

Sample: 02

Transect No.: 09 of 12

Bearing (D): 340

Min. Width (m): 1.5

Site Length (m): 48.3

Active Channel Width (m): 3.2

No. of Transects: 12

Transect Spacing (m): 4.16

Point Spacing (m): 0.64

Points per Transect: 5

Date (mm-dd): 2020-06-25

Transect & Point Layout		
Use this table to determine the number of transects & points required, given the minimum stream width.		
Minimum Width (m)	No.Transects at Site	Points per Transect
> 3.0	10	6
1.5 - 3.0	12	5
1.0 - 1.49	15	3
< 1.0	20	2

Calculations:

Transect Spacing = Site Length / (No. of Transects - 1)

Point Spacing = Active Channel Width / Points per Transect

1st Point = Point Spacing / 2 (from left bank)

Point No.	Location (m)	Measure depth & hydraulic head to nearest 5 mm: Depth (mm)	Hydraulic Head (mm)	Particle Sizes (mm): Point	Max. in Ring
1	0.32	75	5	40	210
2	0.96	70	0	30	260
3	1.60	55	15	50	280
4	2.29	0	0	230	260
5	2.83	80	0	0.10	300
6	.				

Point No.	Cover: Unmeasurable	Quality	Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other	Aquatic Vegetation Types Present: FL	AL	SS	MC	WC	GR	TR
1	☐	2	☐	☐	☒	☒	☐	☐	☒	☐	☐	☐	☐	☐	☐
2	☐	2	☐	☐	☒	☒	☐	☐	☒	☐	☐	☐	☐	☐	☐
3	☐	2	☐	☐	☒	☒	☐	☐	☒	☐	☐	☐	☐	☐	☐
4	☐	2	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
5	☐	2	☐	☐	☒	☒	☐	☐	☒	☐	☐	☐	☐	☐	☐
6	☐		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Bank Angle & Particle Median Diameters
(Bank to tape height; if a height is >2m use check box, else enter values in proper observation points)

	> 2 m	0 mm	250 mm	750 mm	1500 mm	Amount of Undercut (mm)	No. of Veg. Squares on Bank
Left Bank	Height ☐	665	190	180	0	140	2
	Substrate Diameters	15	0.10	0.05	0.05		
Right Bank	Height ☐	510	496	190	0	6	3
	Substrate Diameters	250	340	0.05	0.05		

Dominant Vegetation Type (Check box of the dominant type within the 1 x 2 m area)

	None	Lawn	Crop-land	Mea-dow	Scrub-land	Forest	Wet-land
Left Bank	☐	☐	☐	☐	☒	☐	☐
Right Bank	☐	☐	☐	☒	☐	☐	☐

Table Codes

Particle Sizes: *Measure all particles between 2.00mm and 1000mm*

Material	Size
Unconsolidated Clay	0.01
Consolidated Clay	0.011
Silt	0.05
Sand	0.10
Large Boulders	1001
Bedrock	1111

Cover Quality
0 = No Cover
1 = Embedded Cover
2 = Unembedded Cover

Aquatic Vegetation Types:
FL = Filamentous Algae
AL = Non-Filamentous
SS = Moss
MC = Macrophytes
WC = Watercress
GR = Grass
TR = Terrestrial Plants

Comments

Crew Leader (initial & last name): GBT

Crew	Recorder	Ent/Scanned	Verified	Corrected
ND				

Channel Morphology

Stream Name: TUCK

Stream Code: TUK

Site Code: TUK02

Sample: 02 | Transect No.: 10 of 12 | Bearing (D): 340

Mandatory Fields In Grey
Must be filled out for processing

Date (mm-dd): 2020-06-25

Min. Width (m): 1.5 | Site Length (m): 48.3 | Active Channel Width (m): 3.0

No. of Transects: 12 | Transect Spacing (m): 4.16 | Point Spacing (m): 0.60

Points per Transect: 5

Transect & Point Layout

Use this table to determine the number of transects & points required, given the minimum stream width.

Minimum Width (m)	No. Transects at Site	Points per Transect
> 3.0	10	6
1.5 - 3.0	12	5
1.0 - 1.49	15	3
< 1.0	20	2

Calculations:

Transect Spacing = Site Length / (No. of Transects - 1)

Point Spacing = Active Channel Width / Points per Transect

1st Point = Point Spacing / 2 (from left bank)

Measure depth & hydraulic head to nearest 5 mm

Point No.	Location (m)	Depth (mm)	Hydraulic Head (mm)	Particle Sizes (mm) Point	Particle Sizes (mm) Max. in Ring
1	0.30	25	0	15	180
2	0.90	100	0	180	180
3	1.50	165	0	80	230
4	2.10	105	0	390	370
5	2.70	75	0	45	230
6	.				

Cover

Unmeasurable	Quality	Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other
☐	2	☐	☒	☐	☐	☐	☐
☐	2	☐	☒	☐	☐	☐	☐
☐	2	☐	☒	☐	☐	☐	☐
☐	2	☐	☐	☒	☐	☐	☐
☐	2	☐	☐	☒	☐	☐	☐
☐	2	☐	☐	☐	☐	☐	☐

Aquatic Vegetation Types Present

FL	AL	SS	MC	WC	GR	TR
☒	☐	☐	☐	☐	☐	☐
☒	☐	☐	☐	☐	☐	☐
☒	☐	☐	☐	☐	☐	☐
☒	☐	☐	☐	☐	☐	☐
☒	☐	☐	☐	☐	☐	☐
☐	☐	☐	☐	☐	☐	☐

Bank Angle & Particle Median Diameters

(Bank to tape height; if a height is >2m use check box, else enter values in proper observation points)

	> 2 m	0 mm	250 mm	750 mm	1500 mm	Amount of Undercut (mm)	No. of Veg. Squares on Bank
Left Bank	Height ☐	450	490	160	0	0	3
	Substrate Diameters	10	0.10	215	0.10		
Right Bank	Height ☐	790	290	120	0	0	0
	Substrate Diameters	65	0.05	0.05	0.05		

Dominant Vegetation Type (Check box of the dominant type within the 1 x 2 m area)

	None	Lawn	Crop-land	Mea-dow	Scrub-land	Forest	Wet-land
Left Bank	☐	☐	☐	☐	☐	☐	☐
Right Bank	☐	☐	☐	☐	☒	☐	☐

Table Codes

Particle Sizes: *Measure all particles between 2.00mm and 1000mm*

Material	Size
Unconsolidated Clay	0.01
Consolidated Clay	0.011
Silt	0.05
Sand	0.10
Large Boulders	1001
Bedrock	1111

Cover Quality:
0 = No Cover
1 = Embedded Cover
2 = Unembedded Cover

Aquatic Vegetation Types:
FL = Filamentous Algae
AL = Non-Filamentous
SS = Moss
MC = Macrophytes
WC = Watercress
GR = Grass
TR = Terrestrial Plants

Comments

Crew Leader (initial & last name): CEBT

Crew	Recorder	Ent/Scanned	Verified	Corrected
ND				

Channel Morphology

Mandatory Fields In Grey
Must be filled out for processing

Stream Name: TUCK CREEK

Date (mm-dd): 2020-06-25

Stream Code: TJK

Site Code: TUK02

Sample: 02

Transect No.: 11 of 12

Bearing (D): 345

Min. Width (m): 1.5

Site Length (m): 48.3

Active Channel Width (m): 1.8

No. of Transects: 12

Transect Spacing (m): 4.16

Point Spacing (m): 0.36

Points per Transect: 5

Transect & Point Layout		
Use this table to determine the number of transects & points required, given the minimum stream width.		
Minimum Width (m)	No.Transects at Site	Points per Transect
> 3.0	10	6
1.5 - 3.0	12	5
1.0 - 1.49	15	3
< 1.0	20	2

Calculations:

Transect Spacing = Site Length / (No. of Transects - 1)

Point Spacing = Active Channel Width / Points per Transect

1st Point = Point Spacing / 2 (from left bank)

Point No.	Location (m)	Measure depth & hydraulic head to nearest 5 mm: Depth (mm)	Hydraulic Head (mm)	Particle Sizes (mm): Point	Max. in Ring
1	0.18	70	0	10	190
2	0.54	135	0	25	130
3	0.90	170	0	110	280
4	1.26	110	5	111	111
5	1.62	50	0	1111	1111
6	.				

Point No.	Cover: Unmeasurable	Quality	Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other	Aquatic Vegetation Types Present: FL	AL	SS	MC	WC	GR	TR
1	☐	2	☐	☐	☒	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐
2	☐	2	☐	☒	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐
3	☐	2	☐	☐	☒	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐
4	☐	☐	☐	☐	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐
5	☐	☐	☐	☐	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐
6	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Bank Angle & Particle Median Diameters
(Bank to tape height; if a height is >2m use check box, else enter values in proper observation points)

	Height	> 2 m	0 mm	250 mm	750 mm	1500 mm	Amount of Undercut (mm)	No. of Veg. Squares on Bank
Left Bank	Height	☒	395	320	195	9	0	0
	Substrate Diameters		20	5	30	15		
Right Bank	Height	☐	695	280	150	0	0	2
	Substrate Diameters		1111	0.05	0.05	0.05		

Dominant Vegetation Type (Check box of the dominant type within the 1 x 2 m area)

	None	Lawn	Crop-land	Mea-dow	Scrub-land	Forest	Wet-land
Left Bank	☐	☐	☐	☐	☐	☐	☐
Right Bank	☐	☐	☐	☐	☒	☐	☐

Table Codes

Particle Sizes: *Measure all particles between 2.00mm and 1000mm*

Material	Size
Unconsolidated Clay	0.01
Consolidated Clay	0.011
Silt	0.05
Sand	0.10
Large Boulders	1001
Bedrock	1111

Cover Quality:
0 = No Cover
1 = Embedded Cover
2 = Unembedded Cover

Aquatic Vegetation Types:
FL = Filamentous Algae
AL = Non-Filamentous
SS = Moss
MC = Macrophytes
WC = Watercress
GR = Grass
TR = Terrestrial Plants

Comments

Crew Leader (initial & last name): CEBT

Crew	Recorder	Ent/Scanned	Verified	Corrected
NP				

Channel Morphology

Mandatory Fields In Grey
Must be filled out for processing

Stream Name: TUCK CREEK

Stream Code: HUK

Site Code: TUK02

Sample: 02

Transect No.: 12 of 12

Bearing (D): 350

Min. Width (m): 1.5

Site Length (m): 48.3

Active Channel Width (m): 2.4

No. of Transects: 12

Transect Spacing (m): 4.16

Point Spacing (m): 0.43

Points per Transect: 5

Date (mm-dd): 2020-06-25

Transect & Point Layout

Use this table to determine the number of transects & points required, given the minimum stream width.

Minimum Width (m)	No. Transects at Site	Points per Transect
> 3.0	10	6
1.5 - 3.0	12	5
1.0 - 1.49	15	3
< 1.0	20	2

Calculations:

Transect Spacing = Site Length / (No. of Transects - 1)

Point Spacing = Active Channel Width / Points per Transect

1st Point = Point Spacing / 2 (from left bank)

Point No.	Location (m)	Measure depth & hydraulic head to nearest 5 mm: Depth (mm)	Hydraulic Head (mm)	Particle Sizes (mm): Point	Max. in Ring
1	0.24	25	0	30	120
2	0.72	35	0	90	240
3	1.20	85	20	10	290
4	1.68	45	20	240	240
5	2.16	50	30	250	250
6	.				

Point No.	Cover: Unmeasurable	Quality	Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other	Aquatic Vegetation Types Present: FL	AL	SS	MC	WC	GR	TR
1	☐	2	☒	☐	☒	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐
2	☐	2	☐	☐	☒	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐
3	☐	2	☐	☒	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐
4	☐	2	☐	☒	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐
5	☐	2	☐	☒	☐	☐	☐	☐	☒	☐	☐	☒	☐	☐	☐
6	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Bank Angle & Particle Median Diameters
(Bank to tape height; if a height is >2m use check box, else enter values in proper observation points)

	> 2 m	0 mm	250 mm	750 mm	1500 mm	Amount of Undercut (mm)	No. of Veg. Squares on Bank
Left Bank	Height ☐	250	180	120	0	0	0
	Substrate Diameters	140	30	15	0.05		
Right Bank	Height ☐	485	360	250	0	0	2
	Substrate Diameters	0.05	0.05	15	330		

Dominant Vegetation Type
(Check box of the dominant type within the 1 x 2 m area)

	None	Lawn	Crop-land	Meadow	Scrub-land	Forest	Wetland
Left Bank	☐	☐	☐	☐	☒	☐	☐
Right Bank	☐	☐	☐	☐	☐	☐	☐

Table Codes

Particle Sizes: *Measure all particles between 2.00mm and 1000mm*

Material	Size
Unconsolidated Clay	0.01
Consolidated Clay	0.011
Silt	0.05
Sand	0.10
Large Boulders	1001
Bedrock	1111

Cover Quality
0 = No Cover
1 = Embedded Cover
2 = Unembedded Cover

Aquatic Vegetation Types
FL = Filamentous Algae
AL = Non-Filamentous
SS = Moss
MC = Macrophytes
WC = Watercress
GR = Grass
TR = Terrestrial Plants

Comments

Crew Leader (initial & last name): GEBY

Crew	Recorder	Ent/Scanned	Verified	Corrected
NP				

Site Identification

Stream Code: TUK | Site Code: TUK03 | Sample: 01 | Date (yyyy-mm-dd): 2020-06-25

Stream Name: TUCK CREEK | Alternate Site Code: 003 | Site Length (m): 45.3

*** Record using NAD83 datum

	Zone	Easting	Northing
Uncorr. UTM	17	597567.0	4802457.0
Corr. UTM	1		

OR → Lat. / Long. (DD MM SS.sss)

Source of Uncorrected UTM Coordinates: GPS/DGPS ☐ | GIS ☒ | OBM ☐ | Other

Source of Corrected UTM Coordinates: FWIS ☐ | Ortho-photos ☐ | GIS ☐ | Other

Name of Layer Used for Correction

Access Route

NORTH ON WALKERS LINE FROM HWY 403, WEST ON MAINWAY, SOUTH ON BLAIR ROAD, LAST ON LANDMARK RD PARK @ TAXI SERVICE

16.1
10
16.3
2.9

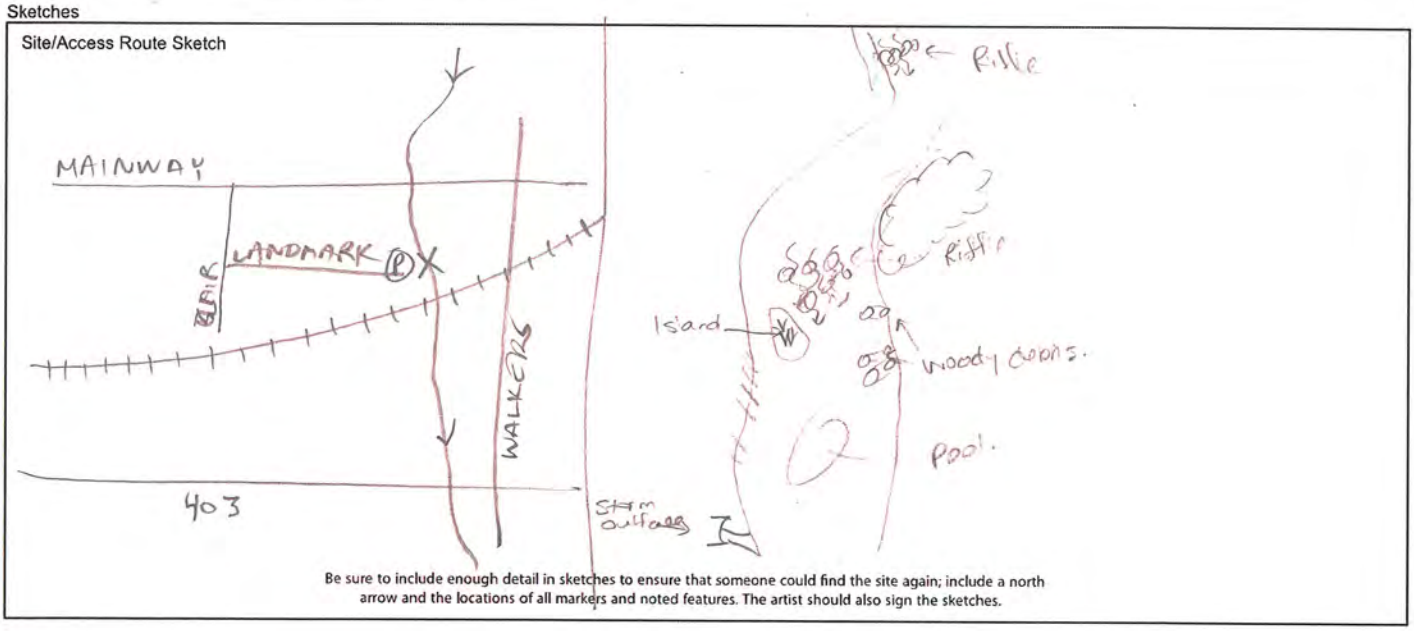
Site Description

WALK EAST TO CREEK, DS END IS @ SMALL KNICK POINT ADJACENT TO OUTFALL

☐ Site Was Unsampleable - add reason(s) on reverse

Sketches

Site/Access Route Sketch



Be sure to include enough detail in sketches to ensure that someone could find the site again; include a north arrow and the locations of all markers and noted features. The artist should also sign the sketches.

Comments

Mixed Deciduous w Manitoba Maple + Maple - Woodland
Buckthorn + Graminoids

Crew Leader (init. & last name)	Crew	Recorder	Entered	Verified	Corrected
GEBY	ND				

GRFR, Raccoon

Site Marker Details

UPSTREAM SITE MARKER
(measure from stake to site)

Bearing (D): 270

Distance (m): 10.0

Description: Hydropole upstream of Willow, left bank

DOWNSTREAM SITE MARKER
(measure from stake to site)

Bearing (D): 250

Distance (m): 4.0

Description: Pinkflag – small ash on left bank

ADDITIONAL SITE MARKER
(measure from stake to site)

Bearing (D):

Distance (m):

Description:

Photos

	Photo No.	Photo Name	Photo Description
Upstream – Upstream			
Upstream – Downstream			
Downstream – Upstream			
Downstream – Downstream			
Other Features			
Other Features			

Site is Unsampleable Reason(s)

- ☐ Stream dry
- ☐ Insufficient water to sample effectively
- ☐ Stream is no longer present at location (tiled or relocated, etc)
- ☐ Naturally unwadeable (i.e. > 1.5 m deep)
- ☐ Unwadeable due to ponding from a permanent barrier
- ☐ Unwadeable due to ponding from temporary barrier (eg. beaver dam)
- ☐ Landowner could not be contacted
- ☐ Landowner refused access
- ☐ Inaccessible for safety reasons (add details in comments below)
- ☐ Stream is wadeable but not appropriate for the intended sampling

What is the permanent barrier?

What is the temporary barrier?

Modules to have been used (e.g. S2.M1, S3.M1):

Comments

Site Features

Mandatory Fields In Grey
Must be filled out for processing

Stream Code: TUK

Site Code: TUK03

Sample: 01

Date (mm-dd): 2017 06-25

Stream Name: TUCK CREEK

For each landuse, check box that applies. Be sure to include comments explaining the particulars, including names and numbers of contacts

Site Features	Ongoing & Active	Historical Evidence	No Evidence but Reported	No Evidence	Unknown	Comments
Potential Point or Non-point Source Contaminant Sources	☒	☐	☐	☐	☐	Industrial, residential agricultural
Major Nutrient Sources Upstream	☒	☐	☐	☐	☐	" stormwater outlet in DLS "
Channel Hardening or Straightening	☐	☐	☐	☒	☐	
Adjacent Landuses that Destabilize Banks	☒	☐	☐	☐	☐	Parking lot encroachment, hydro corridor
Sediment Loading or Deprivation	☒	☐	☐	☐	☐	Sediment loading
Instream Habitat Modifications	☐	☐	☐	☒	☐	
Barriers and/or Dams in the Vicinity of the Site	☒	☐	☐	☐	☐	Minor knickpoint downstream
High Fishing Pressure	☐	☐	☐	☒	☐	
Log Jam Deflectors	☒	☐	☐	☐	☐	Several small deflectors noted (x2)
Springs or Seeps at the Site	☐	☐	☐	☒	☐	
Impervious Substrate Limiting Burrowing Depth of Fish	☐	☐	☐	☒	☐	
Fish Stocked Near Sample Site	☐	☐	☐	☒	☐	
Other Activities that Could Influence Biota or Habitat	☐	☐	☐	☒	☐	
Intensive Logging Activitties within the Riparian Zone	☐	☐	☐	☒	☐	

Sources of Information
Visual Immediate ☒ Visual Extended ☐ Interview ☐ Maps & Photos ☒

Temperatures
Time (24hr):
Air Temp (°C):
Water Temp (°C):
Max Air Temp (°C):
Max. Water Temp (°C):
Source of Max. Air Temp:

Riparian Vegetation Community
Only check one box for each bank and zone.

Dominant Vegetation Type

Riparian Zone	Left Bank None	Lawn	Crop-land	Mea-dow	Scrub-land	Forest	Wet-lands	Right Bank None	Lawn	Crop-land	Mea-dow	Scrub-land	Forest	Wet-lands
1.5-10m	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐	☒	☐	☐
10-30m	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐	☐	☒	☐
30-100m	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☒	☐

Comments:

Crew Leader (initial & last name): C SBT

Crew Initials	Recorder	Ent/Scanned	Verified	Corrected
MD				

Channel Morphology

Mandatory Fields In Grey
Must be filled out for processing

Stream Name: TUCK CREEK

Date (mm-dd): 2020-06-25

Stream Code: TUK

Site Code: TUK03

Sample: 03

Transect No.: 01 of 12

Bearing (D): 330

Min. Width (m): 1.5

No. of Transects: 12

Points per Transect: 5

Site Length (m): 45.3

Transect Spacing (m): 4.12

Active Channel Width (m): 2.0

Point Spacing (m): 0.40

Transect & Point Layout Use this table to determine the number of transects & points required, given the minimum stream width.		
Minimum Width (m)	No. Transects at Site	Points per Transect
> 3.0	10	6
1.5 - 3.0	12	5
1.0 - 1.49	15	3
< 1.0	20	2

Calculations:

Transect Spacing = Site Length / (No. of Transects - 1)

Point Spacing = Active Channel Width / Points per Transect

1st Point = Point Spacing / 2 (from left bank)

Point No.	Location (m)	Measure depth & hydraulic head to nearest 5 mm: Depth (mm)	Hydraulic Head (mm)	Particle Sizes (mm): Point	Max. in Ring
1	0.20	75	0	0.10	0.10
2	0.60	220	0	0.10	0.10
3	1.00	270	0	0.10	0.10
4	1.40	150	0	0.05	0.10
5	1.80	100	0	0.10	35
6	.				

Cover

Unmeasurable	Quality	Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other
	2	X			X		

Aquatic Vegetation Types Present

FL	AL	SS	MC	WC	GR	TR
X						
X						
X						
X						
X						

Bank Angle & Particle Median Diameters
(Bank to tape height; if a height is >2m use check box, else enter values in proper observation points)

	> 2 m	0 mm	250 mm	750 mm	1500 mm	Amount of Undercut (mm)	No. of Veg. Squares on Bank
Left Bank	Height ☒	410	320	290	0	0	2
	Substrate Diameters	0.10	0.05	0.05	0.05		
Right Bank	Height ☒	180	100	110	0	0	2
	Substrate Diameters	10	15	106	20		

Dominant Vegetation Type
(Check box of the dominant type within the 1 x 2 m area)

	None	Lawn	Crop-land	Meadow	Scrub-land	Forest	Wet-land
Left Bank							
Right Bank							

Table Codes

Particle Sizes:
Measure all particles between 2.00mm and 1000mm

Material	Size
Unconsolidated Clay	0.01
Consolidated Clay	0.011
Silt	0.05
Sand	0.10
Large Boulders	1001
Bedrock	1111

Cover Quality:
0 = No Cover
1 = Embedded Cover
2 = Unembedded Cover

Aquatic Vegetation Types:
FL = Filamentous Algae
AL = Non-Filamentous
SS = Moss
MC = Macrophytes
WC = Watercress
GR = Grass
TR = Terrestrial Plants

Comments

Crew Leader (initial & last name): CH

Crew	Recorder	Ent/Scanned	Verified	Corrected
ND				

Channel Morphology

Mandatory Fields In Grey
Must be filled out for processing

Stream Name: TUK

Date (mm-dd): 2020-06-25

Stream Code: TUK

Site Code: TUK03

Sample: 01

Transect No.: 02 of 12

Bearing (D): 330

Min. Width (m): 1.5

Site Length (m): 45.3

Active Channel Width (m): 3.7

No. of Transects: 12

Transect Spacing (m): 4.12

Point Spacing (m): 0.74

Points per Transect: 5

Transect & Point Layout Use this table to determine the number of transects & points required, given the minimum stream width.		
Minimum Width (m)	No.Transects at Site	Points per Transect
> 3.0	10	6
1.5 - 3.0	12	5
1.0 - 1.49	15	3
< 1.0	20	2

Calculations:

Transect Spacing = Site Length / (No. of Transects - 1)

Point Spacing = Active Channel Width / Points per Transect

1st Point = Point Spacing / 2 (from left bank)

Point No.	Location (m)	Measure depth & hydraulic head to nearest 5 mm: Depth (mm)	Hydraulic Head (mm)	Particle Sizes (mm): Point	Max. in Ring	Cover: Unmeasurable	Quality	Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other	Aquatic Vegetation Types Present: FL	AL	SS	MC	WC	GR	TR
1	0.37	180	0	0.05	110		2		X					X						
2	1.11	260	0	0.10	170		2			X										
3	1.85	295	0	190	190		2			X				X						
4	2.59	280	0	0.10	120		2		X					X						
5	3.33	150	0	0.10	40									X						
6	.																			

Bank Angle & Particle Median Diameters
(Bank to tape height; if a height is >2m use check box, else enter values in proper observation points)

	> 2 m	0 mm	250 mm	750 mm	1500 mm	Amount of Undercut (mm)	No. of Veg. Squares on Bank
Left Bank	Height ☐	590	170	110	0	260	3
	Substrate Diameters	0.10	0.05	0.05	0.05		
Right Bank	Height ☐	300	190	46	0	0	2
	Substrate Diameters	0.05	0.05	0.05	0.05		

Dominant Vegetation Type
(Check box of the dominant type within the 1 x 2 m area)

	None	Lawn	Crop-land	Mea-dow	Scrub-land	Forest	Wet-land
Left Bank				X			
Right Bank							

Table Codes Particle Sizes. *Measure all particles between 2.00mm and 1000mm*	
Material	Size
Unconsolidated Clay	0.01
Consolidated Clay	0.011
Silt	0.05
Sand	0.10
Large Boulders	1001
Bedrock	1111

Cover Quality:
0 = No Cover
1 = Embedded Cover
2 = Unembedded Cover

Aquatic Vegetation Types:
FL = Filamentous Algae
AL = Non-Filamentous
SS = Moss
MC = Macrophytes
WC = Watercress
GR = Grass
TR = Terrestrial Plants

Comments

Crew Leader (initial & last name): GEBY

Crew	Recorder	Ent/Scanned	Verified	Corrected
NV				

Channel Morphology

Mandatory Fields in Grey
Must be filled out for processing

Stream Name: TUCK

Date (mm-dd): 2020-06-25

Stream Code: TUK0

Site Code: TUK06

Sample: 01 | Transect No.: 03 of 12 | Bearing (D): 320

Min. Width (m): 1.5 | Site Length (m): 45.3 | Active Channel Width (m): 5.6

No. of Transects: 12 | Transect Spacing (m): 4.12 | Point Spacing (m): 1.12

Points per Transect: 5

Transect & Point Layout

Use this table to determine the number of transects & points required, given the minimum stream width.

Minimum Width (m)	No. Transects at Site	Points per Transect
> 3.0	10	6
1.5 - 3.0	12	5
1.0 - 1.49	15	3
< 1.0	20	2

Calculations:

Transect Spacing = Site Length / (No. of Transects - 1)

Point Spacing = Active Channel Width / Points per Transect

1st Point = Point Spacing / 2 (from left bank)

Point No.	Location (m)	Measure depth & hydraulic head to nearest 5 mm: Depth (mm)	Hydraulic Head (mm)	Particle Sizes (mm): Point	Max. in Ring	Cover: Unmeasurable	Quality	Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other	Aquatic Vegetation Types Present: FL	AL	SS	MC	WC	GR	TR
1	0.56	160	0	0.10	180	☐	2	☐	☒	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐
2	1.68	250	0	0.10	0.10	☐	☐	☐	☐	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐
3	2.80	455	0	0.10	115	☐	2	☐	☐	☒	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐
4	3.92	475	0	0.05	0.10	☐	2	☐	☐	☐	☒	☐	☐	☒	☐	☐	☒	☐	☐	☐
5	5.04	110	0	0.05	0.05	☐	2	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐	☒	☐	☐
6	.					☐		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Bank Angle & Particle Median Diameters
(Bank to tape height; if a height is >2m use check box, else enter values in proper observation points)

	> 2 m	0 mm	250 mm	750 mm	1500 mm	Amount of Undercut (mm)	No. of Veg. Squares on Bank
Left Bank	Height ☐	695	520	205	0	6	1
	Substrate Diameters	0.05	0.05	0.05	0.05		
Right Bank	Height ☐	670	410	240	0	0	4
	Substrate Diameters	0.05	0.05	0.05	0.05		

Dominant Vegetation Type
(Check box of the dominant type within the 1 x 2 m area)

	None	Lawn	Crop-land	Mea-dow	Scrub-land	Forest	Wet-land
Left Bank	☐	☐	☐	☒	☐	☐	☐
Right Bank	☐	☐	☐	☒	☐	☐	☐

Table Codes

Particle Sizes: *Measure all particles between 2.00mm and 1000mm*

Material	Size
Unconsolidated Clay	0.01
Consolidated Clay	0.011
Silt	0.05
Sand	0.10
Large Boulders	1001
Bedrock	1111

Cover Quality:
0 = No Cover
1 = Embedded Cover
2 = Unembedded Cover

Aquatic Vegetation Types:
FL = Filamentous Algae
AL = Non-Filamentous
SS = Moss
MC = Macrophytes
WC = Watercress
GR = Grass
TR = Terrestrial Plants

Comments

Crew Leader (initial & last name): GEBT

Crew	Recorder	Ent/Scanned	Verified	Corrected
ND				

Channel Morphology

Mandatory Fields In Grey
Must be filled out for processing

Stream Name: TUC CREEK

Stream Code: TUK

Site Code: TUC03

Sample: 01

Transect No.: 04 of 12

Bearing (D): 310

Min. Width (m): 1.5

Site Length (m): 45.3

Active Channel Width (m): 5.0

No. of Transects: 12

Transect Spacing (m): 4.12

Point Spacing (m): 1.00

Points per Transect: 5

Date (mm-dd): 2020-06-25

Transect & Point Layout		
Use this table to determine the number of transects & points required, given the minimum stream width.		
Minimum Width (m)	No.Transects at Site	Points per Transect
> 3.0	10	6
1.5 - 3.0	12	5
1.0 - 1.49	15	3
< 1.0	20	2

Calculations:

Transect Spacing = Site Length / (No. of Transects - 1)

Point Spacing = Active Channel Width / Points per Transect

1st Point = Point Spacing / 2 (from left bank)

Point No.	Location (m)	Depth (mm) (Measure depth & hydraulic head to nearest 5 mm)	Hydraulic Head (mm)	Particle Sizes (mm): Point	Particle Sizes (mm): Max. in Ring
1	0.50	80	0	15	65
2	1.50	95	0	110	215
3	2.50	165	0	0.10	120
4	3.50	250	0	0.05	0.10
5	4.50	255	0	0.05	0.05
6					

Point No.	Cover: Unmeasurable	Quality	Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other	Aquatic Vegetation Types Present: FL	AL	SS	MC	WC	GR	TR
1									X						
2		2			X				X						
3		2			X				X						
4									X						
5		2	X			X			X			X			
6															

Bank Angle & Particle Median Diameters
(Bank to tape height; if a height is >2m use check box, else enter values in proper observation points)

		> 2 m	0 mm	250 mm	750 mm	1500 mm	Amount of Undercut (mm)	No. of Veg. Squares on Bank
Left Bank	Height	☒	380	760	500	0	0	3
	Substrate Diameters		0.05	0.05	0.05	0.05		
Right Bank	Height	☒	780	415	330	0	0	2
	Substrate Diameters		0.05	0.05	0.05	0.05		

Dominant Vegetation Type (Check box of the dominant type within the 1 x 2 m area)

	None	Lawn	Crop-land	Mea-dow	Scrub-land	Forest	Wet-land
Left Bank				X			
Right Bank					X		

Table Codes

Particle Sizes: *Measure all particles between 2.00mm and 1000mm*

Material	Size
Unconsolidated Clay	0.01
Consolidated Clay	0.011
Silt	0.05
Sand	0.10
Large Boulders	1001
Bedrock	1111

Cover Quality:
0 = No Cover
1 = Embedded Cover
2 = Unembedded Cover

Aquatic Vegetation Types:
FL = Filamentous Algae
AL = Non-Filamentous
SS = Moss
MC = Macrophytes
WC = Watercress
GR = Grass
TR = Terrestrial Plants

Comments

Crew Leader (initial & last name): GEBT

Crew	Recorder	Ent/Scanned	Verified	Corrected
NA				

Channel Morphology

Mandatory Fields In Grey
Must be filled out for processing

Stream Name: TUCK CREEK

Date (mm-dd): 2020-06-25

Stream Code: TUK

Site Code: TUK03

Sample: 01

Transect No.: 05 of 12

Bearing (D): 290

Min. Width (m): 1.5

Site Length (m): 45.3

Active Channel Width (m): 4.5

No. of Transects: 12

Transect Spacing (m): 4.12

Point Spacing (m): 0.90

Points per Transect: 5

Transect & Point Layout		
Use this table to determine the number of transects & points required, given the minimum stream width.		
Minimum Width (m)	No.Transects at Site	Points per Transect
> 3.0	10	6
1.5 - 3.0	12	5
1.0 - 1.49	15	3
< 1.0	20	2

Calculations:

Transect Spacing = Site Length / (No. of Transects - 1)

Point Spacing = Active Channel Width / Points per Transect

1st Point = Point Spacing / 2 (from left bank)

Point No.	Location (m)	Depth (mm)	Hydraulic Head (mm)	Particle Sizes (mm) Point	Particle Sizes (mm) Max. in Ring
1	0.45	55	5	20	170
2	1.35	50	0	0.10	70
3	2.25	50	0	0.10	150
4	3.15	170	0	0.10	45
5	4.05	145	0	0.05	0.10
6	.				

Measure depth & hydraulic head to nearest 5 mm

Point No.	Unmeasurable	Quality	Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other	FL	AL	SS	MC	WC	GR	TR
1	☐	2	☐	☐	☒	☐	☐	☐	☒	☐	☐	☐	☐	☐	☒
2	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
3	☐	2	☐	☐	☒	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐
4	☐	☐	☐	☐	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐
5	☐	2	☒	☐	☐	☐	☐	☐	☐	☐	☐	☒	☐	☐	☐
6	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Cover

Aquatic Vegetation Types Present

Bank Angle & Particle Median Diameters

(Bank to tape height; if a height is >2m use check box, else enter values in proper observation points)

	> 2 m	0 mm	250 mm	750 mm	1500 mm	Amount of Undercut (mm)	No. of Veg. Squares on Bank
Left Bank	Height ☐	950	770	210		0	1
	Substrate Diameters	0.05	0.05	0.05	0.05		
Right Bank	Height ☐	760	425	215		0	0
	Substrate Diameters	0.05	0.05	0.05	0.05		

Dominant Vegetation Type (Check box of the dominant type within the 1 x 2 m area)

	None	Lawn	Crop-land	Mea-dow	Scrub-land	Forest	Wet-land
Left Bank	☐	☐	☐	☒	☐	☐	☐
Right Bank	☐	☐	☐	☐	☒	☐	☐

Table Codes

Particle Sizes
Measure all particles between 2.00mm and 1000mm

Material	Size
Unconsolidated Clay	0.01
Consolidated Clay	0.011
Silt	0.05
Sand	0.10
Large Boulders	1001
Bedrock	1111

Cover Quality
0 = No Cover
1 = Embedded Cover
2 = Unembedded Cover

Aquatic Vegetation Types
FL = Filamentous Algae
AL = Non-Filamentous
SS = Moss
MC = Macrophytes
WC = Watercress
GR = Grass
TR = Terrestrial Plants

Comments

Crew Leader (initial & last name): GEST

Crew	Recorder	Ent/Scanned	Verified	Corrected
NV				

Channel Morphology

Mandatory Fields In Grey
Must be filled out for processing

Stream Name: TUCK

Stream Code: TUK

Site Code: TUK03

Sample: 01

Transect No.: 06 of 12

Bearing (D): 305

Min. Width (m): 1.5

No. of Transects: 12

Points per Transect: 5

Site Length (m): 45.3

Transect Spacing (m): 4.12

Active Channel Width (m): 2.3

Point Spacing (m): 0.46

Date (mm-dd): 2020-06-25

Transect & Point Layout

Use this table to determine the number of transects & points required, given the minimum stream width.

Minimum Width (m)	No. Transects at Site	Points per Transect
> 3.0	10	6
1.5 - 3.0	12	5
1.0 - 1.49	15	3
< 1.0	20	2

Calculations:

Transect Spacing = Site Length / (No. of Transects - 1)

Point Spacing = Active Channel Width / Points per Transect

1st Point = Point Spacing / 2 (from left bank)

Measure depth & hydraulic head to nearest 5 mm

Point No.	Location (m)	Depth (mm)	Hydraulic Head (mm)	Particle Sizes (mm) Point	Particle Sizes (mm) Max. in Ring
1	0.23	45	0	0.05	70
2	0.69	110	0	65	65
3	1.15	70	0	0.10	35
4	1.61	80	0	0.10	25
5	2.07	35	0	0.10	35
6	.				

Cover

Unmeasurable	Quality	Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other
☐	☐	☐	☐	☐	☐	☐	☐
☐	☐	☐	☐	☐	☐	☐	☐
☐	☐	☐	☐	☐	☐	☐	☐
☐	☐	☐	☐	☐	☐	☐	☐
☐	☐	☐	☐	☐	☐	☐	☐
☐	☐	☐	☐	☐	☐	☐	☐

Aquatic Vegetation Types Present

FL	AL	SS	MC	WC	GR	TR
☒	☐	☐	☐	☐	☐	☐
☐	☐	☐	☐	☐	☐	☐
☐	☐	☐	☐	☐	☐	☐
☐	☐	☐	☐	☐	☐	☐
☒	☐	☐	☐	☐	☐	☐
☐	☐	☐	☐	☐	☐	☐

Bank Angle & Particle Median Diameters

(Bank to tape height; if a height is >2m use check box, else enter values in proper observation points)

	> 2 m	0 mm	250 mm	750 mm	1500 mm
Left Bank	Height ☐	1035	995	725	0
	Substrate Diameters	0.05	0.05	0.05	0.05
Right Bank	Height ☐	0	0	0	0
	Substrate Diameters	25	15	20	30

Amount of Undercut (mm): 380

No. of Veg. Squares on Bank: 4

Dominant Vegetation Type

(Check box of the dominant type within the 1 x 2 m area)

	None	Lawn	Crop-land	Meadow	Scrub-land	Forest	Wet-land
Left Bank	☐	☐	☐	☒	☐	☐	☐
Right Bank	☐	☐	☐	☐	☐	☐	☐

Table Codes

Particle Sizes:
Measure all particles between 2.00mm and 1000mm

Material	Size
Unconsolidated Clay	0.01
Consolidated Clay	0.011
Silt	0.05
Sand	0.10
Large Boulders	1001
Bedrock	1111

Cover Quality:
0 ≙ No Cover
1 = Embedded Cover
2 = Unembedded Cover

Aquatic Vegetation Types
FL = Filamentous Algae
AL = Non-Filamentous
SS = Moss
MC = Macrophytes
WC = Watercress
GR = Grass
TR = Terrestrial Plants

Comments

Crew Leader (initial & last name): GEB

Crew	Recorder	Ent/Scanned	Verified	Corrected
AD				

Channel Morphology

Mandatory Fields in Grey
Must be filled out for processing

Stream Name: TUCK CREEK

Date (mm-dd): 2020-06-25

Stream Code: TUK

Site Code: TUK03

Sample: 01

Transect No.: 07 of 12

Bearing (D): 325

Min. Width (m): 1.5

Site Length (m): 45.3

Active Channel Width (m): 4.3

No. of Transects: 12

Transect Spacing (m): 4.17

Point Spacing (m): 0.86

Points per Transect: 5

Transect & Point Layout		
Use this table to determine the number of transects & points required, given the minimum stream width.		
Minimum Width (m)	No. Transects at Site	Points per Transect
> 3.0	10	6
1.5 - 3.0	12	5
1.0 - 1.49	15	3
< 1.0	20	2

Calculations:

Transect Spacing = Site Length / (No. of Transects - 1)

Point Spacing = Active Channel Width / Points per Transect

1st Point = Point Spacing / 2 (from left bank)

Point No.	Location (m)	Depth (mm) (Measure depth & hydraulic head to nearest 5 mm)	Hydraulic Head (mm)	Particle Sizes (mm): Point	Particle Sizes (mm): Max. in Ring
1	0.43	85	0	0.01	130
2	1.29	135	0	0.10	55
3	2.15	30	0	0.10	35
4	3.01	-5	0	35	55
5	3.37	50	0	60	210
6	.				

Point No.	Cover: Unmeasurable	Cover: Quality	Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other	Aquatic Vegetation Types Present: FL	AL	SS	MC	WC	GR	TR
1	☐	2	☐	☐	☒	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐
2	☐		☐	☐	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐
3	☐		☐	☐	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐
4	☐		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
5	☐	2	☐	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
6	☐		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Bank Angle & Particle Median Diameters
(Bank to tape height; if a height is >2m use check box, else enter values in proper observation points)

	> 2 m	0 mm	250 mm	750 mm	1500 mm	Amount of Undercut (mm)	No. of Veg. Squares on Bank
Left Bank	Height ☒	1350	1155	830		340	0
	Substrate Diameters	180	200	0.05	0.05		
Right Bank	Height ☐	500	330	130		60	3
	Substrate Diameters	0.05	0.05	0.05	0.05		

Dominant Vegetation Type (Check box of the dominant type within the 1 x 2 m area)

	None	Lawn	Crop-land	Meadow	Scrub-land	Forest	Wet-land
Left Bank	☐	☐	☐	☒	☐	☐	☐
Right Bank	☐	☐	☐	☒	☐	☐	☐

Table Codes

Particle Sizes: *Measure all particles between 2.00mm and 1000mm*

Material	Size
Unconsolidated Clay	0.01
Consolidated Clay	0.011
Silt	0.05
Sand	0.10
Large Boulders	1001
Bedrock	1111

Cover Quality:
0 = No Cover
1 = Embedded Cover
2 = Unembedded Cover

Aquatic Vegetation Types:
FL = Filamentous Algae
AL = Non-Filamentous
SS = Moss
MC = Macrophytes
WC = Watercress
GR = Grass
TR = Terrestrial Plants

Comments

Crew Leader (initial & last name): GEBT

Crew	Recorder	Ent/Scanned	Verified	Corrected
NV				

Channel Morphology

Mandatory Fields In Grey
Must be filled out for processing

Stream Name: TUCK

Stream Code: TUKO

Site Code: TUKO3

Sample: 01

Transect No.: 08 of 12

Bearing (D): 355

Min. Width (m): 1.5

No. of Transects: 12

Points per Transect: 5

Site Length (m): 45.3

Transect Spacing (m): 4.12

Active Channel Width (m): 4.4

Point Spacing (m): 0.88

Date (mm-dd): 2020-06-25

Transect & Point Layout

Use this table to determine the number of transects & points required, given the minimum stream width.

Minimum Width (m)	No. Transects at Site	Points per Transect
> 3.0	10	6
1.5 - 3.0	12	5
1.0 - 1.49	15	3
< 1.0	20	2

Calculations:

Transect Spacing = Site Length / (No. of Transects - 1)

Point Spacing = Active Channel Width / Points per Transect

1st Point = Point Spacing / 2 (from left bank)

Measure depth & hydraulic head to nearest 5 mm

Point No.	Location (m)	Depth (mm)	Hydraulic Head (mm)	Particle Sizes (mm) Point	Particle Sizes (mm) Max. in Ring
1	0.44	70	0	90	210
2	1.32	55	0	0.10	0.10
3	2.20	110	0	0.10	46
4	3.08	150	0	65	130
5	3.96	140	0	0.10	200
6	.				

Cover

Unmeasurable	Quality	Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other
☐	2	☒	☐	☐	☐	☐	☐
☐	☐	☐	☐	☐	☐	☐	☐
☐	☐	☐	☐	☐	☐	☐	☐
☐	2	☐	☒	☐	☐	☐	☐
☐	2	☐	☒	☐	☐	☐	☐
☐	☐	☐	☐	☐	☐	☐	☐

Aquatic Vegetation Types Present

FL	AL	SS	MC	WC	GR	TR
☒	☐	☐	☐	☐	☐	☐
☒	☐	☐	☐	☐	☐	☐
☒	☐	☐	☐	☐	☐	☐
☒	☐	☐	☐	☐	☐	☐
☒	☐	☐	☐	☐	☐	☐
☐	☐	☐	☐	☐	☐	☐

Bank Angle & Particle Median Diameters

(Bank to tape height; if a height is >2m use check box, else enter values in proper observation points)

	> 2 m	0 mm	250 mm	750 mm	1500 mm	Amount of Undercut (mm)	No. of Veg. Squares on Bank
Left Bank	Height ☐	1460	1430	1056		520	0
	Substrate Diameters	0.05	0.05	0.05	0.05		
Right Bank	Height ☐	670	200	146	0	140	6
	Substrate Diameters	65	0.05	0.05	0.05		

Dominant Vegetation Type (Check box of the dominant type within the 1 x 2 m area)

	None	Lawn	Crop-land	Meadow	Scrub-land	Forest	Wet-land
Left Bank	☐	☐	☐	☒	☐	☐	☐
Right Bank	☐	☐	☐	☒	☐	☐	☐

Table Codes

Particle Sizes: *Measure all particles between 2.00mm and 1000mm*

Material	Size
Unconsolidated Clay	0.01
Consolidated Clay	0.011
Silt	0.05
Sand	0.10
Large Boulders	1001
Bedrock	1111

Cover Quality:
0 = No Cover
1 = Embedded Cover
2 = Unembedded Cover

Aquatic Vegetation Types
FL = Filamentous Algae
AL = Non-Filamentous
SS = Moss
MC = Macrophytes
WC = Watercress
GR = Grass
TR = Terrestrial Plants

Comments

Crew Leader (initial & last name): CEBT

Crew	Recorder	Ent/Scanned	Verified	Corrected
ND				

Channel Morphology

Stream Name: TUCK CREEK

Mandatory Fields In Grey
Must be filled out for processing

Date (mm-dd): 2020-06-25

Stream Code: TUK

Site Code: TUK03

Sample: 01

Transect No.: 09 of 12

Bearing (D): 360

Min. Width (m): 1.5

No. of Transects: 12

Points per Transect: 5

Site Length (m): 45.3

Transect Spacing (m): 4.12

Active Channel Width (m): 2.9

Point Spacing (m): 0.58

Transect & Point Layout

Use this table to determine the number of transects & points required, given the minimum stream width.

Minimum Width (m)	No.Transects at Site	Points per Transect
> 3.0	10	6
1.5 - 3.0	12	5
1.0 - 1.49	15	3
< 1.0	20	2

Calculations:

Transect Spacing = Site Length / (No. of Transects - 1)

Point Spacing = Active Channel Width / Points per Transect

1st Point = Point Spacing / 2 (from left bank)

Point No.	Location (m)	Measure depth & hydraulic head to nearest 5 mm: Depth (mm)	Hydraulic Head (mm)	Particle Sizes (mm): Point	Max. in Ring	Cover: Unmeasurable	Quality	Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other	Aquatic Vegetation Types Present: FL	AL	SS	MC	WC	GR	TR
1	0.29	100	0	0.10	35															
2	0.97	240	0	0.10	60									X						
3	1.45	360	0	0.10	120		2			X				X						
4	2.03	415	0	0.10	210		2		X					X						
5	2.61	325	0	0.10	240		2		X					X						
6	.																			

Bank Angle & Particle Median Diameters

(Bank to tape height; if a height is >2m use check box, else enter values in proper observation points)

		> 2 m	0 mm	250 mm	750 mm	1500 mm	Amount of Undercut (mm)	No. of Veg. Squares on Bank
Left Bank	Height	☐	380	315	140	0	0	6
	Substrate Diameters		0.05	0.05	0.05	0.05		
Right Bank	Height	☐	810	310	130	0	120	4
	Substrate Diameters		130	0.05	0.05	0.05		

Dominant Vegetation Type
(Check box of the dominant type within the 1 x 2 m area)

	None	Lawn	Crop-land	Mea-dow	Scrub-land	Forest	Wet-land
Left Bank	☐	☐	☐	☐	☐	☐	☐
Right Bank	☐	☐	☐	☐	☐	☒	☐

Table Codes

Particle Sizes:
Measure all particles between 2.00mm and 1000mm

Matenal	Size
Unconsolidated Clay	0.01
Consolidated Clay	0.011
Silt	0.05
Sand	0.10
Large Boulders	1001
Bedrock	1111

Cover Quality:
0 = No Cover
1 = Embedded Cover
2 = Unembedded Cover

Aquatic Vegetation Types:
FL = Filamentous Algae
AL = Non-Filamentous
SS = Moss
MC = Macrophytes
WC = Watercress
GR = Grass
TR = Terrestrial Plants

Comments: Creek chub.

Crew Leader (initial & last name): GERT

Crew	Recorder	Ent/Scanned	Verified	Corrected
ND				

Channel Morphology

Mandatory Fields In Grey
Must be filled out for processing

Stream Name: TUCK

Date (mm-dd): 2020-06-25

Stream Code: TUK

Site Code: TUK03

Sample: 01

Transect No.: 10 of 12

Bearing (D): 320

Min. Width (m): 1.5

Site Length (m): 45.3

Active Channel Width (m): 2.8

No. of Transects: 12

Transect Spacing (m): 4.12

Point Spacing (m): 0.56

Points per Transect: 5

Transect & Point Layout

Use this table to determine the number of transects & points required, given the minimum stream width.

Minimum Width (m)	No.Transects at Site	Points per Transect
> 3.0	10	6
1.5 - 3.0	12	5
1.0 - 1.49	15	3
< 1.0	20	2

Calculations:

Transect Spacing = Site Length / (No. of Transects - 1)

Point Spacing = Active Channel Width / Points per Transect

1st Point = Point Spacing / 2 (from left bank)

Measure depth & hydraulic head to nearest 5 mm

Particle Sizes (mm)

Cover

Aquatic Vegetation Types Present

Point No.	Location (m)	Depth (mm)	Hydraulic Head (mm)	Point	Max. in Ring	Unmeasurable	Quality	Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other	FL	AL	SS	MC	WC	GR	TR
1	0.28	100	0	0.10	25															
2	0.84	130	0	10	150		2													
3	1.40	200	0	40	85															
4	1.96	220	0	0.10	95															
5	2.52	250	0	0.10	50															
6	.																			

Bank Angle & Particle Median Diameters

(Bank to tape height; if a height is >2m use check box, else enter values in proper observation points)

	> 2 m	0 mm	250 mm	750 mm	1500 mm	Amount of Undercut (mm)	No. of Veg. Squares on Bank
Left Bank Height	☐	916	290	90	0	0	
Left Bank Substrate Diameters		0.10	120	0.05	250		
Right Bank Height	☐	94	560	290	0	0	2
Right Bank Substrate Diameters		0.05	0.05	0.05	0.05		

Dominant Vegetation Type (Check box of the dominant type within the 1 x 2 m area)

	None	Lawn	Crop-land	Mea-dow	Scrub-land	Forest	Wet-land
Left Bank	☐	☐	☐	☐	☐	☐	☐
Right Bank	☐	☐	☐	☐	☒	☐	☐

Table Codes

Particle Sizes. *Measure all particles between 2.00mm and 1000mm*

Material	Size
Unconsolidated Clay	0.01
Consolidated Clay	0.011
Silt	0.05
Sand	0.10
Large Boulders	1001
Bedrock	1111

Cover Quality
0 = No Cover
1 = Embedded Cover
2 = Unembedded Cover

Aquatic Vegetation Types
FL = Filamentous Algae
AL = Non-Filamentous
SS = Moss
MC = Macrophytes
WC = Watercress
GR = Grass
TR = Terrestrial Plants

Comments

Crew Leader (initial & last name): GEG

Crew	Recorder	Ent/Scanned	Verified	Corrected
AD				

Channel Morphology

Mandatory Fields In Grey
Must be filled out for processing

Stream Name: TUCK CREEK

Date (mm-dd): 2020-06-25

Stream Code: TUK

Site Code: TUK 03

Sample: 01

Transect No.: 11 of 12

Bearing (D): 260

Min. Width (m): 1.5

Site Length (m): 45.3

Active Channel Width (m): 3.0

No. of Transects: 12

Transect Spacing (m): 4.12

Point Spacing (m): 0.60

Points per Transect: 5

Transect & Point Layout

Use this table to determine the number of transects & points required, given the minimum stream width.

Minimum Width (m)	No. Transects at Site	Points per Transect
> 3.0	10	6
1.5 - 3.0	12	5
1.0 - 1.49	15	3
< 1.0	20	2

Calculations:

Transect Spacing = Site Length / (No. of Transects - 1)

Point Spacing = Active Channel Width / Points per Transect

1st Point = Point Spacing / 2 (from left bank)

Point No.	Location (m)	Measure depth & hydraulic head to nearest 5 mm: Depth (mm)	Hydraulic Head (mm)	Particle Sizes (mm): Point	Max. in Ring
1	0.30	60	0	110	160
2	0.90	170	0	0.10	180
3	1.50	270	0	0.10	110
4	2.10	250	0	25	95
5	2.70	130	0	230	230
6	.				

Point No.	Cover: Unmeasurable	Quality	Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other	Aquatic Vegetation Types Present: FL	AL	SS	MC	WC	GR	TR
1	☐	2	☐	☒	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	☒
2	☐	2	☐	☒	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐
3	☐	2	☐	☒	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐
4	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
5	☐	2	☐	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☒
6	☐	☐	☐	☐	☐	☒	☐	☐	☒	☐	☐	☐	☐	☐	☐

Bank Angle & Particle Median Diameters
(Bank to tape height; if a height is >2m use check box, else enter values in proper observation points)

	Height (> 2 m ☐)	0 mm	250 mm	750 mm	1500 mm	Amount of Undercut (mm)	No. of Veg. Squares on Bank
Left Bank		460	240	80	0	0	2
	Substrate Diameters	0.10	0.10	0.10	280		
Right Bank		750	80	40	0	100	4
	Substrate Diameters	0.10	0.05	0.05	0.05		

Dominant Vegetation Type
(Check box of the dominant type within the 1 x 2 m area)

	None	Lawn	Crop-land	Meadow	Scrub-land	Forest	Wet-land
Left Bank	☐	☐	☐	☐	☐	☐	☐
Right Bank	☐	☐	☐	☒	☐	☐	☐

Table Codes

Particle Sizes:
Measure all particles between 2.00mm and 1000mm

Material	Size
Unconsolidated Clay	0.01
Consolidated Clay	0.011
Silt	0.05
Sand	0.10
Large Boulders	1001
Bedrock	1111

Cover Quality:
0 = No Cover
1 = Embedded Cover
2 = Unembedded Cover

Aquatic Vegetation Types:
FL = Filamentous Algae
AL = Non-Filamentous
SS = Moss
MC = Macrophytes
WC = Watercress
GR = Grass
TR = Terrestrial Plants

Comments:

Crew Leader (initial & last name): GE84

Crew	Recorder	Ent/Scanned	Verified	Corrected
ND				

Channel Morphology

Mandatory Fields In Grey
Must be filled out for processing

Stream Name: TUCK CREEK

Date (mm-dd): 2020-06-25

Stream Code: TUK

Site Code: TUK02

Sample: 01

Transect No.: 12 of 12

Bearing (D): 275

Min. Width (m): 1.5

Site Length (m): 95.3

Active Channel Width (m): 2.5

No. of Transects: 12

Transect Spacing (m): 4.12

Point Spacing (m): 0.50

Points per Transect: 5

Transect & Point Layout		
Use this table to determine the number of transects & points required, given the minimum stream width.		
Minimum Width (m)	No.Transects at Site	Points per Transect
> 3.0	10	6
1.5 - 3.0	12	5
1.0 - 1.49	15	3
< 1.0	20	2

Calculations:

Transect Spacing = Site Length / (No. of Transects - 1)

Point Spacing = Active Channel Width / Points per Transect

1st Point = Point Spacing / 2 (from left bank)

Point No.	Location (m)	Depth (mm)	Hydraulic Head (mm)	Particle Size Point	Particle Size Max. in Ring
1	0.25	20	0	60	120
2	0.75	15	10	90	130
3	1.25	40	10	0.10	170
4	1.75	80	6	70	150
5	2.25	35	0	25	150
6	.				

Measure depth & hydraulic head to nearest 5 mm

Particle Sizes (mm)

Point No.	Cover: Unmeasurable	Cover: Quality	Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other	Aquatic Vegetation Types Present: FL	AL	SS	MC	WC	GR	TR
1	☐	2	☐	☒	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐
2	☐	2	☐	☒	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐
3	☐	2	☐	☐	☒	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐
4	☐	2	☐	☒	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐
5	☐	2	☐	☐	☒	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐
6	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Cover

Aquatic Vegetation Types Present

Bank Angle & Particle Median Diameters

(Bank to tape height; if a height is >2m use check box, else enter values in proper observation points)

	> 2 m	0 mm	250 mm	750 mm	1500 mm	Amount of Undercut (mm)	No. of Veg. Squares on Bank
Left Bank	Height ☐	190	160	100	0	0	0
	Substrate Diameters	10	90	30	190		
Right Bank	Height ☐	350	290	220	0	0	2
	Substrate Diameters	15	0.65	0.05	0.05		

Dominant Vegetation Type (Check box of the dominant type within the 1 x 2 m area)

	None	Lawn	Crop-land	Meadow	Scrub-land	Forest	Wetland
Left Bank	☐	☐	☐	☐	☐	☐	☐
Right Bank	☐	☐	☐	☒	☐	☐	☐

Table Codes

Particle Sizes: *Measure all particles between 2.00mm and 1000mm*

Material	Size
Unconsolidated Clay	0.01
Consolidated Clay	0.011
Silt	0.05
Sand	0.10
Large Boulders	1001
Bedrock	1111

Cover Quality:
0 = No Cover
1 = Embedded Cover
2 = Unembedded Cover

Aquatic Vegetation Types
FL = Filamentous Algae
AL = Non-Filamentous
SS = Moss
MC = Macrophytes
WC = Watercress
GR = Grass
TR = Terrestrial Plants

Comments

Crew Leader (initial & last name): GEST

Crew	Recorder	Ent/Scanned	Verified	Corrected
MP				

Site Identification

Stream Code	Site Code	Sample	Date (yyyy-mm-dd)
TUK	TUK04	01	2020-06-26

Stream Name: TUCK CREEK - HYDRO EA

Alternate Site Code: 0405

Site Length (m): 45.3

*** Record using NAD83 datum

	Zone	Easting	Northing
Uncorr. UTM	17	597167.0	4867952.0
Corr. UTM	1		

OR Lat. / Long.: DD MM SS.sss

Source of Uncorrected UTM Coordinates: GPS/DGPS ☐ Other ☐ GIS ☒ OBM ☐

Source of Corrected UTM Coordinates: FWIS ☐ Other ☐ Ortho-photos ☐ GIS ☐

Name of Layer Used for Correction:

Access Route

NORTH ON WALKERS LINE FROM QEW WEST ON PALMER DR, PARK ON SOUTH LOT OF LANDSDOWN PARK.

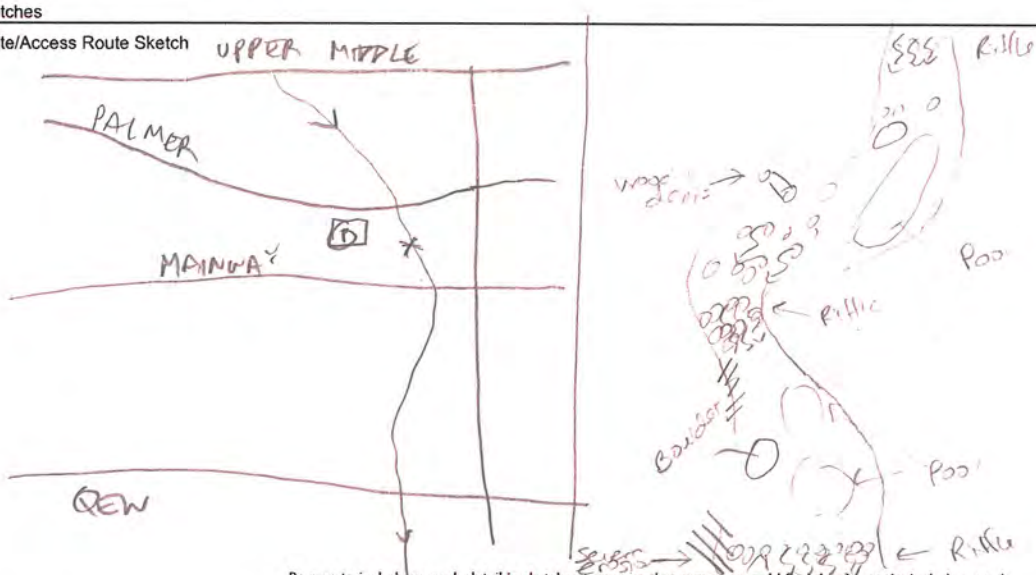
Site Description

CREEK IS EAST OF LOT, SITE APPROX 100m D/S OF CROSSING

☐ Site Was Unsampleable - add reason(s) on reverse

Sketches

Site/Access Route Sketch



Be sure to include enough detail in sketches to ensure that someone could find the site again; include a north arrow and the locations of all markers and noted features. The artist should also sign the sketches.

Comments

LANDSDOWN PARK Blacknose Dace

Crew Leader (init. & last name)	Crew	Recorder	Entered	Verified	Corrected
GEBT	ND				

WAVI

Site Marker Details

UPSTREAM SITE MARKER
(measure from stake to site)

Bearing (D): 160
Distance (m): 00.0

Description: Polka dot pink flagging on honeysuckle bush - Right bank right next to water

DOWNSTREAM SITE MARKER
(measure from stake to site)

Bearing (D): 045
Distance (m): 02.0

Description: Polka-dot pink flagging tape, basswood, right bank

ADDITIONAL SITE MARKER
(measure from stake to site)

Bearing (D):
Distance (m):

Description:

Photos

	Photo No.	Photo Name	Photo Description
Upstream – Upstream			
Upstream – Downstream			
Downstream – Upstream			
Downstream – Downstream			
Other Features			
Other Features			

Site is Unsampleable Reason(s)

- ☐ Stream dry
- ☐ Insufficient water to sample effectively
- ☐ Stream is no longer present at location (tiled or relocated, etc)
- ☐ Naturally unwadeable (i.e. > 1.5 m deep)
- ☐ Unwadeable due to ponding from a permanent barrier
- ☐ Unwadeable due to ponding from temporary barrier (eg. beaver dam)
- ☐ Landowner could not be contacted
- ☐ Landowner refused access
- ☐ Inaccessible for safety reasons (add details in comments below)
- ☐ Stream is wadeable but not appropriate for the intended sampling

What is the permanent barrier?

What is the temporary barrier?

Modules to have been used (e.g. S2.M1, S3.M1):

Comments

Site Features

Mandatory Fields In Grey
Must be filled out for processing

Stream Code: TUK | Site Code: TUK04 | Sample: 01 | Date (mm-dd): 2020 06-26

Stream Name: TUCK CREEK - 04US

For each landuse, check box that applies. Be sure to include comments explaining the particulars, including names and numbers of contacts

Site Features	Ongoing & Active	Historical Evidence	No Evidence but Reported	No Evidence	Unknown	Comments
Potential Point or Non-point Source Contaminant Sources	☐	☐	☐	☐	☐	2 storm source pipes @ crossing Rock run-off
Major Nutrient Sources Upstream	☒	☐	☐	☐	☐	Pasture, agricultural runoff
Channel Hardening or Straightening	☐	☐	☐	☒	☐	
Adjacent Landuses that Destabilize Banks	☒	☐	☐	☐	☐	Pasture encroachment, road crossing
Sediment Loading or Deprivation	☐	☐	☐	☒	☐	
Instream Habitat Modifications	☐	☐	☐	☒	☐	
Barriers and/or Dams in the Vicinity of the Site	☒	☐	☐	☐	☐	Palmer Dr. crossing
High Fishing Pressure	☐	☐	☐	☒	☐	
Log Jam Deflectors	☐	☐	☐	☒	☐	
Springs or Seeps at the Site	☐	☐	☐	☒	☐	
Impervious Substrate Limiting Burrowing Depth of Fish	☐	☐	☐	☒	☐	
Fish Stocked Near Sample Site	☐	☐	☐	☒	☐	
Other Activities that Could Influence Biota or Habitat	☐	☐	☐	☒	☐	
Intensive Logging Activitties within the Riparian Zone	☐	☐	☐	☒	☐	

Sources of Information
Visual Immediate ☒ Visual Extended ☐ Interview ☐ Maps & Photos ☐

Temperatures
Time (24hr): : | Air Temp (°C):
Water Temp (°C): | Max Air Temp (°C):
Max. Water Temp (°C): | Source of Max. Air Temp:

Riparian Vegetation Community
Only check one box for each bank and zone.

Riparian Zone	Left Bank: None	Lawn	Crop-land	Mea-dow	Scrub-land	Forest	Wet-lands	Right Bank: None	Lawn	Crop-land	Mea-dow	Scrub-land	Forest	Wet-lands
1.5-10m	☐	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐	☒	☐
10-30m	☐	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐	☒	☐
30-100m	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☒	☐

Comments:

Crew Leader (initial & last name): GEBY

Crew Initials	Recorder	Ent/Scanned	Verified	Corrected
ND				

Channel Morphology

Mandatory Fields In Grey
Must be filled out for processing

Stream Name: TUCK CREEK

Date (mm-dd): 2020-06-26

Stream Code: TUK

Site Code: TUK04 (04US)

Sample: 01

Transect No.: 01 of 12

Bearing (D): 320

Min. Width (m): 1.5

Site Length (m): 45.3

Active Channel Width (m): 2.7

No. of Transects: 12

Transect Spacing (m): 4.12

Point Spacing (m): 0.59

Points per Transect: 5

Transect & Point Layout

Use this table to determine the number of transects & points required, given the minimum stream width.

Minimum Width (m)	No. Transects at Site	Points per Transect
> 3.0	10	6
1.5 - 3.0	12	5
1.0 - 1.49	15	3
< 1.0	20	2

Calculations:

Transect Spacing = Site Length / (No. of Transects - 1)

Point Spacing = Active Channel Width / Points per Transect

1st Point = Point Spacing / 2 (from left bank)

Point No.	Location (m)	Depth (mm)	Hydraulic Head (mm)	Particle Size: Point (mm)	Particle Size: Max. in Ring (mm)
1	0.27	20	0	5	130
2	0.81	50	5	150	220
3	1.35	40	10	25	220
4	1.89	35	5	170	170
5	2.43	20	0	10	150
6					

Measure depth & hydraulic head to nearest 5 mm

Point No.	Unmeasurable	Quality	Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other
1	☐	2	☐	☐	☒	☐	☐	☐
2	☐	2	☐	☐	☒	☐	☐	☐
3	☐	2	☐	☐	☒	☐	☐	☐
4	☐	2	☐	☐	☒	☐	☐	☐
5	☐	2	☐	☐	☒	☐	☐	☐
6	☐		☐	☐	☐	☐	☐	☐

Cover

Point No.	FL	AL	SS	MC	WC	GR	TR
1	☒	☐	☐	☐	☐	☐	☐
2	☒	☐	☐	☐	☐	☐	☐
3	☒	☐	☐	☐	☐	☐	☐
4	☒	☐	☐	☐	☐	☐	☐
5	☒	☐	☐	☐	☐	☐	☐
6	☐	☐	☐	☐	☐	☐	☐

Aquatic Vegetation Types Present

Bank Angle & Particle Median Diameters

(Bank to tape height; if a height is >2m use check box, else enter values in proper observation points)

	> 2 m	0 mm	250 mm	750 mm	1500 mm	Amount of Undercut (mm)	No. of Veg. Squares on Bank
Left Bank	Height ☐	75	65	10	0	0	0
	Substrate Diameters	25	40	50	55		
Right Bank	Height ☐	85	70	30	0	0	0
	Substrate Diameters	0.10	15	30	0.10		

Dominant Vegetation Type
(Check box of the dominant type within the 1 x 2 m area)

	None	Lawn	Crop-land	Mea-dow	Scrub-land	Forest	Wet-land
Left Bank	☐	☐	☐	☐	☐	☐	☐
Right Bank	☐	☐	☐	☐	☐	☐	☐

Table Codes

Particle Sizes.
Measure all particles between 2.00mm and 1000mm

Material	Size
Unconsolidated Clay	0.01
Consolidated Clay	0.011
Silt	0.05
Sand	0.10
Large Boulders	1001
Bedrock	1111

Cover Quality
0 = No Cover
1 = Embedded Cover
2 = Unembedded Cover

Aquatic Vegetation Types
FL = Filamentous Algae
AL = Non-Filamentous
SS = Moss
MC = Macrophytes
WC = Watercress
GR = Grass
TR = Terrestrial Plants

Comments:

Crew Leader (initial & last name): CEBY

Crew	Recorder	Ent/Scanned	Verified	Corrected
ND				

Channel Morphology

Mandatory Fields In Grey
Must be filled out for processing

Stream Name: TUCK CREEK

Date (mm-dd): 2020-06-26

Stream Code: TUK

Site Code: TUK04

Sample: 01

Transect No.: 02 of 12

Bearing (D): 310

Min. Width (m): 1.5

Site Length (m): 45.3

Active Channel Width (m): 4.6

No. of Transects: 12

Transect Spacing (m): 4.12

Point Spacing (m): 0.92

Points per Transect: 5

Transect & Point Layout Use this table to determine the number of transects & points required, given the minimum stream width.		
Minimum Width (m)	No. Transects at Site	Points per Transect
> 3.0	10	6
1.5 - 3.0	12	5
1.0 - 1.49	15	3
< 1.0	20	2

Calculations:

Transect Spacing = Site Length / (No. of Transects - 1)

Point Spacing = Active Channel Width / Points per Transect

1st Point = Point Spacing / 2 (from left bank)

Point No.	Location (m)	Measure depth & hydraulic head to nearest 5 mm: Depth (mm)	Hydraulic Head (mm)	Particle Sizes (mm): Point	Max. in Ring
1	0.46	155	0	1111	1111
2	1.38	250	0	0.10	1111
3	2.30	210	0	0.10	640
4	3.22	190	0	95	85
5	4.14	55	0	0.10	65
6	.				

Point No.	Cover: Unmeasurable	Quality	Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other	Aquatic Vegetation Types Present: FL	AL	SS	MC	WC	GR	TR
1															
2															
3		2		X											
4															
5									X						
6															

Bank Angle & Particle Median Diameters
(Bank to tape height; if a height is >2m use check box, else enter values in proper observation points)

	> 2 m	0 mm	250 mm	750 mm	1500 mm	Amount of Undercut (mm)	No. of Veg. Squares on Bank
Left Bank	Height	☑				0	0
	Substrate Diameters						
Right Bank	Height	☐	90	50	15	0	0
	Substrate Diameters		25	10	5	0.10	

Dominant Vegetation Type (Check box of the dominant type within the 1 x 2 m area)

	None	Lawn	Crop-land	Meadow	Scrub-land	Forest	Wet-land
Left Bank	☐	☐	☐	☐	☐	☐	☐
Right Bank	☐	☐	☐	☐	☐	☐	☐

Table Codes

Particle Sizes:
Measure all particles between 2.00mm and 1000mm

Material	Size
Unconsolidated Clay	0.01
Consolidated Clay	0.011
Silt	0.05
Sand	0.10
Large Boulders	1001
Bedrock	1111

Cover Quality:
0 = No Cover
1 = Embedded Cover
2 = Unembedded Cover

Aquatic Vegetation Types:
FL = Filamentous Algae
AL = Non-Filamentous
SS = Moss
MC = Macrophytes
WC = Watercress
GR = Grass
TR = Terrestrial Plants

Comments

Crew Leader (initial & last name): GEGr

Crew	Recorder	Ent/Scanned	Verified	Corrected
ND				

Channel Morphology

Mandatory Fields In Grey
Must be filled out for processing

Stream Name: TUCK CREEK

Date (mm-dd): 2020-06-26

Stream Code: TUK

Site Code: TUK04

Sample: 01

Transect No.: 03 of 12

Bearing (D): 330

Min. Width (m): 1.5

Site Length (m): 45.3

Active Channel Width (m): 3.6

No. of Transects: 12

Transect Spacing (m): 4.12

Point Spacing (m): 0.72

Points per Transect: 5

Transect & Point Layout		
Use this table to determine the number of transects & points required, given the minimum stream width.		
Minimum Width (m)	No. Transects at Site	Points per Transect
> 3.0	10	6
1.5 - 3.0	12	5
1.0 - 1.49	15	3
< 1.0	20	2

Calculations:

Transect Spacing = Site Length / (No. of Transects - 1)

Point Spacing = Active Channel Width / Points per Transect

1st Point = Point Spacing / 2 (from left bank)

Point No.	Location (m)	Depth (mm)	Hydraulic Head (mm)	Particle Sizes (mm) Point	Particle Sizes (mm) Max. in Ring
1	0.36	135	0	0.05	230
2	1.08	265	0	0.10	1111
3	1.80	330	5	0.10	1111
4	2.52	170	0	0.10	40
5	3.24	30	0	0.00	170
6	.				

Measure depth & hydraulic head to nearest 5 mm

Point No.	Cover: Unmeasurable	Quality	Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other	Aquatic Vegetation Types Present: FL	AL	SS	MC	WC	GR	TR
1	☐	2	☐	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
2	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
3	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
4	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
5	☐	2	☐	☐	☒	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐
6	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Bank Angle & Particle Median Diameters
(Bank to tape height; if a height is >2m use check box, else enter values in proper observation points)

	> 2 m / 0 mm	250 mm	750 mm	1500 mm	Amount of Undercut (mm)	No. of Veg. Squares on Bank
Left Bank Height	☑				260	0
Left Bank Substrate Diameters						
Right Bank Height	☐	75	70	45	0	0
Right Bank Substrate Diameters		0.10	0.10	10	0.10	

Dominant Vegetation Type (Check box of the dominant type within the 1 x 2 m area)

	None	Lawn	Crop-land	Meadow	Scrub-land	Forest	Wet-land
Left Bank	☐	☐	☐	☐	☒	☐	☐
Right Bank	☐	☐	☐	☐	☐	☐	☐

Table Codes

Particle Sizes: *Measure all particles between 2.00mm and 1000mm*

Material	Size
Unconsolidated Clay	0.01
Consolidated Clay	0.011
Silt	0.05
Sand	0.10
Large Boulders	1001
Bedrock	1111

Cover Quality:
0 = No Cover
1 = Embedded Cover
2 = Unembedded Cover

Aquatic Vegetation Types:
FL = Filamentous Algae
AL = Non-Filamentous
SS = Moss
MC = Macrophytes
WC = Watercress
GR = Grass
TR = Terrestrial Plants

Comments

BCCH, RB Nuthatch WB Nuthatch

Crew Leader (initial & last name): GEB4

Crew	Recorder	Ent/Scanned	Verified	Corrected
ND				

Channel Morphology

Mandatory Fields In Grey
Must be filled out for processing

Stream Name: TUK CREEK

Stream Code: TUK

Site Code: TUK09

Sample: 01

Transect No.: 04 of 12

Bearing (D): 315

Min. Width (m): 1.5

Site Length (m): 45.3

Active Channel Width (m): 2.8

No. of Transects: 12

Transect Spacing (m): 4.12

Point Spacing (m): 0.56

Points per Transect: 5

Date (mm-dd): 2020-06-26

Transect & Point Layout		
Use this table to determine the number of transects & points required, given the minimum stream width.		
Minimum Width (m)	No. Transects at Site	Points per Transect
> 3.0	10	6
1.5 - 3.0	12	5
1.0 - 1.49	15	3
< 1.0	20	2

Calculations:

Transect Spacing = Site Length / (No. of Transects - 1)

Point Spacing = Active Channel Width / Points per Transect

1st Point = Point Spacing / 2 (from left bank)

Point No.	Location (m)	Depth (mm)	Hydraulic Head (mm)	Particle Size: Point (mm)	Particle Size: Max. in Ring (mm)
1	0.28	95	0	1111	1111
2	0.84	195	0	1111	1111
3	1.40	180	0	15	111
4	1.96	50	0	75	170
5	2.52	35	0	0.10	95
6	.				

Measure depth & hydraulic head to nearest 5 mm

Particle Sizes (mm)

Point No.	Unmeasurable	Cover: Quality	Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other	Aquatic Vegetation Types Present: FL	AL	SS	MC	WC	GR	TR
1	☐	2	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐
2	☐	2	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
3	☐		☐	☐	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐
4	☐	2	☐	☐	☒	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐
5	☐		☐	☐	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐
6	☐		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Cover

Aquatic Vegetation Types Present

Bank Angle & Particle Median Diameters

(Bank to tape height; if a height is >2m use check box, else enter values in proper observation points)

	> 2 m	0 mm	250 mm	750 mm	1500 mm	Amount of Undercut (mm)	No. of Veg. Squares on Bank
Left Bank	Height ☐	1550	475	220	0	420	6
	Substrate Diameters	1111	0.05	0.05	0.05		
Right Bank	Height ☐	115	100	50	0	0	0
	Substrate Diameters	45	65	0.10	10		

Dominant Vegetation Type (Check box of the dominant type within the 1 x 2 m area)

	None	Lawn	Crop-land	Mea-dow	Scrub-land	Forest	Wet-land
Left Bank	☐	☐	☐	☐	☒	☐	☐
Right Bank	☐	☐	☐	☐	☐	☐	☐

Table Codes

Particle Sizes: *Measure all particles between 2.00mm and 1000mm*

Material	Size
Unconsolidated Clay	0.01
Consolidated Clay	0.011
Silt	0.05
Sand	0.10
Large Boulders	1001
Bedrock	1111

Cover Quality:
0 = No Cover
1 = Embedded Cover
2 = Unembedded Cover

Aquatic Vegetation Types
FL = Filamentous Algae
AL = Non-Filamentous
SS = Moss
MC = Macrophytes
WC = Watercress
GR = Grass
TR = Terrestrial Plants

Comments

Crew Leader (initial & last name): G EBT

Crew	Recorder	Ent/Scanned	Verified	Corrected
ND				

Channel Morphology

Mandatory Fields In Grey
Must be filled out for processing

Stream Name: TUCK CREEK

Date (mm-dd): 2020-06-26

Stream Code: TUK

Site Code: TUK04

Sample: 01

Transect No.: 05 of 12

Bearing (D): 10

Min. Width (m): 1.5

Site Length (m): 45.3

Active Channel Width (m): 2.0

No. of Transects: 12

Transect Spacing (m): 4.12

Point Spacing (m): 0.40

Points per Transect: 5

Transect & Point Layout		
Use this table to determine the number of transects & points required, given the minimum stream width.		
Minimum Width (m)	No. Transects at Site	Points per Transect
> 3.0	10	6
1.5 - 3.0	12	5
1.0 - 1.49	15	3
< 1.0	20	2

Calculations:

Transect Spacing = Site Length / (No. of Transects - 1)

Point Spacing = Active Channel Width / Points per Transect

1st Point = Point Spacing / 2 (from left bank)

Point No.	Location (m)	Depth (mm)	Hydraulic Head (mm)	Point	Max. in Ring
1	0.20	70	0	1111	1111
2	0.60	65	0	1111	1111
3	1.00	60	0	1111	1111
4	1.40	45	0	1111	1111
5	1.80	60	0	15	214
6	.				

Measure depth & hydraulic head to nearest 5 mm

Particle Sizes (mm)

Point No.	Unmeasurable	Quality	Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other	FL	AL	SS	MC	WC	GR	TR
1	☐	2	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐
2	☐	2	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐
3	☐	0	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
4	☐	0	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
5	☐	2	☐	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
6	☐		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Cover

Aquatic Vegetation Types Present

Bank Angle & Particle Median Diameters

(Bank to tape height; if a height is >2m use check box, else enter values in proper observation points)

	> 2 m	0 mm	250 mm	750 mm	1500 mm	Amount of Undercut (mm)	No. of Veg. Squares on Bank
Left Bank	Height ☐	1600	600	230	0	490	0
	Substrate Diameters	1111	0.05	0.05	0.05		
Right Bank	Height ☐	140	95	45	0	5	0
	Substrate Diameters	195	100	85	210		

Dominant Vegetation Type
(Check box of the dominant type within the 1 x 2 m area)

None	Lawn	Crop-land	Mea-dow	Scrub-land	Forest	Wet-land
☐	☐	☐	☐	☒	☐	☐
☐	☐	☐	☐	☐	☐	☐

Table Codes

Particle Sizes:
Measure all particles between 2.00mm and 1000mm

Material	Size
Unconsolidated Clay	0.01
Consolidated Clay	0.011
Silt	0.05
Sand	0.10
Large Boulders	1001
Bedrock	1111

Cover Quality
0 = No Cover
1 = Embedded Cover
2 = Unembedded Cover

Aquatic Vegetation Types
FL = Filamentous Algae
AL = Non-Filamentous
SS = Moss
MC = Macrophytes
WC = Watercress
GR = Grass
TR = Terrestrial Plants

Comments

Crew Leader (initial & last name): G ES

Crew	Recorder	Ent/Scanned	Verified	Corrected
ND				

Channel Morphology

Mandatory Fields In Grey
Must be filled out for processing

Stream Name: TUCK CREEK

Date (mm-dd): 2020-06-26

Stream Code: TUK

Site Code: TUK04

Sample: 01

Transect No.: 06 of 12

Bearing (D): 10

Min. Width (m): 1.5

Site Length (m): 45.3

Active Channel Width (m): 5.1

No. of Transects: 12

Transect Spacing (m): 4.12

Point Spacing (m): 1.02

Points per Transect: 5

Transect & Point Layout

Use this table to determine the number of transects & points required, given the minimum stream width.

Minimum Width (m)	No.Transects at Site	Points per Transect
> 3.0	10	6
1.5 - 3.0	12	5
1.0 - 1.49	15	3
< 1.0	20	2

Calculations:

Transect Spacing = Site Length / (No. of Transects - 1)

Point Spacing = Active Channel Width / Points per Transect

1st Point = Point Spacing / 2 (from left bank)

Measure depth & hydraulic head to nearest 5 mm

Point No.	Location (m)	Depth (mm)	Hydraulic Head (mm)	Particle Sizes (mm): Point	Particle Sizes (mm): Max. in Ring
1	0.51	20	0	130	130
2	1.53	55	5	200	200
3	2.55	40	0	0.10	210
4	3.57	40	0	60	130
5	4.59	75	0	140	230
6	.				

Cover

Unmeasurable	Quality	Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other
☐	2	☐	☐	☒	☐	☐	☐
☐	2	☐	☐	☒	☐	☐	☐
☐	2	☐	☐	☒	☐	☐	☐
☐	2	☐	☐	☒	☐	☐	☐
☐	2	☐	☐	☒	☐	☐	☐
☐		☐	☐	☐	☐	☐	☐

Aquatic Vegetation Types Present

FL	AL	SS	MC	WC	GR	TR
☒	☐	☐	☐	☐	☐	☐
☒	☐	☐	☐	☐	☐	☐
☒	☐	☐	☐	☐	☐	☐
☒	☐	☐	☐	☐	☐	☐
☒	☐	☐	☐	☐	☐	☐
☐	☐	☐	☐	☐	☐	☐

Bank Angle & Particle Median Diameters

(Bank to tape height; if a height is >2m use check box, else enter values in proper observation points)

	Height	> 2 m	0 mm	250 mm	750 mm	1500 mm	Amount of Undercut (mm)	No. of Veg. Squares on Bank
Left Bank	Height	☐	180	150	90	0	250	6
	Substrate Diameters		40	45	45	0.10		
Right Bank	Height	☐	180	140	110	0	0	0
	Substrate Diameters		150	260	45	0.05		

Dominant Vegetation Type (Check box of the dominant type within the 1 x 2 m area)

	None	Lawn	Crop-land	Mea-dow	Scrub-land	Forest	Wet-land
Left Bank	☐	☐	☐	☐	☐	☐	☐
Right Bank	☐	☐	☐	☐	☐	☐	☐

Table Codes

Particle Sizes:
Measure all particles between 2.00mm and 1000mm

Material	Size
Unconsolidated Clay	0.01
Consolidated Clay	0.011
Silt	0.05
Sand	0.10
Large Boulders	1001
Bedrock	1111

Cover Quality:
0 = No Cover
1 = Embedded Cover
2 = Unembedded Cover

Aquatic Vegetation Types:
FL = Filamentous Algae
AL = Non-Filamentous
SS = Moss
MC = Macrophytes
WC = Watercress
GR = Grass
TR = Terrestrial Plants

Comments

Crew Leader (initial & last name): GB

Crew	Recorder	Ent/Scanned	Verified	Corrected
NO				

Channel Morphology

Mandatory Fields In Grey
Must be filled out for processing

Stream Name: TUK CREEK

Date (mm-dd): 2020-06-25

Stream Code: TUK

Site Code: TUK09

Sample: 01

Transect No.: 07 of 12

Bearing (D): 0

Min. Width (m): 1.5

Site Length (m): 45.3

Active Channel Width (m): 4.7

No. of Transects: 12

Transect Spacing (m): 4.12

Point Spacing (m): 6.94

Points per Transect: 5

Transect & Point Layout

Use this table to determine the number of transects & points required, given the minimum stream width.

Minimum Width (m)	No. Transects at Site	Points per Transect
> 3.0	10	6
1.5 - 3.0	12	5
1.0 - 1.49	15	3
< 1.0	20	2

Calculations:

Transect Spacing = Site Length / (No. of Transects - 1)

Point Spacing = Active Channel Width / Points per Transect

1st Point = Point Spacing / 2 (from left bank)

Point No.	Location (m)	Depth (mm)	Hydraulic Head (mm)	Particle Size Point (mm)	Particle Size Max. in Ring (mm)	Cover: Unmeasurable	Cover: Quality	Cover: Wood	Cover: Round Rock	Cover: Flat Rock	Cover: Macrophyte	Cover: Bank	Cover: Other	Aquatic Vegetation Types Present: FL	AL	SS	MC	WC	GR	TR
1	0.47	50	0	0.10	240	☐	1	☐	☒	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐
2	1.11	25	0	60	160	☐	2	☐	☐	☒	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐
3	2.35	10	0	0.10	230	☐	2	☐	☐	☒	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐
4	3.29	50	0	30	180	☐	2	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
5	4.23	0	0	0.10	230	☐	2	☐	☐	☒	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐
6	.					☐		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Bank Angle & Particle Median Diameters
(Bank to tape height; if a height is >2m use check box, else enter values in proper observation points)

	> 2 m	0 mm	250 mm	750 mm	1500 mm	Amount of Undercut (mm)	No. of Veg. Squares on Bank
Left Bank	Height ☐	50	30	30	0	0	0
	Substrate Diameters	160	10	25	5		
Right Bank	Height ☐	305	300	180	0	0	3
	Substrate Diameters	190	35	0.05	0.05		

Dominant Vegetation Type
(Check box of the dominant type within the 1 x 2 m area)

	None	Lawn	Crop-land	Mea-dow	Scrub-land	Forest	Wet-land
Left Bank	☐	☐	☐	☐	☐	☐	☐
Right Bank	☐	☐	☐	☐	☐	☐	☐

Table Codes

Particle Sizes:
Measure all particles between 2.00mm and 1000mm

Material	Size
Unconsolidated Clay	0.01
Consolidated Clay	0.011
Silt	0.05
Sand	0.10
Large Boulders	1001
Bedrock	1111

Cover Quality:
0 = No Cover
1 = Embedded Cover
2 = Unembedded Cover

Aquatic Vegetation Types
FL = Filamentous Algae
AL = Non-Filamentous
SS = Moss
MC = Macrophytes
WC = Watercress
GR = Grass
TR = Terrestrial Plants

Comments

Crew Leader (initial & last name): GEBT

Crew	Recorder	Ent/Scanned	Verified	Corrected
NV				

Channel Morphology

Mandatory Fields In Grey
Must be filled out for processing

Stream Name: TUCK CREEK

Date (mm-dd): 2020-06-26

Stream Code: TUK

Site Code: TUK04

Sample: 01

Transect No.: 03 of 12

Bearing (D): 345

Min. Width (m): 1.5

Site Length (m): 45.3

Active Channel Width (m): 4.5

No. of Transects: 12

Transect Spacing (m): 4.12

Point Spacing (m): 0.90

Points per Transect: 5

Transect & Point Layout

Use this table to determine the number of transects & points required, given the minimum stream width.

Minimum Width (m)	No. Transects at Site	Points per Transect
> 3.0	10	6
1.5 - 3.0	12	5
1.0 - 1.49	15	3
< 1.0	20	2

Calculations:

Transect Spacing = Site Length / (No. of Transects - 1)

Point Spacing = Active Channel Width / Points per Transect

1st Point = Point Spacing / 2 (from left bank)

Measure depth & hydraulic head to nearest 5 mm

Point No.	Location (m)	Depth (mm)	Hydraulic Head (mm)	Particle Sizes (mm): Point	Particle Sizes (mm): Max. in Ring
1	0.45	40	0	270	270
2	1.35	90	0	0.10	150
3	2.25	20	0	230	730
4	3.15	100	0	290	290
5	4.05	105	0	0.10	185
6					

Cover

Unmeasurable	Quality	Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other
	2			X			
	2			X			
	2			X			
	2			X			
	2			X			

Aquatic Vegetation Types Present

FL	AL	SS	MC	WC	GR	TR
X						
X						
X						
X						
X						

Bank Angle & Particle Median Diameters

(Bank to tape height; if a height is >2m use check box, else enter values in proper observation points)

	> 2 m	0 mm	250 mm	750 mm	1500 mm	Amount of Undercut (mm)	No. of Veg. Squares on Bank
Left Bank	Height ☐	145	100	75	0	0	0
	Substrate Diameters	0.10	120	15	20		
Right Bank	Height ☐	670	410	160	0	90	0
	Substrate Diameters	1111	0.05	0.05	0.05		

Dominant Vegetation Type (Check box of the dominant type within the 1 x 2 m area)

	None	Lawn	Crop-land	Meadow	Scrub-land	Forest	Wetland
Left Bank	☐	☐	☐	☐	☐	☐	☐
Right Bank	☐	☐	☐	☐	☒	☐	☐

Table Codes

Particle Sizes: *Measure all particles between 2.00mm and 1000mm*

Material	Size
Unconsolidated Clay	0.01
Consolidated Clay	0.011
Silt	0.05
Sand	0.10
Large Boulders	1001
Bedrock	1111

Cover Quality:
0 = No Cover
1 = Embedded Cover
2 = Unembedded Cover

Aquatic Vegetation Types:
FL = Filamentous Algae
AL = Non-Filamentous
SS = Moss
MC = Macrophytes
WC = Watercress
GR = Grass
TR = Terrestrial Plants

Comments

Crew Leader (initial & last name): C. EST

Crew	Recorder	Ent/Scanned	Verified	Corrected
ND				

Channel Morphology

Mandatory Fields In Grey
Must be filled out for processing

Stream Name: TUCK CREEK

Date (mm-dd): 2020-06-26

Stream Code: TUK

Site Code: TUK04

Sample: 01

Transect No.: 09 of 12

Bearing (D): 350

Min. Width (m): 1.5

No. of Transects: 12

Points per Transect: 5

Site Length (m): 45.3

Transect Spacing (m): 4.12

Active Channel Width (m): 4.0

Point Spacing (m): 0.83

Transect & Point Layout

Use this table to determine the number of transects & points required, given the minimum stream width.

Minimum Width (m)	No. Transects at Site	Points per Transect
> 3.0	10	6
1.5 - 3.0	12	5
1.0 - 1.49	15	3
< 1.0	20	2

Calculations:

Transect Spacing = Site Length / (No. of Transects - 1)

Point Spacing = Active Channel Width / Points per Transect

1st Point = Point Spacing / 2 (from left bank)

Point No.	Location (m)	Measure depth & hydraulic head to nearest 5 mm: Depth (mm)	Hydraulic Head (mm)	Particle Sizes (mm): Point	Max. in Ring	Cover: Unmeasurable	Quality	Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other	Aquatic Vegetation Types Present: FL	AL	SS	MC	WC	GR	TR
1	0.40	25	0	150	150	☐	2	☐	☐	☒	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐
2	1.20	50	0	9.05	60	☐	0	☐	☐	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐
3	2.00	105	0	9.10	360	☐	2	☐	☐	☒	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐
4	2.80	90	0	1111	1111	☐	0	☐	☐	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐
5	3.60	95	0	1111	260	☐	2	☐	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
6	.					☐		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Bank Angle & Particle Median Diameters
(Bank to tape height; if a height is >2m use check box, else enter values in proper observation points)

	> 2 m	0 mm	250 mm	750 mm	1500 mm	Amount of Undercut (mm)	No. of Veg. Squares on Bank
Left Bank	Height ☐	85	60	40	0	0	0
	Substrate Diameters	30	120	35	20		
Right Bank	Height ☐	995	840	210	0	240	0
	Substrate Diameters	140	0.05	0.05	0.05		

Dominant Vegetation Type
(Check box of the dominant type within the 1 x 2 m area)

	None	Lawn	Crop-land	Mea-dow	Scrub-land	Forest	Wet-land
Left Bank	☐	☐	☐	☐	☐	☐	☐
Right Bank	☐	☐	☐	☐	☒	☐	☐

Table Codes

Particle Sizes:
Measure all particles between 2.00mm and 1000mm

Material	Size
Unconsolidated Clay	0.01
Consolidated Clay	0.011
Silt	0.05
Sand	0.10
Large Boulders	1001
Bedrock	1111

Cover Quality:
0 = No Cover
1 = Embedded Cover
2 = Unembedded Cover

Aquatic Vegetation Types:
FL = Filamentous Algae
AL = Non-Filamentous
SS = Moss
MC = Macrophytes
WC = Watercress
GR = Grass
TR = Terrestrial Plants

Comments: NOFL

Crew Leader (initial & last name): GEM

Crew	Recorder	Ent/Scanned	Verified	Corrected
NP				

Channel Morphology

Mandatory Fields In Grey
Must be filled out for processing

Stream Name: TUCK CREEK

Stream Code: TUK

Site Code: TUK04

Sample: 01

Transect No.: 10 of 12

Bearing (D): 310

Min. Width (m): 1.5

No. of Transects: 12

Points per Transect: 5

Site Length (m): 45.3

Transect Spacing (m): 4.12

Active Channel Width (m): 5.3

Point Spacing (m): 1.06

Date (mm-dd): 2020-06-26

Transect & Point Layout

Use this table to determine the number of transects & points required, given the minimum stream width.

Minimum Width (m)	No.Transects at Site	Points per Transect
> 3.0	10	6
1.5 - 3.0	12	5
1.0 - 1.49	15	3
< 1.0	20	2

Calculations:

Transect Spacing = Site Length / (No. of Transects - 1)

Point Spacing = Active Channel Width / Points per Transect

1st Point = Point Spacing / 2 (from left bank)

Point No.	Location (m)	Measure depth & hydraulic head to nearest 5 mm: Depth (mm)	Hydraulic Head (mm)	Particle Sizes (mm): Point	Max. in Ring
1	0.53	30	0	340	340
2	1.59	35	0	0.10	200
3	2.65	50	0	100	180
4	3.71	5	0	0.10	150
5	4.77	70	0	35	1111
6	.				

Cover

Unmeasurable	Quality	Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other
☐	2	☐	☐	☒	☐	☐	☐
☐	2	☐	☐	☒	☐	☐	☐
☐	2	☐	☐	☒	☐	☐	☐
☐	2	☐	☐	☒	☐	☐	☐
☐	2	☐	☐	☐	☐	☒	☐
☐		☐	☐	☐	☐	☐	☐

Aquatic Vegetation Types Present

FL	AL	SS	MC	WC	GR	TR
☒	☐	☐	☐	☐	☐	☐
☒	☐	☐	☐	☐	☐	☐
☒	☐	☐	☐	☐	☐	☐
☒	☐	☐	☐	☐	☐	☐
☐	☐	☐	☐	☐	☐	☐
☐	☐	☐	☐	☐	☐	☐

Bank Angle & Particle Median Diameters

(Bank to tape height; if a height is >2m use check box, else enter values in proper observation points)

		> 2 m	0 mm	250 mm	750 mm	1500 mm	Amount of Undercut (mm)	No. of Veg. Squares on Bank
Left Bank	Height	☐	130	150	100	0	0	0
	Substrate Diameters		0.10	10	110	0.05		
Right Bank	Height	☐	1380	400	105	0	730	0
	Substrate Diameters		1111	0.05	0.05	0.05		

Dominant Vegetation Type

(Check box of the dominant type within the 1 x 2 m area)

	None	Lawn	Crop-land	Meadow	Scrub-land	Forest	Wet-land
Left Bank	☐	☐	☐	☐	☐	☐	☐
Right Bank	☐	☐	☐	☐	☒	☐	☐

Table Codes

Particle Sizes: *Measure all particles between 2.00mm and 1000mm*

Material	Size
Unconsolidated Clay	0.01
Consolidated Clay	0.011
Silt	0.05
Sand	0.10
Large Boulders	1001
Bedrock	1111

Cover Quality:
0 = No Cover
1 = Embedded Cover
2 = Unembedded Cover

Aquatic Vegetation Types:
FL = Filamentous Algae
AL = Non-Filamentous
SS = Moss
MC = Macrophytes
WC = Watercress
GR = Grass
TR = Terrestrial Plants

Comments

CEWA

Crew Leader (initial & last name): GBT

Crew	Recorder	Ent/Scanned	Verified	Corrected
ND				

Channel Morphology

Mandatory Fields In Grey
Must be filled out for processing

Stream Name: TUCK CREEK

Date (mm-dd): 2020-06-26

Stream Code: TUK

Site Code: TUK 01

Sample: 01

Transect No.: 11 of 12

Bearing (D): 310

Min. Width (m): 1.5

Site Length (m): 45.3

Active Channel Width (m): 3.7

No. of Transects: 12

Transect Spacing (m): 4.12

Point Spacing (m): 0.74

Points per Transect: 5

Transect & Point Layout		
Use this table to determine the number of transects & points required, given the minimum stream width.		
Minimum Width (m)	No. Transects at Site	Points per Transect
> 3.0	10	6
1.5 - 3.0	12	5
1.0 - 1.49	15	3
< 1.0	20	2

Calculations:

Transect Spacing = Site Length / (No. of Transects - 1)

Point Spacing = Active Channel Width / Points per Transect

1st Point = Point Spacing / 2 (from left bank)

Point No.	Location (m)	Measure depth & hydraulic head to nearest 5 mm: Depth (mm)	Hydraulic Head (mm)	Particle Sizes (mm): Point	Max. in Ring
1	0.37	45	0	40	240
2	1.11	50	0	70	130
3	1.35	100	0	20	115
4	2.59	80	0	1111	190
5	3.33	80	0	55	200
6	.				

Point No.	Cover: Unmeasurable	Quality	Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other	Aquatic Vegetation Types Present: FL	AL	SS	MC	WC	GR	TR
1	☐	2	☐	☐	☒	☒	☐	☐	☒	☐	☐	☐	☐	☐	☐
2	☐	2	☐	☐	☒	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐
3	☐	2	☐	☐	☒	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐
4	☐	2	☐	☐	☒	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐
5	☐	2	☐	☐	☒	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐
6	☐		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Bank Angle & Particle Median Diameters
(Bank to tape height; if a height is >2m use check box, else enter values in proper observation points)

	> 2 m	0 mm	250 mm	750 mm	1500 mm	Amount of Undercut (mm)	No. of Veg. Squares on Bank
Left Bank	Height ☐	135	80	55	0	0	0
	Substrate Diameters	130	130	10	0.05		
Right Bank	Height ☐	385	300	240	0	0	0
	Substrate Diameters	0.10	0.05	0.05	0.05		

Dominant Vegetation Type (Check box of the dominant type within the 1 x 2 m area)

	None	Lawn	Crop-land	Mea-dow	Scrub-land	Forest	Wet-land
Left Bank	☐	☐	☐	☐	☐	☐	☐
Right Bank	☐	☐	☐	☐	☒	☐	☐

Table Codes

Particle Sizes: *Measure all particles between 2.00mm and 1000mm*

Material	Size
Unconsolidated Clay	0.01
Consolidated Clay	0.011
Silt	0.05
Sand	0.10
Large Boulders	1001
Bedrock	1111

Cover Quality:
0 = No Cover
1 = Embedded Cover
2 = Unembedded Cover

Aquatic Vegetation Types:
FL = Filamentous Algae
AL = Non-Filamentous
SS = Moss
MC = Macrophytes
WC = Watercress
GR = Grass
TR = Terrestrial Plants

Comments

Ebony Jewelling

Crew Leader (initial & last name): GEST

Crew	Recorder	Ent/Scanned	Verified	Corrected
NP				

Channel Morphology

Stream Name: TUK CREEK

Mandatory Fields In Grey
Must be filled out for processing

Date (mm-dd): 2020-06-26

Stream Code: TUK

Site Code: TUK

Sample: 01

Transect No.: 12 of 12

Bearing (D): 320

Min. Width (m): 1.5

No. of Transects: 12

Points per Transect: 5

Site Length (m): 45.3

Transect Spacing (m): 4.12

Active Channel Width (m): 4.5

Point Spacing (m): 0.90

Transect & Point Layout

Use this table to determine the number of transects & points required, given the minimum stream width.

Minimum Width (m)	No. Transects at Site	Points per Transect
> 3.0	10	6
1.5 - 3.0	12	5
1.0 - 1.49	15	3
< 1.0	20	2

Calculations:

Transect Spacing = Site Length / (No. of Transects - 1)

Point Spacing = Active Channel Width / Points per Transect

1st Point = Point Spacing / 2 (from left bank)

Point No.	Location (m)	Measure depth & hydraulic head to nearest 5 mm: Depth (mm)	Hydraulic Head (mm)	Particle Sizes (mm): Point	Max. in Ring
1	0.45	60	0	15	130
2	1.35	50	0	10	170
3	2.25	60	0	5	300
4	3.15	25	0	95	240
5	4.05	30	0	170	185
6	.				

Cover

Point No.	Unmeasurable	Quality	Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other
1	☐	2	☐	☐	☒	☐	☐	☐
2	☐	2	☐	☐	☒	☐	☐	☐
3	☐	1	☐	☐	☒	☐	☐	☐
4	☐	1	☐	☐	☒	☐	☐	☐
5	☐	2	☐	☐	☒	☐	☐	☐
6	☐		☐	☐	☐	☐	☐	☐

Aquatic Vegetation Types Present

Point No.	FL	AL	SS	MC	WC	GR	TR
1	☒	☐	☐	☐	☐	☐	☐
2	☒	☐	☐	☐	☐	☐	☐
3	☒	☐	☐	☐	☐	☐	☐
4	☒	☐	☐	☐	☐	☐	☐
5	☒	☐	☐	☐	☐	☐	☐
6	☐	☐	☐	☐	☐	☐	☐

Bank Angle & Particle Median Diameters

(Bank to tape height; if a height is >2m use check box, else enter values in proper observation points)

	Height	> 2 m	0 mm	250 mm	750 mm	1500 mm	Amount of Undercut (mm)	No. of Veg. Squares on Bank
Left Bank	☐		330	330	310	0	0	0
	Substrate Diameters		60	0.10	0.10	0.05		
Right Bank	☐		355	320	100	0	0	9
	Substrate Diameters		0.10	0.05	0.05	0.05		

Dominant Vegetation Type

(Check box of the dominant type within the 1 x 2 m area)

	None	Lawn	Crop-land	Mea-dow	Scrub-land	Forest	Wet-land
Left Bank	☐	☐	☐	☐	☐	☐	☐
Right Bank	☐	☐	☐	☒	☐	☐	☐

Table Codes

Particle Sizes: *Measure all particles between 2.00mm and 1000mm*

Material	Size
Unconsolidated Clay	0.01
Consolidated Clay	0.011
Silt	0.05
Sand	0.10
Large Boulders	1001
Bedrock	1111

Cover Quality:
0 = No Cover
1 = Embedded Cover
2 = Unembedded Cover

Aquatic Vegetation Types
FL = Filamentous Algae
AL = Non-Filamentous
SS = Moss
MC = Macrophytes
WC = Watercress
GR = Grass
TR = Terrestrial Plants

Comments

COHA

Crew Leader (initial & last name): CBY

Crew	Recorder	Ent/Scanned	Verified	Corrected
NP				

Site Identification

Stream Code: TUK | Site Code: TUK 05 | Sample: 01 | Date (yyyy-mm-dd): 2020-06-26

Stream Name: TUCK CREEK | Alternate Site Code: | Site Length (m): 46.7

*** Record using NAD83 datum

	Zone	Easting	Northing	OR	DD	MM	SS.sss
Uncorr. UTM	17	596031.7	4603320.2	Lat.			
Corr. UTM	17			Long.			

Source of Uncorrected UTM Coordinates: GPS/DGPS ☐ GIS ☒ OBM ☐ Other

Source of Corrected UTM Coordinates: FWIS ☐ Ortho-photos ☐ GIS ☐ Other

Name of Layer Used for Correction

7.1
3.2
30
6.4

Access Route

NORTH ON WALKERS LINE FROM HWY 403, WEST ON UPPER MIDDLE RD, NORTH ON HEADON RD, WEST ON GOLDEN EAGLE, PARK

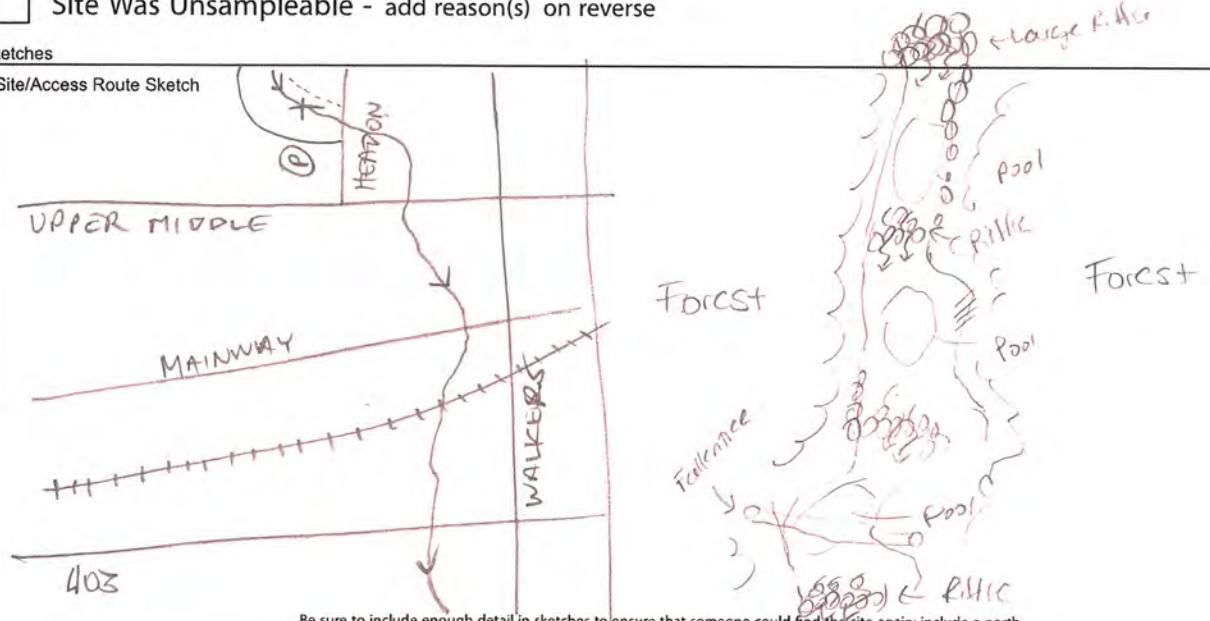
Site Description

CREEK CROSSES HEADON ROAD, WALK ALONG TRAIL ON RIGHT BANK UPSTREAM FOR ~80m TO FIRST CREEK CROSSING D/S END

☐ Site Was Unsampleable - add reason(s) on reverse

Sketches

Site/Access Route Sketch



Be sure to include enough detail in sketches to ensure that someone could find the site again; include a north arrow and the locations of all markers and noted features. The artist should also sign the sketches.

Comments

Fish noted - likely Creek chub

Canopy = Manitoba Maple / Walnut forest, meadow and shrubs along banks

Crew Leader (init. & last name)	Crew	Recorder	Entered	Verified	Corrected
G EBY	ND				

Site Marker Details

UPSTREAM SITE MARKER
(measure from stake to site)

Bearing (D): 140

Distance (m): 4.0

Description: Overhanging willow, left bank
Polka Pot pink flagging

DOWNSTREAM SITE MARKER
(measure from stake to site)

Bearing (D): 0

Distance (m): 0.0

Description: Right at the large fallen cherry tree

ADDITIONAL SITE MARKER
(measure from stake to site)

Bearing (D):

Distance (m):

Description:

Photos

	Photo No.	Photo Name	Photo Description
Upstream			
Upstream			
Downstream			
Downstream			
Upstream			
Downstream			
Other Features			

Site is Unsampleable Reason(s)

- ☐ Stream dry
- ☐ Insufficient water to sample effectively
- ☐ Stream is no longer present at location (tiled or relocated, etc)
- ☐ Naturally unwadeable (i.e. > 1.5 m deep)
- ☐ Unwadeable due to ponding from a permanent barrier
- ☐ Unwadeable due to ponding from temporary barrier (eg. beaver dam)
- ☐ Landowner could not be contacted
- ☐ Landowner refused access
- ☐ Inaccessible for safety reasons (add details in comments below)
- ☐ Stream is wadeable but not appropriate for the intended sampling

What is the permanent barrier?

What is the temporary barrier?

Modules to have been used (e.g. S2.M1, S3.M1):

Comments

Site Features

Mandatory Fields In Grey
Must be filled out for processing

Stream Code: TUK

Site Code: TUKOS

Sample: 01

Date (mm-dd): 2010 06-26

Stream Name: Tuck Creek

For each landuse, check box that applies. Be sure to include comments explaining the particulars, including names and numbers of contacts

Site Features	Ongoing & Active	Historical Evidence	No Evidence but Reported	No Evidence	Unknown	Comments
Potential Point or Non-point Source Contaminant Sources	☐	☐	☐	☒	☐	
Major Nutrient Sources Upstream	☒	☐	☐	☐	☐	Pasture land, road crossing, residential, agriculture.
Channel Hardening or Straightening	☐	☒	☐	☐	☐	Evidence of historical restoration
Adjacent Landuses that Destabilize Banks	☒	☐	☐	☐	☐	Trail
Sediment Loading or Deprivation	☐	☐	☐	☒	☐	
Instream Habitat Modifications	☐	☒	☐	☐	☐	Past restriction
Barriers and/or Dams in the Vicinity of the Site	☒	☐	☐	☐	☐	Large DIS log-jam barrier
High Fishing Pressure	☐	☐	☐	☒	☐	
Log Jam Deflectors	☒	☐	☐	☐	☐	Large jam D/S, mine throughout
Springs or Seeps at the Site	☐	☐	☐	☒	☐	
Impervious Substrate Limiting Burrowing Depth of Fish	☐	☐	☐	☒	☐	
Fish Stocked Near Sample Site	☐	☐	☐	☒	☐	
Other Activities that Could Influence Biota or Habitat	☐	☐	☐	☒	☐	
Intensive Logging Activitties within the Riparian Zone	☐	☐	☐	☒	☐	

Sources of Information
Visual Immediate ☒ Visual Extended ☐ Interview ☐ Maps & Photos ☒

Temperatures
Time (24hr): Air Temp (°C):
Water Temp (°C): Max Air Temp (°C):
Max. Water Temp (°C): Source of Max. Air Temp:

Riparian Vegetation Community
Only check one box for each bank and zone.

Riparian Zone	Left Bank: None	Lawn	Crop-land	Mea-dow	Scrub-land	Forest	Wet-lands	Right Bank: None	Lawn	Crop-land	Mea-dow	Scrub-land	Forest	Wet-lands
1.5-10m	☐	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐	☒	☐
10-30m	☐	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐	☒	☐
30-100m	☐	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐	☒	☐

Comments:

Crew Leader (initial & last name): GEH

Crew Initials	Recorder	Ent/Scanned	Verified	Corrected
NB				

Channel Morphology

Mandatory Fields In Grey
Must be filled out for processing

Stream Name: TUCK CREEK

Date (mm-dd): 2020-06-26

Stream Code: TUK

Site Code: TUK05

Sample: 01

Transect No.: 01 of 12

Bearing (D): 270

Min. Width (m): 1.5

Site Length (m): 46.7

Active Channel Width (m): 2.6

No. of Transects: 12

Transect Spacing (m): 4.25

Point Spacing (m): 0.52

Points per Transect: 5

Transect & Point Layout		
Use this table to determine the number of transects & points required, given the minimum stream width.		
Minimum Width (m)	No.Transects at Site	Points per Transect
> 3.0	10	6
1.5 - 3.0	12	5
1.0 - 1.49	15	3
< 1.0	20	2

Calculations:

Transect Spacing = Site Length / (No. of Transects - 1)

Point Spacing = Active Channel Width / Points per Transect

1st Point = Point Spacing / 2 (from left bank)

Measure depth & hydraulic head to nearest 5 mm

Particle Sizes (mm)

Cover

Aquatic Vegetation Types Present

Point No.	Location (m)	Depth (mm)	Hydraulic Head (mm)	Particle Size: Point	Particle Size: Max. in Ring	Cover: Unmeasurable	Cover: Quality	Cover: Wood	Cover: Round Rock	Cover: Flat Rock	Cover: Macrophyte	Cover: Bank	Cover: Other	Aquatic Vegetation: FL	AL	SS	MC	WC	GR	TR
1	0.26	40	5	56	120		2			X										
2	0.78	50	0	10	280		2													
3	1.30	30	5	0.10	260		2													
4	1.82	50	5	20	260		2									X				
5	2.34	35	5	15	150		1													
6	.																			

Bank Angle & Particle Median Diameters

(Bank to tape height; if a height is >2m use check box, else enter values in proper observation points)

	> 2 m	0 mm	250 mm	750 mm	1500 mm	Amount of Undercut (mm)	No. of Veg. Squares on Bank
Left Bank	Height	740	720	560		90	0
	Substrate Diameters	20	0.05	0.05	0.05		
Right Bank	Height	235	195	85	0	0	0
	Substrate Diameters	25	10	0.05	0.05		

Dominant Vegetation Type (Check box of the dominant type within the 1 x 2 m area)

	None	Lawn	Crop-land	Meadow	Scrub-land	Forest	Wet-land
Left Bank							
Right Bank							

Table Codes

Particle Sizes: *Measure all particles between 2.00mm and 1000mm*

Material	Size
Unconsolidated Clay	0.01
Consolidated Clay	0.011
Silt	0.05
Sand	0.10
Large Boulders	1001
Bedrock	1111

Cover Quality:
0 = No Cover
1 = Embedded Cover
2 = Unembedded Cover

Aquatic Vegetation Types:
FL = Filamentous Algae
AL = Non-Filamentous
SS = Moss
MC = Macrophytes
WC = Watercress
GR = Grass
TR = Terrestrial Plants

Comments

Crew Leader (initial & last name): GEB

Crew	Recorder	Ent/Scanned	Verified	Corrected
ND				

Channel Morphology

Mandatory Fields In Grey
Must be filled out for processing

Stream Name: TUCK CREEK

Date (mm-dd): 2026-06-26

Stream Code: TUK

Site Code: TUK05

Sample: 01

Transect No.: 02 of 12

Bearing (D): 290

Min. Width (m): 1.5

No. of Transects: 12

Points per Transect: 5

Site Length (m): 46.7

Transect Spacing (m): 4.25

Active Channel Width (m): 2.3

Point Spacing (m): 0.56

Transect & Point Layout

Use this table to determine the number of transects & points required, given the minimum stream width.

Minimum Width (m)	No. Transects at Site	Points per Transect
> 3.0	10	6
1.5 - 3.0	12	5
1.0 - 1.49	15	3
< 1.0	20	2

Calculations:

Transect Spacing = Site Length / (No. of Transects - 1)

Point Spacing = Active Channel Width / Points per Transect

1st Point = Point Spacing / 2 (from left bank)

Point No.	Location (m)	Measure depth & hydraulic head to nearest 5 mm: Depth (mm)	Hydraulic Head (mm)	Particle Sizes (mm): Point	Max. in Ring
1	0.23	35	0	0.05	120
2	0.34	56	0	0.05	1111
3	1.40	90	0	1111	1111
4	1.96	105	0	25	30
5	2.52	15	0	10	20
6	.				

Point No.	Cover: Unmeasurable	Quality	Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other	Aquatic Vegetation Types Present: FL	AL	SS	MC	WC	GR	TR
1		2		☒											
2		0													
3		0													
4		0													
5		0													
6															

Bank Angle & Particle Median Diameters

(Bank to tape height; if a height is >2m use check box, else enter values in proper observation points)

	> 2 m	0 mm	250 mm	750 mm	1500 mm	Amount of Undercut (mm)	No. of Veg. Squares on Bank
Left Bank	Height ☐	340	630	1090		0	0
	Substrate Diameters	0.10	0.05	0.05	0.05		
Right Bank	Height ☐	280	210	170	0	0	0
	Substrate Diameters	5	10	0.10	0.10		

Dominant Vegetation Type
(Check box of the dominant type within the 1 x 2 m area)

	None	Lawn	Crop-land	Mea-dow	Scrub-land	Forest	Wet-land
Left Bank	☐	☐	☐	☐	☐	☐	☐
Right Bank	☐	☐	☐	☐	☐	☒	☐

Table Codes

Particle Sizes
Measure all particles between 2.00mm and 1000mm

Material	Size
Unconsolidated Clay	0.01
Consolidated Clay	0.011
Silt	0.05
Sand	0.10
Large Boulders	1001
Bedrock	1111

Cover Quality:
0 = No Cover
1 = Embedded Cover
2 = Unembedded Cover

Aquatic Vegetation Types:
FL = Filamentous Algae
AL = Non-Filamentous
SS = Moss
MC = Macrophytes
WC = Watercress
GR = Grass
TR = Terrestrial Plants

Comments

Crew Leader (initial & last name): GES

Crew	Recorder	Ent/Scanned	Verified	Corrected
ND				

Channel Morphology

Mandatory Fields In Grey
Must be filled out for processing

Stream Name: TUCK CREEK

Date (mm-dd): 2020-06-26

Stream Code: TUK

Site Code: TUK05

Sample: 01

Transect No.: 03 of 12

Bearing (D): 310

Min. Width (m): 1.5

Site Length (m): 46.7

Active Channel Width (m): 1.9

No. of Transects: 12

Transect Spacing (m): 4.25

Point Spacing (m): 0.39

Points per Transect: 5

Transect & Point Layout

Use this table to determine the number of transects & points required, given the minimum stream width.

Minimum Width (m)	No. Transects at Site	Points per Transect
> 3.0	10	6
1.5 - 3.0	12	5
1.0 - 1.49	15	3
< 1.0	20	2

Calculations:

Transect Spacing = Site Length / (No. of Transects - 1)

Point Spacing = Active Channel Width / Points per Transect

1st Point = Point Spacing / 2 (from left bank)

Point No.	Location (m)	Measure depth & hydraulic head to nearest 5 mm: Depth (mm)	Hydraulic Head (mm)	Particle Sizes (mm): Point	Max. in Ring
1	0.19	30	0	150	180
2	9.57	70	0	1111	1111
3	0.95	60	0	1111	1111
4	1.33	50	0	0.10	20
5	1.71	55	0	30	280
6	.				

Point No.	Cover: Unmeasurable	Quality	Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other	Aquatic Vegetation Types Present: FL	AL	SS	MC	WC	GR	TR
1		2			✓										
2		0											✓		
3		0													
4		0												✓	
5		2		✓							✓				
6															

Bank Angle & Particle Median Diameters

(Bank to tape height; if a height is >2m use check box, else enter values in proper observation points)

	> 2 m	0 mm	250 mm	750 mm	1500 mm	Amount of Undercut (mm)	No. of Veg. Squares on Bank
Left Bank	Height ☐	410	305	210	0	60	0
	Substrate Diameters	30	0.05	0.05	0.05		
Right Bank	Height ☐	180	130	75	0	0	2
	Substrate Diameters	16	10	5	0.10		

Dominant Vegetation Type
(Check box of the dominant type within the 1 x 2 m area)

	None	Lawn	Crop-land	Meadow	Scrub-land	Forest	Wetland
Left Bank							
Right Bank							

Table Codes

Particle Sizes:
Measure all particles between 2.00mm and 1000mm

Material	Size
Unconsolidated Clay	0.01
Consolidated Clay	0.011
Silt	0.05
Sand	0.10
Large Boulders	1001
Bedrock	1111

Cover Quality:
0 = No Cover
1 = Embedded Cover
2 = Unembedded Cover

Aquatic Vegetation Types:
FL = Filamentous Algae
AL = Non-Filamentous
SS = Moss
MC = Macrophytes
WC = Watercress
GR = Grass
TR = Terrestrial Plants

Comments

BCJA

Crew Leader (initial & last name): GEST

Crew	Recorder	Ent/Scanned	Verified	Corrected
ND				

Channel Morphology

Mandatory Fields In Grey
Must be filled out for processing

Stream Name: TUCK CREEK

Date (mm-dd): 2020-06-26

Stream Code: TUK

Site Code: TUK 05

Sample: 01

Transect No.: 04 of 12

Bearing (D): 300

Min. Width (m): 1.5

Site Length (m): 46.7

Active Channel Width (m): 3.6

No. of Transects: 12

Transect Spacing (m): 4.25

Point Spacing (m): 0.72

Points per Transect: 5

Transect & Point Layout		
Use this table to determine the number of transects & points required, given the minimum stream width.		
Minimum Width (m)	No. Transects at Site	Points per Transect
> 3.0	10	6
1.5 - 3.0	12	5
1.0 - 1.49	15	3
< 1.0	20	2

Calculations:

Transect Spacing = Site Length / (No. of Transects - 1)

Point Spacing = Active Channel Width / Points per Transect

1st Point = Point Spacing / 2 (from left bank)

Point No.	Location (m)	Measure depth & hydraulic head to nearest 5 mm: Depth (mm)	Hydraulic Head (mm)	Particle Sizes (mm): Point	Max. in Ring
1	0.36	80	0	9.05	330
2	1.08	50	0	300	300
3	1.80	100	0	15	260
4	2.52	50	0	15	140
5	3.24	25	0	20	140
6	.				

Point No.	Cover: Unmeasurable	Quality	Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other	Aquatic Vegetation Types Present: FL	AL	SS	MC	WC	GR	TR
1	☐	2	☐	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
2	☐	2	☐	☐	☒	☐	☐	☐	☐	☐	☒	☐	☐	☐	☐
3	☐	2	☐	☐	☒	☐	☐	☐	☐	☐	☐	☒	☐	☐	☐
4	☐	1	☐	☒	☐	☐	☐	☐	☐	☐	☒	☐	☐	☐	☐
5	☐	1	☐	☒	☐	☐	☐	☐	☐	☐	☒	☐	☐	☐	☐
6	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Bank Angle & Particle Median Diameters
(Bank to tape height; if a height is >2m use check box, else enter values in proper observation points)

	> 2 m	0 mm	250 mm	750 mm	1500 mm	Amount of Undercut (mm)	No. of Veg. Squares on Bank
Left Bank	Height ☐	435	430	310	0	0	0
	Substrate Diameters	420	0.05	0.05	0.05		
Right Bank	Height ☐	360	250	215	0		0
	Substrate Diameters	25	10	0.05	0.05		

Dominant Vegetation Type (Check box of the dominant type within the 1 x 2 m area)

	None	Lawn	Crop-land	Meadow	Scrub-land	Forest	Wetland
Left Bank	☐	☐	☐	☐	☐	☐	☐
Right Bank	☐	☐	☐	☐	☐	☐	☐

Table Codes

Particle Sizes. *Measure all particles between 2.00mm and 1000mm*

Material	Size
Unconsolidated Clay	0.01
Consolidated Clay	0.011
Silt	0.05
Sand	0.10
Large Boulders	1001
Bedrock	1111

Cover Quality:
0 = No Cover
1 = Embedded Cover
2 = Unembedded Cover

Aquatic Vegetation Types:
FL = Filamentous Algae
AL = Non-Filamentous
SS = Moss
MC = Macrophytes
WC = Watercress
GR = Grass
TR = Terrestrial Plants

Comments: Upstream of artificial riffle

Crew Leader (initial & last name): GEB Y

Crew	Recorder	Ent/Scanned	Verified	Corrected
ND				

Channel Morphology

Mandatory Fields In Grey
Must be filled out for processing

Stream Name: TUCK CREEK

Date (mm-dd): 2020-06-26

Stream Code: TUK

Site Code: TUKOS

Sample: 01

Transect No.: 05 of 12

Bearing (D): 295

Min. Width (m): 1.5

Site Length (m): 46.7

Active Channel Width (m): 3.2

No. of Transects: 12

Transect Spacing (m): 4.25

Point Spacing (m): 0.64

Points per Transect: 5

Transect & Point Layout

Use this table to determine the number of transects & points required, given the minimum stream width.

Minimum Width (m)	No. Transects at Site	Points per Transect
> 3.0	10	6
1.5 - 3.0	12	5
1.0 - 1.49	15	3
< 1.0	20	2

Calculations:

Transect Spacing = Site Length / (No. of Transects - 1)

Point Spacing = Active Channel Width / Points per Transect

1st Point = Point Spacing / 2 (from left bank)

Point No.	Location (m)	Measure depth & hydraulic head to nearest 5 mm: Depth (mm)	Hydraulic Head (mm)	Particle Sizes (mm): Point	Max. in Ring	Cover: Unmeasurable	Quality	Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other	Aquatic Vegetation Types Present: FL	AL	SS	MC	WC	GR	TR
1	0.32	175	0	0.05	180	☐	2	☐	☒	☐	☐	☐	☐	☐	☐	☒	☐	☐	☐	☐
2	0.96	140	0	0.10	30	☐	0	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
3	1.60	70	0	5	20	☐	0	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
4	2.24	160	0	15	1111	☐	0	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
5	2.88	80	0	10	50	☐	0	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
6	.					☐		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Bank Angle & Particle Median Diameters
(Bank to tape height; if a height is >2m use check box, else enter values in proper observation points)

		> 2 m	0 mm	250 mm	750 mm	1500 mm	Amount of Undercut (mm)	No. of Veg. Squares on Bank
Left Bank	Height ☐		660	560	260	0	0	0
	Substrate Diameters		330	300	260	345		
Right Bank	Height ☐		785	735	430	0	0	0
	Substrate Diameters		20	10	0.05	0.05		

Dominant Vegetation Type
(Check box of the dominant type within the 1 x 2 m area)

	None	Lawn	Crop-land	Meadow	Scrub-land	Forest	Wet-land
Left Bank	☐	☐	☐	☒	☐	☐	☐
Right Bank	☐	☐	☐	☐	☒	☐	☐

Table Codes

Particle Sizes
Measure all particles between 2.00mm and 1000mm

Material	Size
Unconsolidated Clay	0.01
Consolidated Clay	0.011
Silt	0.05
Sand	0.10
Large Boulders	1001
Bedrock	1111

Cover Quality:
0 = No Cover
1 = Embedded Cover
2 = Unembedded Cover

Aquatic Vegetation Types:
FL = Filamentous Algae
AL = Non-Filamentous
SS = Moss
MC = Macrophytes
WC = Watercress
GR = Grass
TR = Terrestrial Plants

Comments: SCUBA + keepers.

Crew Leader (initial & last name): GEOY

Crew	Recorder	Ent/Scanned	Verified	Corrected
ND				

Channel Morphology

Mandatory Fields In Grey
Must be filled out for processing

Stream Name: TUCK CREEK

Date (mm-dd): 2020-06-26

Stream Code: TUK

Site Code: TUK05

Sample: 01

Transect No.: 06 of 12

Bearing (D): 310

Min. Width (m): 1.5

Site Length (m): 46.7

Active Channel Width (m): 3.7

No. of Transects: 12

Transect Spacing (m): 4.23

Point Spacing (m): 0.74

Points per Transect: 5

Transect & Point Layout

Use this table to determine the number of transects & points required, given the minimum stream width.

Minimum Width (m)	No. Transects at Site	Points per Transect
> 3.0	10	6
1.5 - 3.0	12	5
1.0 - 1.49	15	3
< 1.0	20	2

Calculations:

Transect Spacing = Site Length / (No. of Transects - 1)

Point Spacing = Active Channel Width / Points per Transect

1st Point = Point Spacing / 2 (from left bank)

Measure depth & hydraulic head to nearest 5 mm

Particle Sizes (mm)

Cover

Aquatic Vegetation Types Present

Point No.	Location (m)	Depth (mm)	Hydraulic Head (mm)	Particle Point	Particle Max. in Ring	Unmeasurable	Quality	Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other	FL	AL	SS	MC	WC	GR	TR
1	0.37	80	0	120	250	☐	2	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
2	1.11	30	0	70	170	☐	1	☐	☐	☒	☐	☐	☐	☐	☐	☒	☐	☐	☐	☐
3	1.85	60	0	15	290	☐	2	☐	☒	☐	☐	☐	☐	☐	☐	☒	☐	☐	☐	☐
4	2.59	105	0	20	290	☐	2	☐	☐	☒	☐	☐	☐	☐	☐	☒	☐	☐	☐	☐
5	3.23	15	0	25	190	☐	1	☐	☐	☒	☐	☐	☐	☐	☐	☒	☐	☐	☐	☐
6	.					☐		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Bank Angle & Particle Median Diameters

(Bank to tape height; if a height is >2m use check box, else enter values in proper observation points)

		> 2 m	0 mm	250 mm	750 mm	1500 mm	Amount of Undercut (mm)	No. of Veg. Squares on Bank
Left Bank	Height ☐		760	615	270	0	0	0
	Substrate Diameters		150	330	520	420		
Right Bank	Height ☐		766	640	510	0	0	2
	Substrate Diameters		120	330	0.05	280		

Dominant Vegetation Type (Check box of the dominant type within the 1 x 2 m area)

	None	Lawn	Crop-land	Mea-dow	Scrub-land	Forest	Wet-land
Left Bank	☐	☐	☐	☐	☐	☐	☐
Right Bank	☐	☐	☐	☐	☐	☐	☐

Table Codes

Particle Sizes:
Measure all particles between 2.00mm and 1000mm

Material	Size
Unconsolidated Clay	0.01
Consolidated Clay	0.011
Silt	0.05
Sand	0.10
Large Boulders	1001
Bedrock	1111

Cover Quality:
0 = No Cover
1 = Embedded Cover
2 = Unembedded Cover

Aquatic Vegetation Types:
FL = Filamentous Algae
AL = Non-Filamentous
SS = Moss
MC = Macrophytes
WC = Watercress
GR = Grass
TR = Terrestrial Plants

Comments

Crew Leader (initial & last name): GE

Crew	Recorder	Ent/Scanned	Verified	Corrected
AD				

Channel Morphology

Mandatory Fields In Grey
Must be filled out for processing

Stream Name: TUCK CREEK

Date (mm-dd): 2020-06-26

Stream Code: TUK

Site Code: TUK05

Sample: 01

Transect No.: 07 of 12

Bearing (D): 305

Min. Width (m):

Site Length (m):

Active Channel Width (m): 4.1

No. of Transects:

Transect Spacing (m):

Point Spacing (m): 0.82

Points per Transect: 5

Transect & Point Layout		
Use this table to determine the number of transects & points required, given the minimum stream width.		
Minimum Width (m)	No. Transects at Site	Points per Transect
> 3.0	10	6
1.5 - 3.0	12	5
1.0 - 1.49	15	3
< 1.0	20	2

Calculations:

Transect Spacing = Site Length / (No. of Transects - 1)

Point Spacing = Active Channel Width / Points per Transect

1st Point = Point Spacing / 2 (from left bank)

Point No.	Location (m)	Measure depth & hydraulic head to nearest 5 mm: Depth (mm)	Hydraulic Head (mm)	Particle Sizes (mm): Point	Max. in Ring
1	0.11	75	0	2.05	230
2	1.23	60	0	0.10	20
3	2.05	120	0	20	45
4	2.87	245	0	30	50
5	3.69	155	0	25	210
6	.				

Point No.	Cover: Unmeasurable	Quality	Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other	Aquatic Vegetation Types Present: FL	AL	SS	MC	WC	GR	TR
1		2		X											
2		0													
3		0													
4		0													
5		2		X							X				
6															

Bank Angle & Particle Median Diameters
(Bank to tape height; if a height is >2m use check box, else enter values in proper observation points)

	> 2 m	0 mm	250 mm	750 mm	1500 mm	Amount of Undercut (mm)	No. of Veg. Squares on Bank
Left Bank Height		710	490	190	0	0	2
Left Bank Substrate Diameters		0.05	0.05	0.05	0.05		
Right Bank Height		665	605	130	0	0	5
Right Bank Substrate Diameters		270	210	0.05	0.05		

Dominant Vegetation Type (Check box of the dominant type within the 1 x 2 m area)

	None	Lawn	Crop-land	Meadow	Scrub-land	Forest	Wet-land
Left Bank						X	
Right Bank				X			

Table Codes: Particle Sizes: *Measure all particles between 2.00mm and 1000mm*	
Material	Size
Unconsolidated Clay	0.01
Consolidated Clay	0.011
Silt	0.05
Sand	0.10
Large Boulders	1001
Bedrock	1111

Cover Quality:
0 = No Cover
1 = Embedded Cover
2 = Unembedded Cover

Aquatic Vegetation Types:
FL = Filamentous Algae
AL = Non-Filamentous
SS = Moss
MC = Macrophytes
WC = Watercress
GR = Grass
TR = Terrestrial Plants

Comments:

Crew Leader (initial & last name): GEB4

Crew	Recorder	Ent/Scanned	Verified	Corrected
ND				

Channel Morphology

Stream Name: TUCK CREEK

Mandatory Fields In Grey
Must be filled out for processing

Date (mm-dd): 2020-06-26

Stream Code: TUK

Site Code: TUK05

Sample: 01 Transect No.: 03 of 12 Bearing (D): 305

Min. Width (m): 1.5 Site Length (m): 46.6 Active Channel Width (m): 4.3

No. of Transects: 12 Transect Spacing (m): 4.25 Point Spacing (m): 0.36

Points per Transect: 5

Transect & Point Layout

Use this table to determine the number of transects & points required, given the minimum stream width.

Minimum Width (m)	No.Transects at Site	Points per Transect
> 3.0	10	6
1.5 - 3.0	12	5
1.0 - 1.49	15	3
< 1.0	20	2

Calculations:

Transect Spacing = Site Length / (No. of Transects - 1)

Point Spacing = Active Channel Width / Points per Transect

1st Point = Point Spacing / 2 (from left bank)

Point No.	Location (m)	Depth (mm)	Hydraulic Head (mm)	Particle Size: Point	Particle Size: Max. in Ring
1	0.43	90	0	0.05	160
2	1.29	130	0	2.10	50
3	2.15	205	0	10	25
4	3.01	230	0	1111	300
5	3.87	120	0	153	150
6	.				

Measure depth & hydraulic head to nearest 5 mm

Particle Sizes (mm)

Cover

Point No.	Unmeasurable	Quality	Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other
1		2			X			
2		0						
3		0						
4		2		X				
5		2		X				
6								

Aquatic Vegetation Types Present

Point No.	FL	AL	SS	MC	WC	GR	TR
1							
2							
3							
4			X				
5			X				
6							

Bank Angle & Particle Median Diameters

(Bank to tape height; if a height is >2m use check box, else enter values in proper observation points)

	Height	> 2 m	0 mm	250 mm	750 mm	1500 mm	Amount of Undercut (mm)	No. of Veg. Squares on Bank
Left Bank			630	440	145	0	0	4
	Substrate Diameters		0.05	0.05	0.05	0.05		
Right Bank			665	330	95	0	0	2
	Substrate Diameters		300	0.05	0.05	0.05		

Dominant Vegetation Type

(Check box of the dominant type within the 1 x 2 m area)

	None	Lawn	Crop-land	Mea-dow	Scrub-land	Forest	Wet-land
Left Bank						X	
Right Bank				X			

Table Codes

Particle Sizes:
Measure all particles between 2.00mm and 1000mm

Material	Size
Unconsolidated Clay	0.01
Consolidated Clay	0.011
Silt	0.05
Sand	0.10
Large Boulders	1001
Bedrock	1111

Cover Quality
0 = No Cover
1 = Embedded Cover
2 = Unembedded Cover

Aquatic Vegetation Types
FL = Filamentous Algae
AL = Non-Filamentous
SS = Moss
MC = Macrophytes
WC = Watercress
GR = Grass
TR = Terrestrial Plants

Comments:

Crew Leader (initial & last name): GES

Crew	Recorder	Ent/Scanned	Verified	Corrected
ND				

Channel Morphology

Mandatory Fields In Grey
Must be filled out for processing

Stream Name: TUCK CREEK

Date (mm-dd): 2020-06-26

Stream Code: TUK

Site Code: TUKOS

Sample: 01 Transect No.: 09 of 12 Bearing (D): 305

Min. Width (m): 1.5 Site Length (m): 46.7 Active Channel Width (m): 3.2

No. of Transects: 12 Transect Spacing (m): 4.25 Point Spacing (m): 0.64

Points per Transect: 5

Transect & Point Layout

Use this table to determine the number of transects & points required, given the minimum stream width.

Minimum Width (m)	No.Transects at Site	Points per Transect
> 3.0	10	6
1.5 - 3.0	12	5
1.0 - 1.49	15	3
< 1.0	20	2

Calculations:

Transect Spacing = Site Length / (No. of Transects - 1)

Point Spacing = Active Channel Width / Points per Transect

1st Point = Point Spacing / 2 (from left bank)

Point No.	Location (m)	Measure depth & hydraulic head to nearest 5 mm: Depth (mm)	Hydraulic Head (mm)	Particle Sizes (mm): Point	Max. in Ring	Cover: Unmeasurable	Quality	Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other	Aquatic Vegetation Types Present: FL	AL	SS	MC	WC	GR	TR
1	0.32	50	0	0.10	95	☐	0	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
2	0.96	225	0	15	45	☐	0	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
3	1.60	370	0	25	1111	☐	0	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
4	2.24	305	0	0.10	370	☐	2	☐	☒	☐	☐	☐	☐	☐	☐	☒	☐	☐	☐	☐
5	2.88	170	0	0.10	370	☐	2	☐	☐	☒	☐	☐	☐	☐	☐	☒	☐	☐	☐	☐
6	.					☐		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Bank Angle & Particle Median Diameters

(Bank to tape height; if a height is >2m use check box, else enter values in proper observation points)

	> 2 m	0 mm	250 mm	750 mm	1500 mm	Amount of Undercut (mm)	No. of Veg. Squares on Bank
Left Bank	Height ☐	645	635	630	0	0	0
	Substrate Diameters	0.10	0.10	0.10	0.05		
Right Bank	Height ☐	980	780	355	0	0	0
	Substrate Diameters	310	260	310	420		

Dominant Vegetation Type (Check box of the dominant type within the 1 x 2 m area)

	None	Lawn	Crop-land	Mea-dow	Scrub-land	Forest	Wet-land
Left Bank	☐	☐	☐	☐	☒	☐	☐
Right Bank	☒	☐	☐	☐	☐	☐	☐

Table Codes

Particle Sizes: *Measure all particles between 2.00mm and 1000mm*

Material	Size
Unconsolidated Clay	0.01
Consolidated Clay	0.011
Silt	0.05
Sand	0.10
Large Boulders	1001
Bedrock	1111

Cover Quality:
0 = No Cover
1 = Embedded Cover
2 = Unembedded Cover

Aquatic Vegetation Types:
FL = Filamentous Algae
AL = Non-Filamentous
SS = Moss
MC = Macrophytes
WC = Watercress
GR = Grass
TR = Terrestrial Plants

Comments

Crew Leader (initial & last name): GEST

Crew	Recorder	Ent/Scanned	Verified	Corrected
MD				

Channel Morphology

Mandatory Fields In Grey
Must be filled out for processing

Stream Name: TUCK CREEK

Date (mm-dd): 2020-06-26

Stream Code: TUK

Site Code: TUK05

Sample: 01 Transect No.: 10 of 12 Bearing (D): 305

Min. Width (m): 1.5 Site Length (m): 46.7 Active Channel Width (m): 3.1

No. of Transects: 12 Transect Spacing (m): 4.25 Point Spacing (m): 0.62

Points per Transect: 5

Transect & Point Layout

Use this table to determine the number of transects & points required, given the minimum stream width.

Minimum Width (m)	No.Transects at Site	Points per Transect
> 3.0	10	6
1.5 - 3.0	12	5
1.0 - 1.49	15	3
< 1.0	20	2

Calculations:

Transect Spacing = Site Length / (No. of Transects - 1)

Point Spacing = Active Channel Width / Points per Transect

1st Point = Point Spacing / 2 (from left bank)

Point No.	Location (m)	Measure depth & hydraulic head to nearest 5 mm: Depth (mm)	Hydraulic Head (mm)	Particle Sizes (mm): Point	Max. in Ring
1	0.31	75	0	10	200
2	0.93	190	0	35	100
3	1.55	390	0	285	285
4	2.17	310	0	0.10	250
5	2.79	40	0	230	280
6	.				

Point No.	Cover: Unmeasurable	Quality	Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other	Aquatic Vegetation Types Present: FL	AL	SS	MC	WC	GR	TR
1		0													
2		0													
3		2			X										
4		2			X										
5		2			X										
6															

Bank Angle & Particle Median Diameters

(Bank to tape height; if a height is >2m use check box, else enter values in proper observation points)

	> 2 m	0 mm	250 mm	750 mm	1500 mm	Amount of Undercut (mm)	No. of Veg. Squares on Bank
Left Bank Height		595	510	340	0	0	0
Left Bank Substrate Diameters		0.10	0.10	0.05	0.05		
Right Bank Height		990	630	510	0	0	0
Right Bank Substrate Diameters		370	165	130	205		

Dominant Vegetation Type
(Check box of the dominant type within the 1 x 2 m area)

	None	Lawn	Crop-land	Mea-dow	Scrub-land	Forest	Wet-land
Left Bank	X						
Right Bank	X						

Table Codes

Particle Sizes
Measure all particles between 2.00mm and 1000mm

Material	Size
Unconsolidated Clay	0.01
Consolidated Clay	0.011
Silt	0.05
Sand	0.10
Large Boulders	1001
Bedrock	1111

Cover Quality
0 = No Cover
1 = Embedded Cover
2 = Unembedded Cover

Aquatic Vegetation Types
FL = Filamentous Algae
AL = Non-Filamentous
SS = Moss
MC = Macrophytes
WC = Watercress
GR = Grass
TR = Terrestrial Plants

Comments

Crew Leader (initial & last name): GEGT

Crew	Recorder	Ent/Scanned	Verified	Corrected
ND				

Channel Morphology

Mandatory Fields In Grey
Must be filled out for processing

Stream Name: TUK CREEK

Date (mm-dd): 2020-06-26

Stream Code: TUK

Site Code: TUK05

Sample: 01

Transect No.: 11 of 12

Bearing (D): 300

Min. Width (m): 1.5

Site Length (m): 46.7

Active Channel Width (m): 2.3

No. of Transects: 12

Transect Spacing (m): 4.25

Point Spacing (m): 0.56

Points per Transect: 5

Transect & Point Layout

Use this table to determine the number of transects & points required, given the minimum stream width.

Minimum Width (m)	No.Transects at Site	Points per Transect
> 3.0	10	6
1.5 - 3.0	12	5
1.0 - 1.49	15	3
< 1.0	20	2

Calculations:

Transect Spacing = Site Length / (No. of Transects - 1)

Point Spacing = Active Channel Width / Points per Transect

1st Point = Point Spacing / 2 (from left bank)

Measure depth & hydraulic head to nearest 5 mm

Particle Sizes (mm)

Cover

Aquatic Vegetation Types Present

Point No.	Location (m)	Depth (mm)	Hydraulic Head (mm)	Particle Size: Point	Particle Size: Max. in Ring	Cover: Unmeasurable	Cover: Quality	Cover: Wood	Cover: Round Rock	Cover: Flat Rock	Cover: Macrophyte	Cover: Bank	Cover: Other	FL	AL	SS	MC	WC	GR	TR
1	0.23	100	-0	20	260		1		X							X				
2	0.34	120	00	40	275		1			X						X				
3	1.40	170	00	45	100		2			X										
4	1.96	210	00	0.10	230		2			X						X				
5	2.52	235	00	0.10	330		2		X							X	X			
6	.																			

Bank Angle & Particle Median Diameters

(Bank to tape height; if a height is >2m use check box, else enter values in proper observation points)

	> 2 m	0 mm	250 mm	750 mm	1500 mm	Amount of Undercut (mm)	No. of Veg. Squares on Bank
Left Bank	Height ☐	785	676	150	7	0	2
	Substrate Diameters	20	0.05	10	0.05		
Right Bank	Height ☐	670	330	140	0	0	0
	Substrate Diameters	185	325	145	205		

Dominant Vegetation Type (Check box of the dominant type within the 1 x 2 m area)

	None	Lawn	Crop-land	Meadow	Scrub-land	Forest	Wetland
Left Bank	☐	☐	☐	☐	☐	☒	☐
Right Bank	☒	☐	☐	☐	☐	☐	☐

Table Codes

Particle Sizes:
Measure all particles between 2.00mm and 1000mm

Material	Size
Unconsolidated Clay	0.01
Consolidated Clay	0.011
Silt	0.05
Sand	0.10
Large Boulders	1001
Bedrock	1111

Cover Quality:
0 = No Cover
1 = Embedded Cover
2 = Unembedded Cover

Aquatic Vegetation Types:
FL = Filamentous Algae
AL = Non-Filamentous
SS = Moss
MC = Macrophytes
WC = Watercress
GR = Grass
TR = Terrestrial Plants

Comments

Crew Leader (initial & last name): GT

Crew	Recorder	Ent/Scanned	Verified	Corrected
ND				

Channel Morphology

Mandatory Fields In Grey
Must be filled out for processing

Stream Name: TUCK CREEK

Date (mm-dd): 2020-06-26

Stream Code: TUK

Site Code: TUK05

Sample: 01

Transect No.: 12 of 12

Bearing (D): 230

Min. Width (m): 1.5

Site Length (m): 46.7

Active Channel Width (m): 3.9

No. of Transects: 12

Transect Spacing (m): 4.25

Point Spacing (m): 0.78

Points per Transect: 5

Transect & Point Layout		
Use this table to determine the number of transects & points required, given the minimum stream width.		
Minimum Width (m)	No.Transects at Site	Points per Transect
> 3.0	10	6
1.5 - 3.0	12	5
1.0 - 1.49	15	3
< 1.0	20	2

Calculations:

Transect Spacing = Site Length / (No. of Transects - 1)

Point Spacing = Active Channel Width / Points per Transect

1st Point = Point Spacing / 2 (from left bank)

Point No.	Location (m)	Measure depth & hydraulic head to nearest 5 mm: Depth (mm)	Hydraulic Head (mm)	Particle Sizes (mm): Point	Max. in Ring
1	0.39	90	0	65	230
2	1.17	110	0	30	260
3	1.95	60	0	220	215
4	2.73	100	5	340	340
5	3.51	130	0	260	260
6	.				

Cover: Unmeasurable	Quality	Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other	Aquatic Vegetation Types Present: FL	AL	SS	MC	WC	GR	TR
☐	2	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
☐	2	☐	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
☐	2	☐	☐	☒	☐	☐	☐	☐	☐	☒	☐	☐	☐	☐
☐	2	☐	☒	☐	☐	☐	☐	☐	☐	☒	☐	☐	☐	☐
☐	2	☐	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
☐		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Bank Angle & Particle Median Diameters
(Bank to tape height; if a height is >2m use check box, else enter values in proper observation points)

		> 2 m	0 mm	250 mm	750 mm	1500 mm	Amount of Undercut (mm)	No. of Veg. Squares on Bank
Left Bank	Height	☐	835	650	355	0	0	6
	Substrate Diameters		15	90	0.05	0.05		
Right Bank	Height	☐	765	475	280	0	0	0
	Substrate Diameters		200	270	350	0.05		

Dominant Vegetation Type (Check box of the dominant type within the 1 x 2 m area)

	None	Lawn	Crop-land	Meadow	Scrub-land	Forest	Wet-land
Left Bank	☒	☐	☐	☐	☐	☐	☐
Right Bank	☒	☐	☐	☐	☐	☐	☐

Table Codes

Particle Sizes: *Measure all particles between 2.00mm and 1000mm*

Material	Size
Unconsolidated Clay	0.01
Consolidated Clay	0.011
Silt	0.05
Sand	0.10
Large Boulders	1001
Bedrock	1111

Cover Quality:
0 = No Cover
1 = Embedded Cover
2 = Unembedded Cover

Aquatic Vegetation Types:
FL = Filamentous Algae
AL = Non-Filamentous
SS = Moss
MC = Macrophytes
WC = Watercress
GR = Grass
TR = Terrestrial Plants

Comments: On an artificial riffle

Crew Leader (initial & last name): GEBT

Crew	Recorder	Ent/Scanned	Verified	Corrected
ND				

Site Identification

Stream Code	Site Code	Sample	Date (yyyy-mm-dd)
TUK	TUK06	01	2020-06-26

Stream Name: Tuck Creek

Alternate Site Code: 006.

Site Length (m): 41.6

*** Record using NAD83 datum

	Zone	Easting	Northing
Uncorr. UTM	17	595373.5	4803480.1
Corr. UTM	17		

OR Lat. / Long. — DD MM SS.sss

Source of Uncorrected UTM Coordinates: GPS/DGPS ☐ GIS ☑ OBM ☐ Other

Source of Corrected UTM Coordinates: FWIS ☐ Ortho-photos ☐ GIS ☐ Other

Name of Layer Used for Correction

Access Route

NORTH ON WALKERS LINE, WEST ON UPPER MIDDLE RD, NORTH ON DEER RUN AVE, NORTH ON HUNT CRES, PARK @ CORNER W PARK

30
11

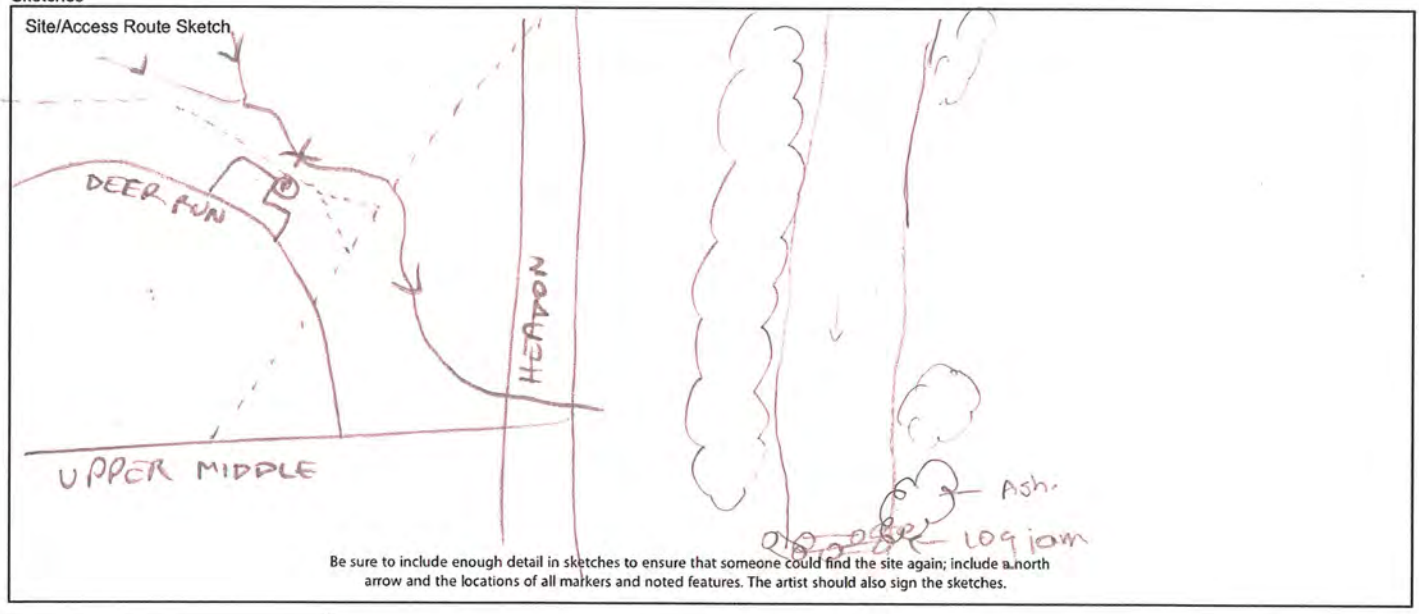
Site Description

WALK NORTH THROUGH PARK TO CREEK, D/S END ~120 M U/S OF PED BRIDGE

☐ Site Was Unsampleable - add reason(s) on reverse

Sketches

Site/Access Route Sketch



Be sure to include enough detail in sketches to ensure that someone could find the site again; include a north arrow and the locations of all markers and noted features. The artist should also sign the sketches.

Comments

Creek chub, longnose dace., noted a stretch of terrafix upstream of reach.

Crew Leader (init. & last name)	Crew	Recorder	Entered	Verified	Corrected

Site Marker Details

UPSTREAM SITE MARKER
(measure from stake to site)

Bearing (D): [ ][ ][ ]
Distance (m): [ ][ ]2.5

Description: Willow Tree Right bank - pink polka dot

DOWNSTREAM SITE MARKER
(measure from stake to site)

Bearing (D): [ ][ ][ ]
Distance (m): [ ][ ]0.0

Description: large Ash in creek on left bank - pink polkadot flag

ADDITIONAL SITE MARKER
(measure from stake to site)

Bearing (D): [ ][ ][ ]
Distance (m): [ ][ ][ ].[ ]

Description:

Photos

	Photo No.	Photo Name	Photo Description
Upstream – Upstream			
Upstream – Downstream			
Downstream – Upstream			
Downstream – Downstream			
Other Features			
Other Features			

Site is Unsampleable Reason(s)

- ☐ Stream dry
- ☐ Insufficient water to sample effectively
- ☐ Stream is no longer present at location (tiled or relocated, etc)
- ☐ Naturally unwadeable (i.e. > 1.5 m deep)
- ☐ Unwadeable due to ponding from a permanent barrier
- ☐ Unwadeable due to ponding from temporary barrier (eg. beaver dam)
- ☐ Landowner could not be contacted
- ☐ Landowner refused access
- ☐ Inaccessible for safety reasons (add details in comments below)
- ☐ Stream is wadeable but not appropriate for the intended sampling

What is the permanent barrier?

What is the temporary barrier?

Modules to have been used (e.g. S2.M1, S3.M1):

Comments

Site Features

Mandatory Fields In Grey
Must be filled out for processing

Stream Code: TUK

Site Code: TUK06

Sample: 01

Date (mm-dd): 2010 010-26

Stream Name: Tuck Creek

For each landuse, check box that applies. Be sure to include comments explaining the particulars, including names and numbers of contacts

Site Features	Ongoing & Active	Historical Evidence	No Evidence but Reported	No Evidence	Unknown	Comments
Potential Point or Non-point Source Contaminant Sources	☒	☐	☐	☐	☐	Parkland, residential, agricultural (40)
Major Nutrient Sources Upstream	☒	☐	☐	☐	☐	"
Channel Hardening or Straightening	☒	☐	☐	☐	☐	Upstream trail x, DIS straighter at (but naturalizing)
Adjacent Landuses that Destabilize Banks	☒	☐	☐	☐	☐	Parkland.
Sediment Loading or Deprivation	☒	☐	☐	☐	☐	Salt substrates
Instream Habitat Modifications	☒	☐	☐	☐	☐	Straighten 2
Barriers and/or Dams in the Vicinity of the Site	☐	☐	☐	☐	☐	Log jams.
High Fishing Pressure	☐	☐	☐	☒	☐	
Log Jam Deflectors	☒	☐	☐	☐	☐	Lack of log jams
Springs or Seeps at the Site	☐	☐	☐	☒	☐	
Impervious Substrate Limiting Burrowing Depth of Fish	☒	☐	☐	☐	☐	Upstream culvert
Fish Stocked Near Sample Site	☐	☐	☐	☒	☐	
Other Activities that Could Influence Biota or Habitat	☐	☐	☐	☒	☐	
Intensive Logging Activitties within the Riparian Zone	☐	☐	☐	☒	☐	

Sources of Information
Visual Immediate ☐ Visual Extended ☐ Interview ☐ Maps & Photos ☐

Temperatures
Time (24hr): : Air Temp (°C):
Water Temp (°C): Max Air Temp (°C):
Max. Water Temp (°C): Source of Max. Air Temp:

Riparian Vegetation Community
Only check one box for each bank and zone.

Riparian Zone	Left Bank: None	Lawn	Crop-land	Mea-dow	Scrub-land	Forest	Wet-lands	Right Bank: None	Lawn	Crop-land	Mea-dow	Scrub-land	Forest	Wet-lands
1.5-10m	☐	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	☒	☐	☐
10-30m	☐	☒	☐	☐	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐
30-100m	☐	☒	☐	☐	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐

Comments:

Crew Leader (initial & last name): BRi

Crew Initials	Recorder	Ent/Scanned	Verified	Corrected
ND				

Channel Morphology

Mandatory Fields In Grey
Must be filled out for processing

Stream Name: TUCK CREEK

Date (mm-dd): 2020-06-26

Stream Code: TUK

Site Code: TUK06

Sample: 01 | Transect No.: 01 of 12 | Bearing (D):

Min. Width (m): 1.5 | Site Length (m): 41.0 | Active Channel Width (m): 2.1

No. of Transects: 12 | Transect Spacing (m): 3.73 | Point Spacing (m): 0.42

Points per Transect: 5

Transect & Point Layout

Use this table to determine the number of transects & points required, given the minimum stream width.

Minimum Width (m)	No. Transects at Site	Points per Transect
> 3.0	10	6
1.5 - 3.0	12	5
1.0 - 1.49	15	3
< 1.0	20	2

Calculations:

Transect Spacing = Site Length / (No. of Transects - 1)

Point Spacing = Active Channel Width / Points per Transect

1st Point = Point Spacing / 2 (from left bank)

Measure depth & hydraulic head to nearest 5 mm

Point No.	Location (m)	Depth (mm)	Hydraulic Head (mm)	Particle Sizes (mm): Point	Particle Sizes (mm): Max. in Ring
1	0.21	85	0	0.10	10
2	0.63	225	0	0.10	5
3	1.05	300	0	0.10	25
4	1.47	390	0	0.10	30
5	1.89	805	0	0.05	0.01
6	.				

Cover

Point No.	Unmeasurable	Quality	Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other
1	☐	2	☐	☐	☐	☒	☐	☐
2	☐	0	☐	☐	☐	☐	☐	☐
3	☐	0	☐	☐	☐	☐	☐	☐
4	☐	0	☐	☐	☐	☐	☐	☐
5	☐	2	☒	☐	☐	☐	☐	☐
6	☐		☐	☐	☐	☐	☐	☐

Aquatic Vegetation Types Present

Point No.	FL	AL	SS	MC	WC	GR	TR
1	☐	☐	☐	☒	☐	☐	☐
2	☐	☐	☐	☐	☐	☐	☐
3	☐	☐	☐	☐	☐	☐	☐
4	☐	☐	☐	☐	☐	☐	☐
5	☐	☐	☐	☐	☐	☐	☐
6	☐	☐	☐	☐	☐	☐	☐

Bank Angle & Particle Median Diameters

(Bank to tape height; if a height is >2m use check box, else enter values in proper observation points)

	Height	> 2 m	0 mm	250 mm	750 mm	1500 mm	Amount of Undercut (mm)	No. of Veg. Squares on Bank
Left Bank	☐	300	0.05	170	10	0	0	4
Right Bank	☐	510	0.05	105	75	0	0	0

Dominant Vegetation Type (Check box of the dominant type within the 1 x 2 m area)

	None	Lawn	Crop-land	Meadow	Scrub-land	Forest	Wet-land
Left Bank	☒	☐	☐	☐	☐	☐	☐
Right Bank	☒	☐	☐	☐	☐	☐	☐

Table Codes

Particle Sizes: *Measure all particles between 2.00mm and 1000mm*

Material	Size
Unconsolidated Clay	0.01
Consolidated Clay	0.011
Silt	0.05
Sand	0.10
Large Boulders	1001
Bedrock	1111

Cover Quality:
0 = No Cover
1 = Embedded Cover
2 = Unembedded Cover

Aquatic Vegetation Types:
FL = Filamentous Algae
AL = Non-Filamentous
SS = Moss
MC = Macrophytes
WC = Watercress
GR = Grass
TR = Terrestrial Plants

Comments:

Crew Leader (initial & last name): G CS3 T

Crew	Recorder	Ent/Scanned	Verified	Corrected
ND				

Channel Morphology

Mandatory Fields In Grey
Must be filled out for processing

Stream Name: TUC. CREEK

Date (mm-dd): 2020-08-26

Stream Code: TUK

Site Code: TUK06

Sample: 01

Transect No.: 02 of 12

Bearing (D): straight

Min. Width (m): 1.5

Site Length (m): 41.0

Active Channel Width (m): 2.1

No. of Transects: 12

Transect Spacing (m): 3.73

Point Spacing (m): 0.42

Points per Transect: 5

Transect & Point Layout		
Use this table to determine the number of transects & points required, given the minimum stream width.		
Minimum Width (m)	No.Transects at Site	Points per Transect
> 3.0	10	6
1.5 - 3.0	12	5
1.0 - 1.49	15	3
< 1.0	20	2

Calculations:

Transect Spacing = Site Length / (No. of Transects - 1)

Point Spacing = Active Channel Width / Points per Transect

1st Point = Point Spacing / 2 (from left bank)

Point No.	Location (m)	Depth (mm)	Hydraulic Head (mm)	Particle Size Point (mm)	Particle Size Max. in Ring (mm)
1	0.21	200	0	0.25	0.10
2	0.63	300	0	0.25	0.10
3	1.05	410	0	0.10	5
4	1.47	410	0	0.10	25
5	1.87	350	0	0.10	140
6					

Measure depth & hydraulic head to nearest 5 mm

Point No.	Unmeasurable	Quality	Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other	FL	AL	SS	MC	WC	GR	TR
1		2				X						X			
2		0													
3		0													
4		0													
5		2			X						X				
6															

Cover

Aquatic Vegetation Types Present

Bank Angle & Particle Median Diameters
(Bank to tape height; if a height is >2m use check box, else enter values in proper observation points)

	> 2 m	0 mm	250 mm	750 mm	1500 mm	Amount of Undercut (mm)	No. of Veg. Squares on Bank
Left Bank	Height ☐	615	430	120	0	0	0
	Substrate Diameters	0.05	0.05	0.05	0.05		
Right Bank	Height ☐	385	0	110	120	0	0
	Substrate Diameters	0.05	WOOD	0.05	0.05		

Dominant Vegetation Type
(Check box of the dominant type within the 1 x 2 m area)

	None	Lawn	Crop-land	Mea-dow	Scrub-land	Forest	Wet-land
Left Bank	☐	☐	☐	☐	☐	X	☐
Right Bank	☐	☐	☐	☐	☐	X	☐

Table Codes

Particle Sizes
Measure all particles between 2.00mm and 1000mm

Material	Size
Unconsolidated Clay	0.01
Consolidated Clay	0.011
Silt	0.05
Sand	0.10
Large Boulders	1001
Bedrock	1111

Cover Quality
0 = No Cover
1 = Embedded Cover
2 = Unembedded Cover

Aquatic Vegetation Types
FL = Filamentous Algae
AL = Non-Filamentous
SS = Moss
MC = Macrophytes
WC = Watercress
GR = Grass
TR = Terrestrial Plants

Comments: Plant identified as a pyrola root

Crew Leader (initial & last name): GEOY

Crew	Recorder	Ent/Scanned	Verified	Corrected
ND				

Channel Morphology

Stream Name: TURNER

Mandatory Fields In Grey
Must be filled out for processing

Date (mm-dd): 2020-06-26

Stream Code: TUK

Site Code: TUK06

Sample: 01

Transect No.: 03 of 12

Bearing (D):

Min. Width (m): 1.5

Site Length (m): 41.0

Active Channel Width (m): 2.3

No. of Transects: 12

Transect Spacing (m): 3.73

Point Spacing (m): 0.46

Points per Transect: 5

Transect & Point Layout

Use this table to determine the number of transects & points required, given the minimum stream width.

Minimum Width (m)	No.Transects at Site	Points per Transect
> 3.0	10	6
1.5 - 3.0	12	5
1.0 - 1.49	15	3
< 1.0	20	2

Calculations:

Transect Spacing = Site Length / (No. of Transects - 1)

Point Spacing = Active Channel Width / Points per Transect

1st Point = Point Spacing / 2 (from left bank)

Point No.	Location (m)	Depth (mm)	Hydraulic Head (mm)	Particle Sizes (mm) Point	Particle Sizes (mm) Max. in Ring	Cover: Unmeasurable	Cover: Quality	Cover: Wood	Cover: Round Rock	Cover: Flat Rock	Cover: Macrophyte	Cover: Bank	Cover: Other	Aquatic Vegetation Types Present: FL	AL	SS	MC	WC	GR	TR
1	0.23	200	6	0.05	250		2		X							X	X			
2	0.69	420	0	0.10	250		2		X							X				
3	1.15	370	0	0.10	15		3													
4	1.61	380	0	0.10	10		0													
5	2.07	340	0	0.25	0.10		0										X			
6																				

Measure depth & hydraulic head to nearest 5 mm

Bank Angle & Particle Median Diameters
(Bank to tape height; if a height is >2m use check box, else enter values in proper observation points)

	> 2 m	0 mm	250 mm	750 mm	1500 mm	Amount of Undercut (mm)	No. of Veg. Squares on Bank
Left Bank	Height ☐	450	330	120	0	0	2
	Substrate Diameters	0.05	0.05	0.05	0.05		
Right Bank	Height ☐	250	130	70	0	0	3
	Substrate Diameters	0.05	0.05	0.05	0.05		

Dominant Vegetation Type
(Check box of the dominant type within the 1 x 2 m area)

	None	Lawn	Crop-land	Mea-dow	Scrub-land	Forest	Wet-land
Left Bank	☐	☐	☐	☐	X	☐	☐
Right Bank	☐	☐	☐	X	☐	☐	☐

Table Codes

Particle Sizes:
Measure all particles between 2.00mm and 1000mm

Material	Size
Unconsolidated Clay	0.01
Consolidated Clay	0.011
Silt	0.05
Sand	0.10
Large Boulders	1001
Bedrock	1111

Cover Quality:
0 = No Cover
1 = Embedded Cover
2 = Unembedded Cover

Aquatic Vegetation Types:
FL = Filamentous Algae
AL = Non-Filamentous
SS = Moss
MC = Macrophytes
WC = Watercress
GR = Grass
TR = Terrestrial Plants

Comments

Crew Leader (initial & last name): CBT

Crew	Recorder	Ent/Scanned	Verified	Corrected
ND				

Channel Morphology

Mandatory Fields In Grey
Must be filled out for processing

Stream Name: TUCK CREEK

Date (mm-dd): 2022-06-26

Stream Code: TUK

Site Code: TUK06

Sample: 01

Transect No.: 04 of

Bearing (D):

Min. Width (m): 1.5

Site Length (m): 91.0

Active Channel Width (m): 2.6

No. of Transects: 12

Transect Spacing (m): 3.73

Point Spacing (m): 0.52

Points per Transect: 5

Transect & Point Layout		
Use this table to determine the number of transects & points required, given the minimum stream width.		
Minimum Width (m)	No.Transects at Site	Points per Transect
> 3.0	10	6
1.5 - 3.0	12	5
1.0 - 1.49	15	3
< 1.0	20	2

Calculations:

Transect Spacing = Site Length / (No. of Transects - 1)

Point Spacing = Active Channel Width / Points per Transect

1st Point = Point Spacing / 2 (from left bank)

Point No.	Location (m)	Measure depth & hydraulic head to nearest 5 mm: Depth (mm)	Hydraulic Head (mm)	Particle Sizes (mm): Point	Max. in Ring	Cover: Unmeasurable	Quality	Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other	Aquatic Vegetation Types Present: FL	AL	SS	MC	WC	GR	TR
1	0.26	190	0	0.25	130	☐	2	☐	☒	☐	☒	☐	☐	☐	☐	☐	☒	☐	☐	☐
2	6.73	210	0	170	170	☐	2	☐	☒	☐	☒	☐	☐	☐	☐	☒	☐	☐	☐	☐
3	1.39	370	0	10	20	☐	0	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
4	1.82	390	0	0.10	5	☐	0	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
5	2.34	290	0	0.05	0.10	☐	2	☒	☐	☐	☐	☐	☐	☐	☐	☐	☒	☐	☐	☐
6	.					☐		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Bank Angle & Particle Median Diameters
(Bank to tape height; if a height is >2m use check box, else enter values in proper observation points)

	> 2 m	0 mm	250 mm	750 mm	1500 mm	Amount of Undercut (mm)	No. of Veg. Squares on Bank
Left Bank	Height ☐	600	290	200	0	0	
	Substrate Diameters	0.05	0.05	0.05	0.05		
Right Bank	Height ☐	610	270	120	0	0	7
	Substrate Diameters	0.05	0.05	0.05	0.05		

Dominant Vegetation Type (Check box of the dominant type within the 1 x 2 m area)

	None	Lawn	Crop-land	Mea-dow	Scrub-land	Forest	Wet-land
Left Bank	☐	☐	☐	☐	☒	☐	☐
Right Bank	☐	☐	☐	☐	☐	☒	☐

Table Codes

Particle Sizes:
Measure all particles between 2.00mm and 1000mm

Material	Size
Unconsolidated Clay	0.01
Consolidated Clay	0.011
Silt	0.05
Sand	0.10
Large Boulders	1001
Bedrock	1111

Cover Quality:
0 = No Cover
1 = Embedded Cover
2 = Unembedded Cover

Aquatic Vegetation Types:
FL = Filamentous Algae
AL = Non-Filamentous
SS = Moss
MC = Macrophytes
WC = Watercress
GR = Grass
TR = Terrestrial Plants

Comments

Crew Leader (initial & last name): CERT

Crew	Recorder	Ent/Scanned	Verified	Corrected
ND				

Channel Morphology

Mandatory Fields In Grey
Must be filled out for processing

Stream Name: TUCK CREEK

Date (mm-dd): 2020-06-26

Stream Code: TUK

Site Code: TUK06

Sample: 01

Transect No.: 05 of 12

Bearing (D):

Min. Width (m): 1.5

Site Length (m): 41.0

Active Channel Width (m): 1.9

No. of Transects: 12

Transect Spacing (m): 3.73

Point Spacing (m): 0.33

Points per Transect: 5

Transect & Point Layout Use this table to determine the number of transects & points required, given the minimum stream width.		
Minimum Width (m)	No. Transects at Site	Points per Transect
> 3.0	10	6
1.5 - 3.0	12	5
1.0 - 1.49	15	3
< 1.0	20	2

Calculations:

Transect Spacing = Site Length / (No. of Transects - 1)

Point Spacing = Active Channel Width / Points per Transect

1st Point = Point Spacing / 2 (from left bank)

Point No.	Location (m)	Measure depth & hydraulic head to nearest 5 mm: Depth (mm)	Hydraulic Head (mm)	Particle Sizes (mm): Point	Max. in Ring
1	2.19	160	0	130	130
2	0.57	300	0	90	195
3	0.95	235	0	0.10	220
4	1.33	270	0	0.05	0.10
5	1.71	35	0	0.05	0.10
6	.				

Point No.	Cover: Unmeasurable	Quality	Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other	Aquatic Vegetation Types Present: FL	AL	SS	MC	WC	GR	TR
1		2		X					X						
2		2		X					X						
3		0													
4		2				X			X						
5		0							X						
6															

Bank Angle & Particle Median Diameters
(Bank to tape height; if a height is >2m use check box, else enter values in proper observation points)

	> 2 m	0 mm	250 mm	750 mm	1500 mm	Amount of Undercut (mm)	No. of Veg. Squares on Bank
Left Bank	Height ☐	630	265	335	3	0	2
	Substrate Diameters	0.05	0.05	0.05	0.05		
Right Bank	Height ☐	335	112	75	3	0	4
	Substrate Diameters	0.05	0.05	0.05	0.05		

Dominant Vegetation Type (Check box of the dominant type within the 1 x 2 m area)

	None	Lawn	Crop-land	Mea-dow	Scrub-land	Forest	Wet-land
Left Bank	X						
Right Bank				X			

Table Codes Particle Sizes: *Measure all particles between 2.00mm and 1000mm*	
Material	Size
Unconsolidated Clay	0.01
Consolidated Clay	0.011
Silt	0.05
Sand	0.10
Large Boulders	1001
Bedrock	1111

Cover Quality:
0 = No Cover
1 = Embedded Cover
2 = Unembedded Cover

Aquatic Vegetation Types:
FL = Filamentous Algae
AL = Non-Filamentous
SS = Moss
MC = Macrophytes
WC = Watercress
GR = Grass
TR = Terrestrial Plants

Comments:

Crew Leader (initial & last name): GEB T

Crew	Recorder	Ent/Scanned	Verified	Corrected
ND				

Channel Morphology

Mandatory Fields In Grey
Must be filled out for processing

Stream Name: TUCK CREEK

Date (mm-dd): 2026-06-26

Stream Code: TUK

Site Code: TUK06

Sample: 01

Transect No.: 06 of 12

Bearing (D):

Min. Width (m): 1.5

Site Length (m): 41.0

Active Channel Width (m): 2.4

No. of Transects: 12

Transect Spacing (m): 3.73

Point Spacing (m): 0.48

Points per Transect: 5

Transect & Point Layout

Use this table to determine the number of transects & points required, given the minimum stream width.

Minimum Width (m)	No. Transects at Site	Points per Transect
> 3.0	10	6
1.5 - 3.0	12	5
1.0 - 1.49	15	3
< 1.0	20	2

Calculations:

Transect Spacing = Site Length / (No. of Transects - 1)

Point Spacing = Active Channel Width / Points per Transect

1st Point = Point Spacing / 2 (from left bank)

Point No.	Location (m)	Depth (mm)	Hydraulic Head (mm)	Particle Size (mm) Point	Particle Size (mm) Max. in Ring
1	0.24	75	0	0.05	0.10
2	0.72	210	0	0.10	175
3	1.20	275	6	0.10	30
4	1.68	260	0	56	200
5	2.16	130	0	0.05	0.10
6					

Measure depth & hydraulic head to nearest 5 mm

Point No.	Cover: Unmeasurable	Quality	Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other	Aquatic Vegetation Types Present: FL	AL	SS	MC	WC	GR	TR
1	☐	0	☐	☐	☐	☐	☐	☐	☒	☐	☐	☒	☐	☐	☐
2	☐	2	☐	☐	☒	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐
3	☐	0	☐	☐	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐
4	☐	2	☐	☐	☒	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐
5	☐	2	☐	☐	☐	☒	☐	☐	☒	☐	☐	☐	☐	☐	☐
6	☐		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Bank Angle & Particle Median Diameters

(Bank to tape height; if a height is >2m use check box, else enter values in proper observation points)

	> 2 m	0 mm	250 mm	750 mm	1500 mm	Amount of Undercut (mm)	No. of Veg. Squares on Bank
Left Bank	Height ☐	390	235	105	0	0	2
	Substrate Diameters	0.05	0.05	0.05	0.05		
Right Bank	Height ☐	330	120	100	0	0	5
	Substrate Diameters	0.05	0.05	0.05	0.05		

Dominant Vegetation Type (Check box of the dominant type within the 1 x 2 m area)

	None	Lawn	Crop-land	Mea-dow	Scrub-land	Forest	Wet-land
Left Bank	☒	☐	☐	☐	☐	☐	☐
Right Bank	☐	☐	☐	☒	☐	☐	☐

Table Codes

Particle Sizes: *Measure all particles between 2.00mm and 1000mm*

Material	Size
Unconsolidated Clay	0.01
Consolidated Clay	0.011
Silt	0.05
Sand	0.10
Large Boulders	1001
Bedrock	1111

Cover Quality:
0 = No Cover
1 = Embedded Cover
2 = Unembedded Cover

Aquatic Vegetation Types:
FL = Filamentous Algae
AL = Non-Filamentous
SS = Moss
MC = Macrophytes
WC = Watercress
GR = Grass
TR = Terrestrial Plants

Comments:

Crew Leader (initial & last name): G CB

Crew	Recorder	Ent/Scanned	Verified	Corrected
ND				

Channel Morphology

Stream Name: TUCK CREEK

Mandatory Fields In Grey
Must be filled out for processing

Date (mm-dd): 2025-06-23

Stream Code: TUK

Site Code: TUK06

Sample: 01

Transect No.: 07 of 12

Bearing (D):

Min. Width (m): 1.5

Site Length (m): 41.0

Active Channel Width (m): 2.2

No. of Transects: 12

Transect Spacing (m): 3.73

Point Spacing (m): 0.99

Points per Transect: 5

Transect & Point Layout

Use this table to determine the number of transects & points required, given the minimum stream width.

Minimum Width (m)	No.Transects at Site	Points per Transect
> 3.0	10	6
1.5 - 3.0	12	5
1.0 - 1.49	15	3
< 1.0	20	2

Calculations:

Transect Spacing = Site Length / (No. of Transects - 1)

Point Spacing = Active Channel Width / Points per Transect

1st Point = Point Spacing / 2 (from left bank)

Point No.	Location (m)	Measure depth & hydraulic head to nearest 5 mm: Depth (mm)	Hydraulic Head (mm)	Particle Sizes (mm): Point	Max. in Ring
1	0.22	215	0	3.10	190
2	0.66	300	0	5	150
3	1.10	320	0	0.10	35
4	1.54	345	0	0.10	140
5	1.98	160	0	120	120
6	.				

Cover

Point No.	Unmeasurable	Quality	Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other
1	☐	2	☐	☒	☐	☐	☐	☐
2	☐	2	☐	☒	☐	☐	☐	☐
3	☐	0	☐	☐	☐	☐	☐	☐
4	☐	2	☐	☐	☒	☐	☐	☐
5	☐	2	☒	☒	☐	☐	☐	☐
6	☐	☐	☐	☐	☐	☐	☐	☐

Aquatic Vegetation Types Present

Point No.	FL	AL	SS	MC	WC	GR	TR
1	☒	☐	☐	☐	☐	☐	☐
2	☒	☐	☐	☐	☐	☐	☐
3	☒	☐	☐	☐	☐	☐	☐
4	☒	☐	☐	☐	☐	☐	☐
5	☒	☐	☐	☐	☐	☐	☐
6	☐	☐	☐	☐	☐	☐	☐

Bank Angle & Particle Median Diameters

(Bank to tape height; if a height is >2m use check box, else enter values in proper observation points)

	Height	> 2 m	0 mm	250 mm	750 mm	1500 mm	Amount of Undercut (mm)	No. of Veg. Squares on Bank
Left Bank	☐		440	220	75	0	0	2
	Substrate Diameters		0.07	0.07	0.05	0.05		
Right Bank	☐		515	215	60	0	0	5
	Substrate Diameters		0.05	0.09	0.05	0.05		

Dominant Vegetation Type (Check box of the dominant type within the 1 x 2 m area)

	None	Lawn	Crop-land	Mea-dow	Scrub-land	Forest	Wet-land
Left Bank	☐	☐	☐	☐	☐	☒	☐
Right Bank	☐	☐	☐	☐	☒	☐	☐

Table Codes

Particle Sizes: *Measure all particles between 2.00mm and 1000mm*

Material	Size
Unconsolidated Clay	0.01
Consolidated Clay	0.011
Silt	0.05
Sand	0.10
Large Boulders	1001
Bedrock	1111

Cover Quality
0 = No Cover
1 = Embedded Cover
2 = Unembedded Cover

Aquatic Vegetation Types
FL = Filamentous Algae
AL = Non-Filamentous
SS = Moss
MC = Macrophytes
WC = Watercress
GR = Grass
TR = Terrestrial Plants

Comments

Crew Leader (initial & last name): GST

Crew	Recorder	Ent/Scanned	Verified	Corrected
KS				

Channel Morphology

Stream Name: TUCK CREEK

Mandatory Fields In Grey
Must be filled out for processing

Date (mm-dd): 2020-06-26

Stream Code: TUK

Site Code: TUK05

Sample: 01

Transect No.: 08 of 12

Bearing (D):

Min. Width (m): 1.5

No. of Transects: 12

Points per Transect: 5

Site Length (m): 41.0

Transect Spacing (m): 3.73

Active Channel Width (m): 2.2

Point Spacing (m): 0.44

Transect & Point Layout Use this table to determine the number of transects & points required, given the minimum stream width.		
Minimum Width (m)	No. Transects at Site	Points per Transect
> 3.0	10	6
1.5 - 3.0	12	5
1.0 - 1.49	15	3
< 1.0	20	2

Calculations:

Transect Spacing = Site Length / (No. of Transects - 1)

Point Spacing = Active Channel Width / Points per Transect

1st Point = Point Spacing / 2 (from left bank)

Point No.	Location (m)	Measure depth & hydraulic head to nearest 5 mm: Depth (mm)	Hydraulic Head (mm)	Particle Sizes (mm): Point	Max. in Ring	Cover: Unmeasurable	Quality	Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other	Aquatic Vegetation Types Present: FL	AL	SS	MC	WC	GR	TR
1	0.22	75	0	0.05	0.10		2				X			X						
2	0.66	195	0	10	195		2		X					X						
3	1.10	235	0	50	220		2			X				X						
4	1.54	200	0	135	135		2			X				X						
5	1.98	55	0	0.05	0.10		0													
6	.																			

Bank Angle & Particle Median Diameters
(Bank to tape height; if a height is >2m use check box, else enter values in proper observation points)

	> 2 m	0 mm	250 mm	750 mm	1500 mm	Amount of Undercut (mm)	No. of Veg. Squares on Bank
Left Bank Height		450	150	65	0	0	6
Left Bank Substrate Diameters		0.05	0.05	0.05	0.05		
Right Bank Height		470	356	305	0	0	0
Right Bank Substrate Diameters		0.05	0.05	0.05	0.05		

Dominant Vegetation Type
(Check box of the dominant type within the 1 x 2 m area)

	None	Lawn	Crop-land	Mea-dow	Scrub-land	Forest	Wet-land
Left Bank				X			
Right Bank					X		

Table Codes Particle Sizes: *Measure all particles between 2.00mm and 1000mm*	
Material	Size
Unconsolidated Clay	0.01
Consolidated Clay	0.011
Silt	0.05
Sand	0.10
Large Boulders	1001
Bedrock	1111

Cover Quality:
0 = No Cover
1 = Embedded Cover
2 = Unembedded Cover

Aquatic Vegetation Types:
FL = Filamentous Algae
AL = Non-Filamentous
SS = Moss
MC = Macrophytes
WC = Watercress
GR = Grass
TR = Terrestrial Plants

Comments:

Crew Leader (initial & last name): GET

Crew	Recorder	Ent/Scanned	Verified	Corrected
ND				

Channel Morphology

Mandatory Fields In Grey
Must be filled out for processing

Stream Name: TUK CREEK

Date (mm-dd): 2020-06-26

Stream Code: TUK

Site Code: TUK06

Sample: 0

Transect No.: 09 of 12

Bearing (D):

Min. Width (m): 1.5

Site Length (m): 41.0

Active Channel Width (m): 1.9

No. of Transects: 12

Transect Spacing (m): 3.73

Point Spacing (m): 0.38

Points per Transect: 5

Transect & Point Layout		
Use this table to determine the number of transects & points required, given the minimum stream width.		
Minimum Width (m)	No. Transects at Site	Points per Transect
> 3.0	10	6
1.5 - 3.0	12	5
1.0 - 1.49	15	3
< 1.0	20	2

Calculations:

Transect Spacing = Site Length / (No. of Transects - 1)

Point Spacing = Active Channel Width / Points per Transect

1st Point = Point Spacing / 2 (from left bank)

Measure depth & hydraulic head to nearest 5 mm

Particle Sizes (mm)

Cover

Aquatic Vegetation Types Present

Point No.	Location (m)	Depth (mm)	Hydraulic Head (mm)	Point	Max. in Ring	Unmeasurable	Quality	Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other	FL	AL	SS	MC	WC	GR	TR
1	0.19	150	0	0.05	0.10	☐	2	☐	☐	☐	☒	☐	☐	☒	☐	☐	☒	☐	☐	☐
2	0.57	255	0	1.00	1.00	☐	2	☐	☐	☒	☐	☐	☐	☒	☐	☐	☒	☐	☐	☐
3	0.95	280	0	0.10	1.40	☐	2	☐	☐	☒	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐
4	1.33	230	0	0.10	0.30	☐	0	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
5	1.71	180	0	0.05	0.10	☐	0	☐	☐	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐
6	.					☐		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Bank Angle & Particle Median Diameters

(Bank to tape height; if a height is >2m use check box, else enter values in proper observation points)

	> 2 m	0 mm	250 mm	750 mm	1500 mm	Amount of Undercut (mm)	No. of Veg. Squares on Bank
Left Bank	Height ☐	420	250	70	0	0	4
	Substrate Diameters	0.05	0.05	0.05	0.05		
Right Bank	Height ☐	360	205	190	0	0	4
	Substrate Diameters	0.05	0.05	0.05	0.05		

Dominant Vegetation Type (Check box of the dominant type within the 1 x 2 m area)

	None	Lawn	Crop-land	Mea-dow	Scrub-land	Forest	Wet-land
Left Bank	☒	☐	☐	☐	☐	☐	☐
Right Bank	☐	☐	☐	☐	☒	☐	☐

Table Codes

Particle Sizes
Measure all particles between 2.00mm and 1000mm

Material	Size
Unconsolidated Clay	0.01
Consolidated Clay	0.011
Silt	0.05
Sand	0.10
Large Boulders	1001
Bedrock	1111

Cover Quality
0 = No Cover
1 = Embedded Cover
2 = Unembedded Cover

Aquatic Vegetation Types
FL = Filamentous Algae
AL = Non-Filamentous
SS = Moss
MC = Macrophytes
WC = Watercress
GR = Grass
TR = Terrestrial Plants

Comments

Crew Leader (initial & last name): GEB

Crew	Recorder	Ent/Scanned	Verified	Corrected
NS				

Channel Morphology

Mandatory Fields In Grey
Must be filled out for processing

Stream Name: TUK CREEK

Date (mm-dd): 2020-06-26

Stream Code: TUK

Site Code: TUK06

Sample: 21

Transect No.: 10 of 12

Bearing (D):

Min. Width (m): 1.5

Site Length (m): 41.0

Active Channel Width (m): 1.5

No. of Transects: 12

Transect Spacing (m): 3.73

Point Spacing (m): 0.30

Points per Transect: 5

Transect & Point Layout

Use this table to determine the number of transects & points required, given the minimum stream width.

Minimum Width (m)	No. Transects at Site	Points per Transect
> 3.0	10	6
1.5 - 3.0	12	5
1.0 - 1.49	15	3
< 1.0	20	2

Calculations:

Transect Spacing = Site Length / (No. of Transects - 1)

Point Spacing = Active Channel Width / Points per Transect

1st Point = Point Spacing / 2 (from left bank)

Measure depth & hydraulic head to nearest 5 mm

Particle Sizes (mm)

Cover

Aquatic Vegetation Types Present

Point No.	Location (m)	Depth (mm)	Hydraulic Head (mm)	Particle Point	Particle Max. in Ring	Cover: Unmeasurable	Cover: Quality	Cover: Wood	Cover: Round Rock	Cover: Flat Rock	Cover: Macrophyte	Cover: Bank	Cover: Other	Aquatic Vegetation: FL	AL	SS	MC	WC	GR	TR
1	0.15	30	0	0.05	0.10	☐	0	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
2	0.45	105	0	0.05	20	☐	0	☐	☐	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐
3	0.75	160	0	10	70	☐	0	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
4	1.05	110	0	0.10	45	☐	0	☐	☐	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐
5	1.35	60	0	0.05	0.10	☐	0	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
6	.					☐		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Bank Angle & Particle Median Diameters

(Bank to tape height; if a height is >2m use check box, else enter values in proper observation points)

	> 2 m	0 mm	250 mm	750 mm	1500 mm	Amount of Undercut (mm)	No. of Veg. Squares on Bank
Left Bank	Height ☐	470	360	265	0	0	0
	Substrate Diameters	0.05	0.05	0.05	0.05		
Right Bank	Height ☐	370	135	160	0	0	3
	Substrate Diameters	0.05	0.05	0.05	0.05		

Dominant Vegetation Type

(Check box of the dominant type within the 1 x 2 m area)

	None	Lawn	Crop-land	Mea-dow	Scrub-land	Forest	Wet-land
Left Bank	☐	☐	☐	☐	☐	☒	☐
Right Bank	☐	☐	☐	☒	☐	☐	☐

Table Codes

Particle Sizes
Measure all particles between 2.00mm and 1000mm

Material	Size
Unconsolidated Clay	0.01
Consolidated Clay	0.011
Silt	0.05
Sand	0.10
Large Boulders	1001
Bedrock	1111

Cover Quality
0 = No Cover
1 = Embedded Cover
2 = Unembedded Cover

Aquatic Vegetation Types
FL = Filamentous Algae
AL = Non-Filamentous
SS = Moss
MC = Macrophytes
WC = Watercress
GR = Grass
TR = Terrestrial Plants

Comments

Crew Leader (initial & last name): S ST

Crew	Recorder	Ent/Scanned	Verified	Corrected
ND				

Channel Morphology

Mandatory Fields In Grey
Must be filled out for processing

Stream Name: TUCK CREEK

Date (mm-dd): 2026-06-26

Stream Code: TUK

Site Code: TUK06

Sample: 01

Transect No.: 11 of 12

Bearing (D):

Min. Width (m): 1.5

Site Length (m): 41.0

Active Channel Width (m): 1.6

No. of Transects: 12

Transect Spacing (m): 3.73

Point Spacing (m): 0.32

Points per Transect: 5

Transect & Point Layout

Use this table to determine the number of transects & points required, given the minimum stream width.

Minimum Width (m)	No. Transects at Site	Points per Transect
> 3.0	10	6
1.5 - 3.0	12	5
1.0 - 1.49	15	3
< 1.0	20	2

Calculations:

Transect Spacing = Site Length / (No. of Transects - 1)

Point Spacing = Active Channel Width / Points per Transect

1st Point = Point Spacing / 2 (from left bank)

Point No.	Location (m)	Depth (mm)	Hydraulic Head (mm)	Particle Sizes (mm) Point	Particle Sizes (mm) Max. in Ring
1	0.16	85	0	0.05	0.10
2	0.48	195	0	0.10	210
3	0.80	130	0	135	135
4	1.12	155	0	0.10	10
5	1.44	60	0	0.05	0.10
6	.				

Measure depth & hydraulic head to nearest 5 mm

Particle Sizes (mm)

Point No.	Unmeasurable	Quality	Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other	FL	AL	SS	MC	WC	GR	TR
1	☐	2	☐	☐	☐	☒	☐	☐	☒	☐	☐	☒	☐	☐	☐
2	☐	2	☐	☐	☒	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐
3	☐	2	☐	☐	☒	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐
4	☐	0	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
5	☐	2	☐	☐	☐	☒	☐	☐	☒	☐	☐	☒	☐	☐	☐
6	☐		☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Cover

Aquatic Vegetation Types Present

Bank Angle & Particle Median Diameters

(Bank to tape height; if a height is >2m use check box, else enter values in proper observation points)

	> 2 m	0 mm	250 mm	750 mm	1500 mm	Amount of Undercut (mm)	No. of Veg. Squares on Bank
Left Bank	Height ☐	425	225	75	0	0	2
	Substrate Diameters	0.05	0.05	0.05	0.05		
Right Bank	Height ☐	490	255	45	0	0	2
	Substrate Diameters	0.05	0.05	0.05	0.05		

Dominant Vegetation Type

(Check box of the dominant type within the 1 x 2 m area)

	None	Lawn	Crop-land	Mea-dow	Scrub-land	Forest	Wet-land
Left Bank	☐	☐	☐	☒	☐	☐	☐
Right Bank	☐	☐	☐	☒	☐	☐	☐

Table Codes

Particle Sizes: *Measure all particles between 2.00mm and 1000mm*

Material	Size
Unconsolidated Clay	0.01
Consolidated Clay	0.011
Silt	0.05
Sand	0.10
Large Boulders	1001
Bedrock	1111

Cover Quality:
0 = No Cover
1 = Embedded Cover
2 = Unembedded Cover

Aquatic Vegetation Types:
FL = Filamentous Algae
AL = Non-Filamentous
SS = Moss
MC = Macrophytes
WC = Watercress
GR = Grass
TR = Terrestrial Plants

Comments

Crew Leader (initial & last name): OEIT

Crew	Recorder	Ent/Scanned	Verified	Corrected
ND				

Channel Morphology

Mandatory Fields In Grey
Must be filled out for processing

Stream Name: TUCK CREEK

Date (mm-dd): 2020-06-26

Stream Code: TUK

Site Code: TUK06

Sample: 01

Transect No.: 12 of 12

Bearing (D):

Min. Width (m): 1.5

Site Length (m): 410

Active Channel Width (m): 2.1

No. of Transects: 12

Transect Spacing (m): 33.73

Point Spacing (m): 0.42

Points per Transect: 5

Transect & Point Layout

Use this table to determine the number of transects & points required, given the minimum stream width.

Minimum Width (m)	No. Transects at Site	Points per Transect
> 3.0	10	6
1.5 - 3.0	12	5
1.0 - 1.49	15	3
< 1.0	20	2

Calculations:

Transect Spacing = Site Length / (No. of Transects - 1)

Point Spacing = Active Channel Width / Points per Transect

1st Point = Point Spacing / 2 (from left bank)

Point No.	Location (m)	Depth (mm)	Hydraulic Head (mm)	Particle Sizes (mm): Point	Particle Sizes (mm): Max. in Ring
1	0.21	90	0	0.10	310
2	0.63	200	0	15	210
3	1.05	210	0	15	150
4	1.47	180	0	10	35
5	1.89	110	0	0.10	10
6					

Measure depth & hydraulic head to nearest 5 mm

Point No.	Unmeasurable	Quality	Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other	FL	AL	SS	MC	WC	GR	TR
1		2			X				X			X			
2		2			X				X						
3		2			X										
4		0													
5		2				X			X			X			
6															

Cover

Aquatic Vegetation Types Present

Bank Angle & Particle Median Diameters

(Bank to tape height; if a height is >2m use check box, else enter values in proper observation points)

	> 2 m	0 mm	250 mm	750 mm	1500 mm	Amount of Undercut (mm)	No. of Veg. Squares on Bank
Left Bank Height	☐	530	320	30	0	0	1
Left Bank Substrate Diameters		0.05	0.05	0.05	0.05		
Right Bank Height	☐	660	210	10	0	0	2
Right Bank Substrate Diameters		0.65	0.05		0.05		

Dominant Vegetation Type (Check box of the dominant type within the 1 x 2 m area)

	None	Lawn	Crop-land	Mea-dow	Scrub-land	Forest	Wet-land
Left Bank	☐	☐	☐	X	☐	☐	☐
Right Bank	☐	☐	☐	☐	☐	☐	☐

Table Codes

Particle Sizes
Measure all particles between 2.00mm and 1000mm

Material	Size
Unconsolidated Clay	0.01
Consolidated Clay	0.011
Silt	0.05
Sand	0.10
Large Boulders	1001
Bedrock	1111

Cover Quality
0 = No Cover
1 = Embedded Cover
2 = Unembedded Cover

Aquatic Vegetation Types
FL = Filamentous Algae
AL = Non-Filamentous
SS = Moss
MC = Macrophytes
WC = Watercress
GR = Grass
TR = Terrestrial Plants

Comments

Crew Leader (initial & last name): GEG T

Crew	Recorder	Ent/Scanned	Verified	Corrected
ND				

Appendix C-6 –

SWIS Data Summaries

Organization(s): Aquafor Beech Limited
Project(s): Tuck Creek Hydro Corridor EA
Date Report Printed (yyyy-mm-dd): 2020-08-20

Channel Structure

Stream Name: **Tuck Creek**	Stream Code: **TUK**	Site Code: **TUK01**	Year: **2020**	Sample: **1**
Average Wetted Width: 4.68 m	Minimum Width: 3 m	Site Length: 45 m	Number of Transects: 10	Transect Spacing: 5 m
Usable Area: 210.45 m²				

Physical Habitat Summary Statistics

Depth (mm)	Hydraulic Head (mm)				
	0 - 2	3 - 7	8 - 15	> 15	Total
0 - 100	56.7	8.3	1.7	0	66.7
101 - 600	30	1.7	0	0	31.7
601 - 1000	0	0	0	0	0
> 1000	0	0	0	0	0
Total	86.7	10	1.7	0	98.3

Islands: 1 (1.7 %)

Number of points unclassified: 0

Percent Unembedded Cover Distribution

Depth (mm)	Hydraulic Head (mm)				
	0 - 2	3 - 7	8 - 15	> 15	Total
0 - 100	47.5	5.1	1.7	0	54.2
101 - 600	18.6	1.7	0	0	20.3
601 - 1000	0	0	0	0	0
> 1000	0	0	0	0	0
Total	66.1	6.8	1.7	0	74.6

Unmeasurable:

Percent Embedded Cover Distribution

Depth (mm)	Hydraulic Head (mm)				
	0 - 2	3 - 7	8 - 15	> 15	Total
0 - 100	3.4	1.7	0	0	5.1
101 - 600	5.1	0	0	0	5.1
601 - 1000	0	0	0	0	0
> 1000	0	0	0	0	0
Total	8.5	1.7	0	0	10.2

Percent Unembedded Cover Types

Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other
0	33.9	42.4	5.1	0	0

Note that more than one cover type can be present at an observation point.

Percent Embedded Cover Types

Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other
0	1.7	8.5	0	0	0

Note that more than one cover type can be present at an observation point.

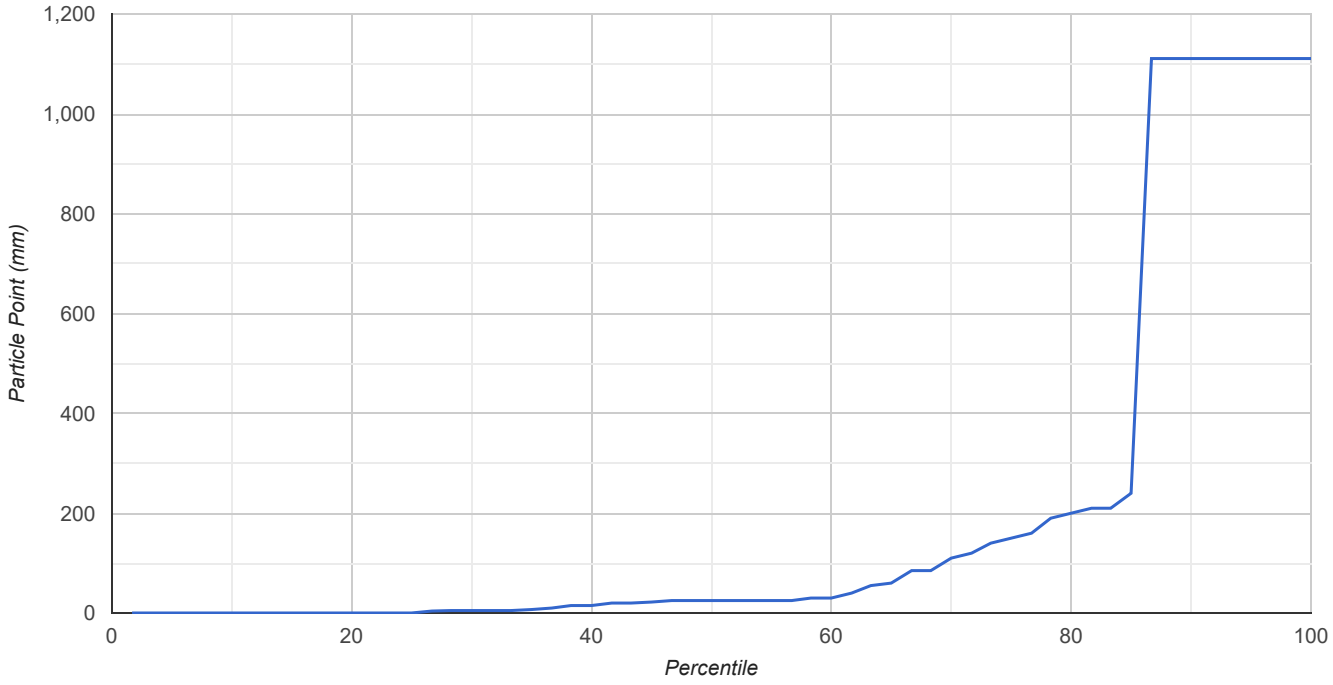
Percent Vegetation Types

Filamentous Algae (FL)	Non-Filamentous (AL)	Moss (SS)	Macrophytes (MC)	Watercress (WC)	Grass (GR)	Terrestrial Plants (TR)
72.9	0	74.6	0	0	0	0

Note that more than one vegetation type can be present at an observation point.

Substrate: d15 = 0.1, d50 = 25, d85 = 660.5

Substrate


1,200
1,000
800
600
400
200
0
Particle Point (mm)
0
20
40
60
80
100
Percentile

Organization(s): Aquafor Beech Limited
Project(s): Tuck Creek Hydro Corridor EA

Channel Structure

Date Report Printed (yyyy-mm-dd): 2020-08-20

Stream Name: **Tuck Creek**	Stream Code: **TUK**	Site Code: **TUK02**	Year: **2020**	Sample: **1**
Average Wetted Width: 2.79 m	Minimum Width: 1.5 m	Site Length: 48.3 m	Number of Transects: 12	Transect Spacing: 4.16 m
Usable Area: 134.68 m²				

Physical Habitat Summary Statistics

Depth (mm)	Hydraulic Head (mm)				
	0 - 2	3 - 7	8 - 15	> 15	Total
0 - 100	48.4	4.8	1.6	6.5	61.3
101 - 600	33.9	3.2	0	0	37.1
601 - 1000	0	0	0	0	0
> 1000	0	0	0	0	0
Total	82.3	8.1	1.6	6.5	98.4

Islands: 1 (1.6 %)

Number of points unclassified: 0

Percent Unembedded Cover Distribution

Depth (mm)	Hydraulic Head (mm)				
	0 - 2	3 - 7	8 - 15	> 15	Total
0 - 100	44.3	4.9	1.6	6.6	57.4
101 - 600	32.8	0	0	0	32.8
601 - 1000	0	0	0	0	0
> 1000	0	0	0	0	0
Total	77	4.9	1.6	6.6	90.2

Unmeasurable:

Percent Embedded Cover Distribution

Depth (mm)	Hydraulic Head (mm)				
	0 - 2	3 - 7	8 - 15	> 15	Total
0 - 100	3.3	0	0	0	3.3
101 - 600	0	0	0	0	0
601 - 1000	0	0	0	0	0
> 1000	0	0	0	0	0
Total	3.3	0	0	0	3.3

Percent Unembedded Cover Types

Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other
4.9	18	44.3	47.5	3.3	0

Note that more than one cover type can be present at an observation point.

Percent Embedded Cover Types

Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other
0	1.6	1.6	0	0	0

Note that more than one cover type can be present at an observation point.

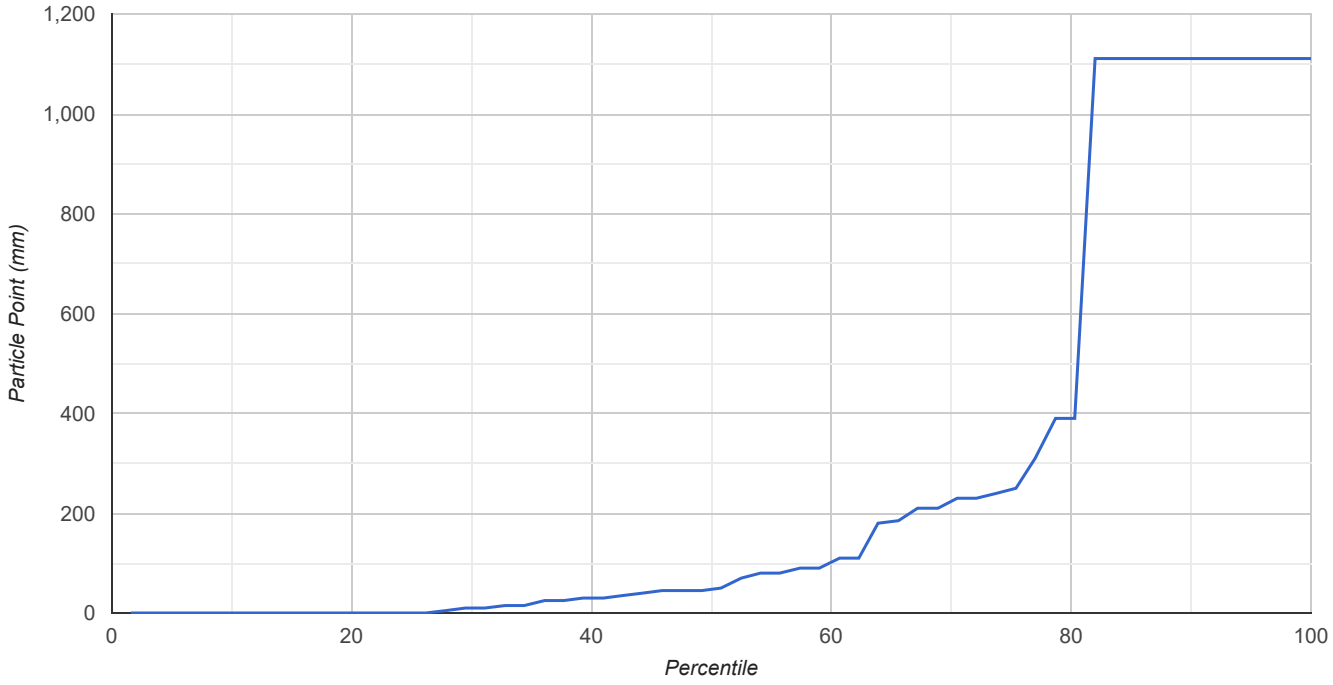
Percent Vegetation Types

Filamentous Algae (FL)	Non-Filamentous (AL)	Moss (SS)	Macrophytes (MC)	Watercress (WC)	Grass (GR)	Terrestrial Plants (TR)
91.8	1.6	0	4.9	0	0	0

Note that more than one vegetation type can be present at an observation point.

Substrate: d15 = 0.1, d50 = 47.5, d85 = 1111

Substrate


1,200
1,000
800
600
400
200
0
Particle Point (mm)
0
20
40
60
80
100
Percentile

Organization(s): Aquafor Beech Limited
Project(s): Tuck Creek Hydro Corridor EA
Date Report Printed (yyyy-mm-dd): 2020-08-20

Channel Structure

Stream Name: **Tuck Creek**	Stream Code: **TUK**	Site Code: **TUK03**	Year: **2020**	Sample: **1**
Average Wetted Width: 3.44 m	Minimum Width: 1.5 m	Site Length: 45.3 m	Number of Transects: 12	Transect Spacing: 4.12 m
Usable Area: 155.68 m²				

Physical Habitat Summary Statistics

Depth (mm)	Hydraulic Head (mm)				
	0 - 2	3 - 7	8 - 15	> 15	Total
0 - 100	31.7	3.3	3.3	0	38.3
101 - 600	58.3	0	0	0	58.3
601 - 1000	0	0	0	0	0
> 1000	0	0	0	0	0
Total	90	3.3	3.3	0	96.7

Islands: 2 (3.3 %)

Number of points unclassified: 0

Percent Unembedded Cover Distribution

Depth (mm)	Hydraulic Head (mm)				
	0 - 2	3 - 7	8 - 15	> 15	Total
0 - 100	13.8	3.4	3.4	0	20.7
101 - 600	36.2	0	0	0	36.2
601 - 1000	0	0	0	0	0
> 1000	0	0	0	0	0
Total	50	3.4	3.4	0	56.9

Unmeasurable:

Percent Embedded Cover Distribution

Depth (mm)	Hydraulic Head (mm)				
	0 - 2	3 - 7	8 - 15	> 15	Total
0 - 100	0	0	0	0	0
101 - 600	0	0	0	0	0
601 - 1000	0	0	0	0	0
> 1000	0	0	0	0	0
Total	0	0	0	0	0

Percent Unembedded Cover Types

Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other
6.9	22.4	25.9	6.9	0	0

Note that more than one cover type can be present at an observation point.

Percent Embedded Cover Types

Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other
0	0	0	0	0	0

Note that more than one cover type can be present at an observation point.

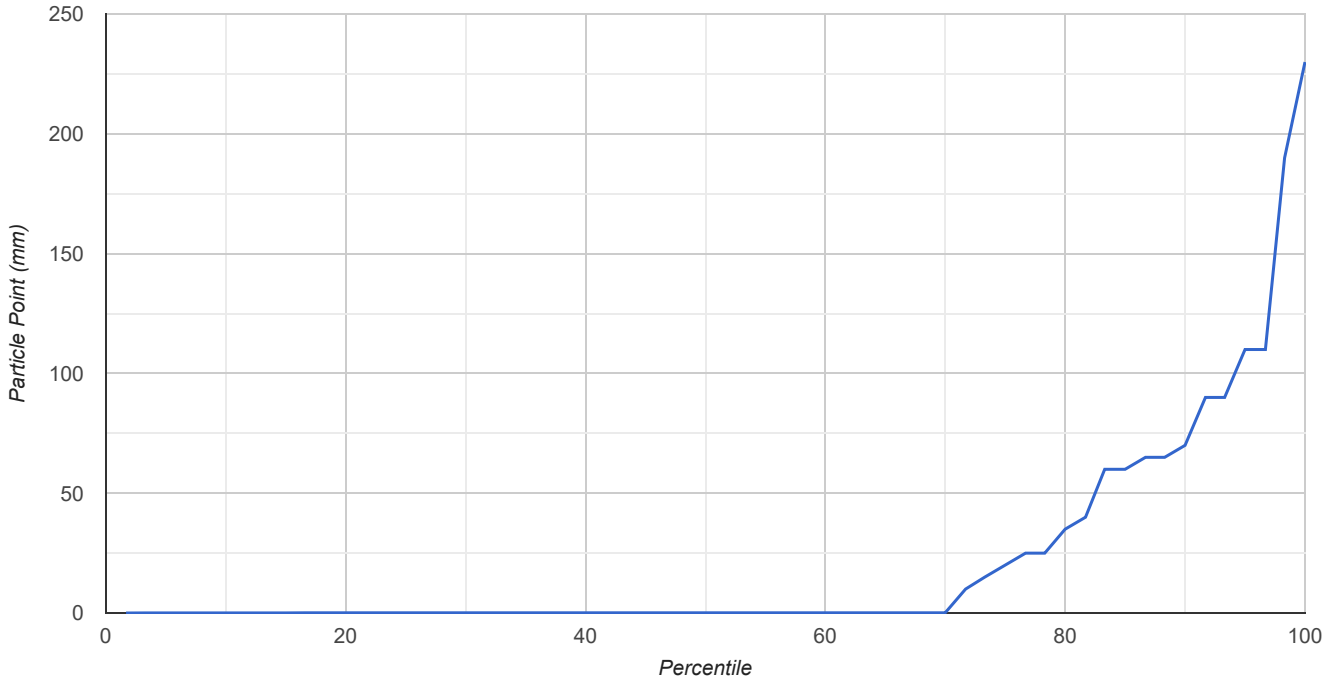
Percent Vegetation Types

Filamentous Algae (FL)	Non-Filamentous (AL)	Moss (SS)	Macrophytes (MC)	Watercress (WC)	Grass (GR)	Terrestrial Plants (TR)
86.2	0	0	5.2	0	0	1.7

Note that more than one vegetation type can be present at an observation point.

Substrate: d15 = 0.075, d50 = 0.1, d85 = 62.5

Substrate


250
200
150
100
50
0
Particle Point (mm)
0
20
40
60
80
100
Percentile

Organization(s): Aquafor Beech Limited
Project(s): Tuck Creek Hydro Corridor EA
Date Report Printed (yyyy-mm-dd): 2020-08-20

Channel Structure

Stream Name: **Tuck Creek**	Stream Code: **TUK**	Site Code: **TUK04**	Year: **2020**	Sample: **1**
Average Wetted Width: 3.88 m	Minimum Width: 1.5 m	Site Length: 45.3 m	Number of Transects: 12	Transect Spacing: 4.12 m
Usable Area: 175.76 m²				

Physical Habitat Summary Statistics

Depth (mm)	Hydraulic Head (mm)				
	0 - 2	3 - 7	8 - 15	> 15	Total
0 - 100	72.1	4.9	1.6	0	78.7
101 - 600	18	1.6	0	0	19.7
601 - 1000	0	0	0	0	0
> 1000	0	0	0	0	0
Total	90.2	6.6	1.6	0	98.4

Islands: 1 (1.6 %)

Number of points unclassified: 0

Percent Unembedded Cover Distribution

Depth (mm)	Hydraulic Head (mm)				
	0 - 2	3 - 7	8 - 15	> 15	Total
0 - 100	58.3	5	1.7	0	65
101 - 600	8.3	0	0	0	8.3
601 - 1000	0	0	0	0	0
> 1000	0	0	0	0	0
Total	66.7	5	1.7	0	73.3

Unmeasurable:

Percent Embedded Cover Distribution

Depth (mm)	Hydraulic Head (mm)				
	0 - 2	3 - 7	8 - 15	> 15	Total
0 - 100	5	0	0	0	5
101 - 600	0	0	0	0	0
601 - 1000	0	0	0	0	0
> 1000	0	0	0	0	0
Total	5	0	0	0	5

Percent Unembedded Cover Types

Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other
1.7	3.3	61.7	0	6.7	0

Note that more than one cover type can be present at an observation point.

Percent Embedded Cover Types

Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other
0	1.7	3.3	0	0	0

Note that more than one cover type can be present at an observation point.

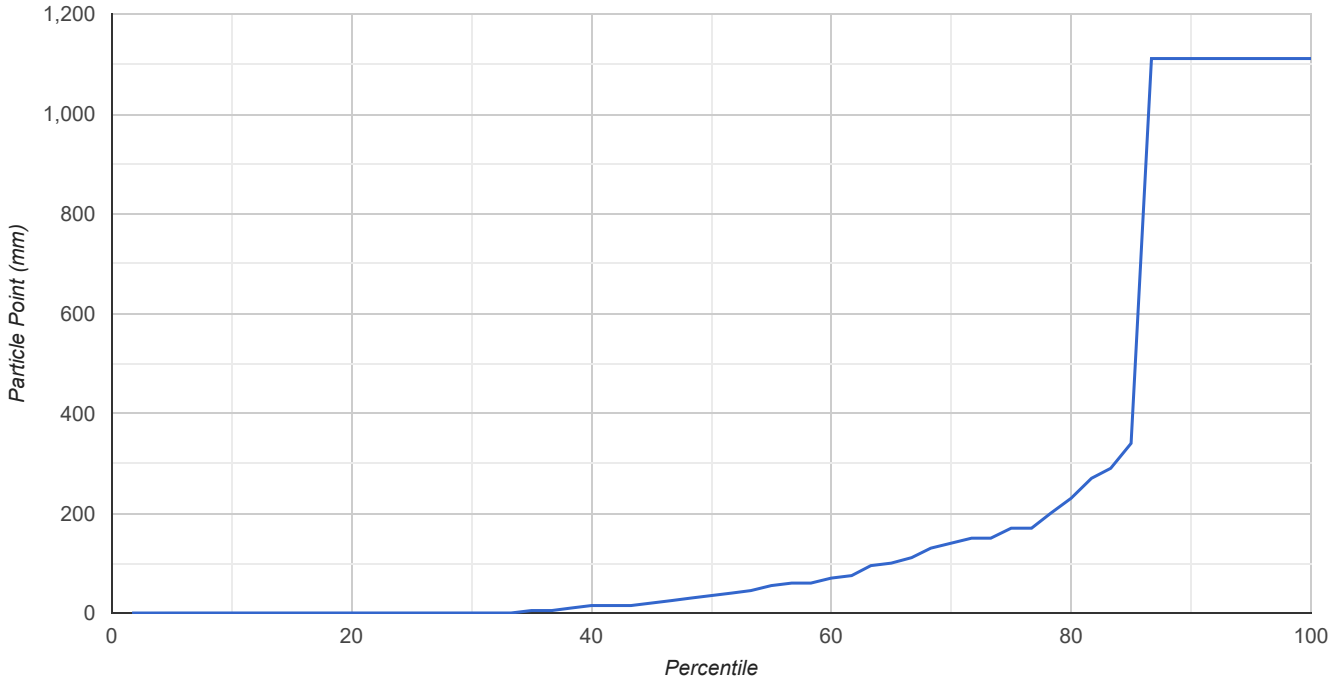
Percent Vegetation Types

Filamentous Algae (FL)	Non-Filamentous (AL)	Moss (SS)	Macrophytes (MC)	Watercress (WC)	Grass (GR)	Terrestrial Plants (TR)
70	0	0	0	0	0	0

Note that more than one vegetation type can be present at an observation point.

Substrate: d15 = 0.1, d50 = 35, d85 = 700.5

Substrate


1,200
1,000
800
600
400
200
0
Particle Point (mm)
0
20
40
60
80
100
Percentile

Organization(s): Aquafor Beech Limited
Project(s): Tuck Creek Hydro Corridor EA
Date Report Printed (yyyy-mm-dd): 2020-08-20

Channel Structure

Stream Name: **Tuck Creek**	Stream Code: **TUK**	Site Code: **TUK05**	Year: **2020**	Sample: **1**
Average Wetted Width: 3.14 m	Minimum Width: 1.5 m	Site Length: 46.7 m	Number of Transects: 12	Transect Spacing: 4.25 m
Usable Area: 146.48 m²				

Physical Habitat Summary Statistics

Depth (mm)	Hydraulic Head (mm)				
	0 - 2	3 - 7	8 - 15	> 15	Total
0 - 100	48.3	8.3	0	0	56.7
101 - 600	40	0	0	0	40
601 - 1000	0	0	0	0	0
> 1000	0	0	0	0	0
Total	88.3	8.3	0	0	96.7

Islands: 2 (3.3 %)

Number of points unclassified: 0

Percent Unembedded Cover Distribution

Depth (mm)	Hydraulic Head (mm)				
	0 - 2	3 - 7	8 - 15	> 15	Total
0 - 100	22.4	6.9	0	0	29.3
101 - 600	22.4	0	0	0	22.4
601 - 1000	0	0	0	0	0
> 1000	0	0	0	0	0
Total	44.8	6.9	0	0	51.7

Unmeasurable:

Percent Embedded Cover Distribution

Depth (mm)	Hydraulic Head (mm)				
	0 - 2	3 - 7	8 - 15	> 15	Total
0 - 100	8.6	1.7	0	0	10.3
101 - 600	1.7	0	0	0	1.7
601 - 1000	0	0	0	0	0
> 1000	0	0	0	0	0
Total	10.3	1.7	0	0	12.1

Percent Unembedded Cover Types

Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other
0	25.9	29.3	0	0	0

Note that more than one cover type can be present at an observation point.

Percent Embedded Cover Types

Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other
0	5.2	6.9	0	0	0

Note that more than one cover type can be present at an observation point.

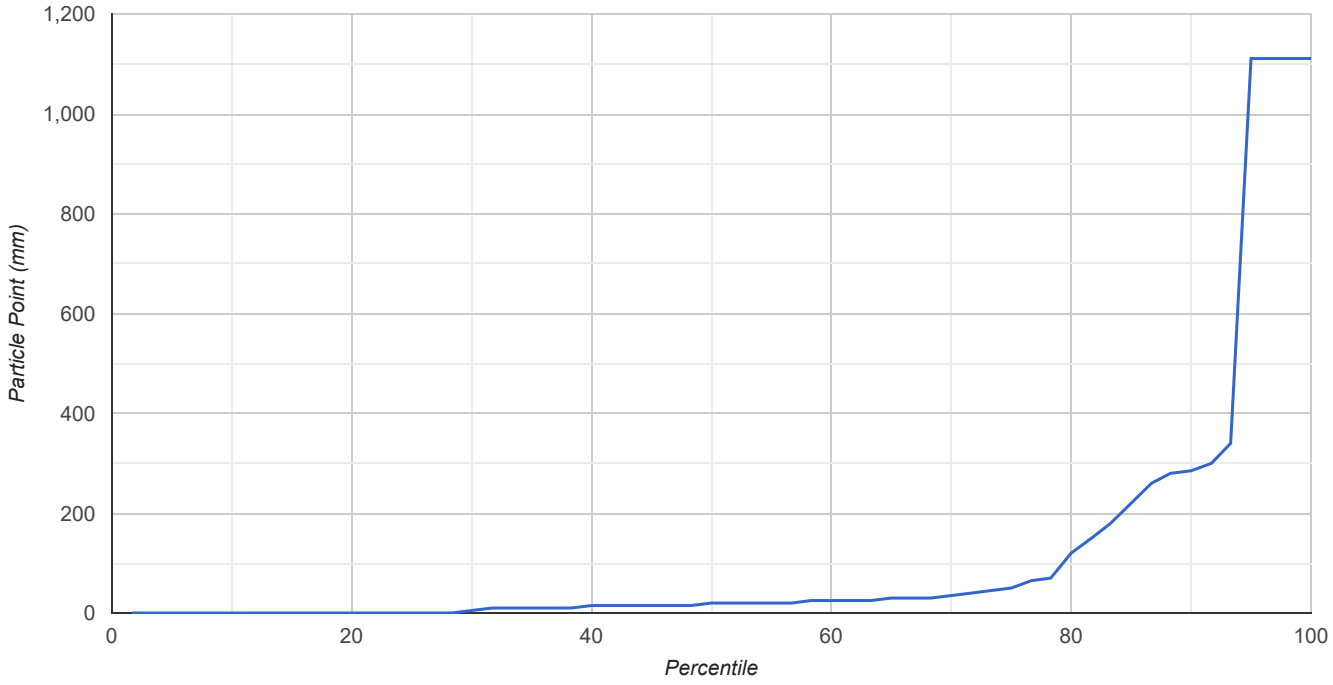
Percent Vegetation Types

Filamentous Algae (FL)	Non-Filamentous (AL)	Moss (SS)	Macrophytes (MC)	Watercress (WC)	Grass (GR)	Terrestrial Plants (TR)
0	0	41.4	1.7	0	0	0

Note that more than one vegetation type can be present at an observation point.

Substrate: d15 = 0.1, d50 = 17.5, d85 = 220

Substrate


1,200
1,000
800
600
400
200
0
Particle Point (mm)
0
20
40
60
80
100
Percentile

Organization(s): Aquafor Beech Limited
Project(s): Tuck Creek Hydro Corridor EA
Date Report Printed (yyyy-mm-dd): 2020-08-20

Channel Structure

Stream Name: **Tuck Creek**	Stream Code: **TUK**	Site Code: **TUL06**	Year: **2020**	Sample: **1**
Average Wetted Width: 2.08 m	Minimum Width: 1.5 m	Site Length: 41 m	Number of Transects: 12	Transect Spacing: 3.73 m
Usable Area: 85.08 m²				

Physical Habitat Summary Statistics

Depth (mm)	Hydraulic Head (mm)				
	0 - 2	3 - 7	8 - 15	> 15	Total
0 - 100	16.7	0	0	0	16.7
101 - 600	83.3	0	0	0	83.3
601 - 1000	0	0	0	0	0
> 1000	0	0	0	0	0
Total	100	0	0	0	100

Islands: 0 (0 %)

Number of points unclassified: 0

Percent Unembedded Cover Distribution

Depth (mm)	Hydraulic Head (mm)				
	0 - 2	3 - 7	8 - 15	> 15	Total
0 - 100	8.3	0	0	0	8.3
101 - 600	48.3	0	0	0	48.3
601 - 1000	0	0	0	0	0
> 1000	0	0	0	0	0
Total	56.7	0	0	0	56.7

Unmeasurable:

Percent Embedded Cover Distribution

Depth (mm)	Hydraulic Head (mm)				
	0 - 2	3 - 7	8 - 15	> 15	Total
0 - 100	0	0	0	0	0
101 - 600	0	0	0	0	0
601 - 1000	0	0	0	0	0
> 1000	0	0	0	0	0
Total	0	0	0	0	0

Percent Unembedded Cover Types

Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other
5	16.7	21.7	18.3	0	0

Note that more than one cover type can be present at an observation point.

Percent Embedded Cover Types

Wood	Round Rock	Flat Rock	Macrophyte	Bank	Other
0	0	0	0	0	0

Note that more than one cover type can be present at an observation point.

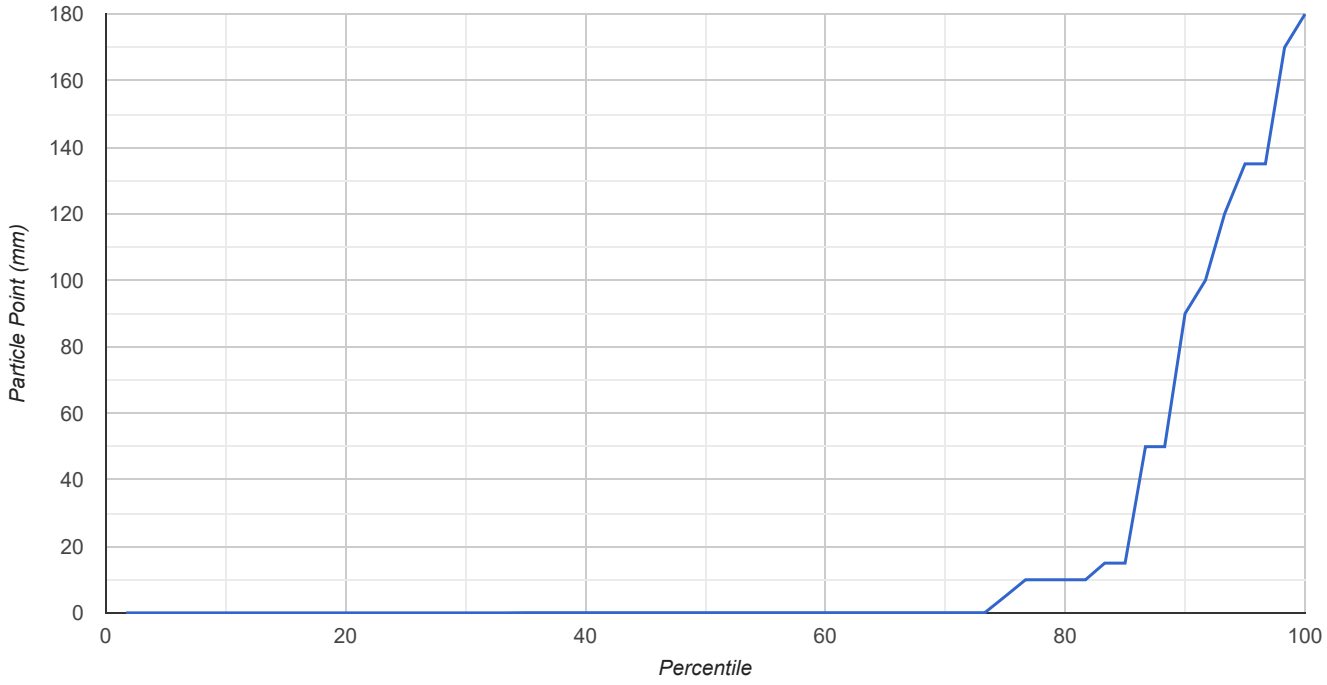
Percent Vegetation Types

Filamentous Algae (FL)	Non-Filamentous (AL)	Moss (SS)	Macrophytes (MC)	Watercress (WC)	Grass (GR)	Terrestrial Plants (TR)
51.7	0	6.7	20	0	0	0

Note that more than one vegetation type can be present at an observation point.

Substrate: d15 = 0.05, d50 = 0.1, d85 = 32.5

Substrate


180
160
140
120
100
80
60
40
20
0
Particle Point (mm)
0
20
40
60
80
100
Percentile

Appendix C-7 –

Representative Aquatic Habitat Photographs



Figure 1: TUK01 - DS Looking US



Figure 2: TUK02 - DS Looking DS



Figure 3: TUK01 - US Looking US



Figure 4: TUK01 - US Looking DS



Figure 5: TUK02 - DS Looking US



Figure 6: TUK02 - DS Looking DS

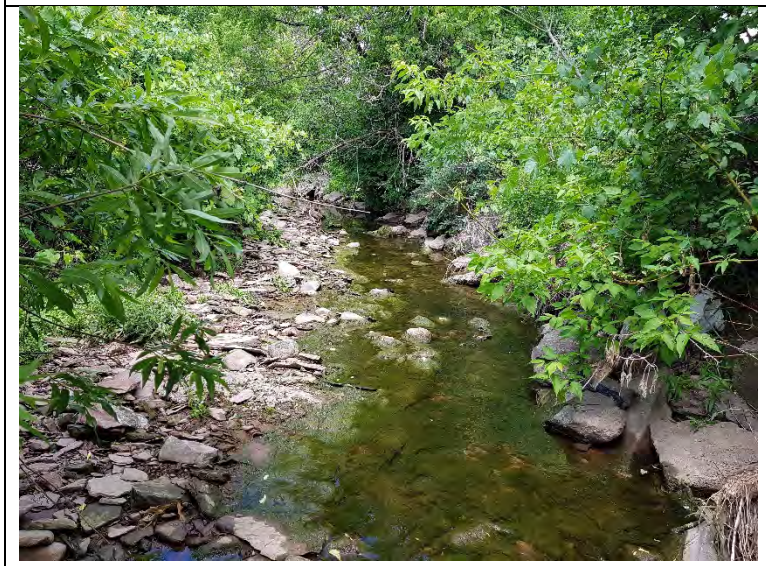


Figure 7: TUK02 - US Looking US



Figure 8: TUK02 - US Looking DS



Figure 9: TUK03 - DS Looking US



Figure 10: TUK03 - DS Looking DS



Figure 11: TUK03 - US Looking US



Figure 12: TUK03 - US Looking DS



Figure 13: TUK04 - DS Looking US



Figure 14: TUK04 - DS Looking DS



Figure 15: TUK04 - US Looking US



Figure 16: TUK04 - US Looking DS



Figure 17: TUK05 - DS Looking US



Figure 18: TUK05 - DS Looking DS



Figure 19: TUK05 - US Looking US



Figure 20: TUK05 - US Looking DS



Figure 21: TUK06 - DS Looking US



Figure 22: TUK06 - DS Looking DS



Figure 23: TUK06 - US Looking US



Figure 24: TUK06 - US Looking DS

Appendix C-8 –

Species at Risk Screening

Species		COSEWIC Status	SARA Status	ESA Status	G-Rank	S-Rank	Data Source	Habitat Requirements (MNRF, 2000 unless otherwise sourced)	Assessment of Species Occurrence in Study Area
Scientific Name	**Common Name**								
BIRDS									
Empidonax virescens	Acadian Flycatcher	END	END	END	G5	S2S3B	OBBA[1]	In Ontario, the Acadian Flycatcher breeds in the understory of large, mature, closed-canopy forests, swamps and forested ravines. This bird prefers forests greater than 40 ha in size, and exhibits edge sensitivity preferring the deep interior of the forest. Its nest is loosely woven and placed near the tip of branch in a small tree or shrub often, but not always, near water (Whitehead and Taylor 2002).	**Unlikely Present:** Woodlands within the study area are smaller in size and do not contain interior forest habitat preferable to this species.
Haliaeetus leucocephalus	Bald Eagle	-	-	SC	G5	S2N, S4B	OBBA	Prefers deciduous and mixed deciduous forest; and habitat close to water bodies such as lakes and rivers. The large, conspicuous nests are typically found in large super-canopy trees along water bodies	**Not Present**: Woodlands within the study area are not conducive to breeding (i.e. there are no super-canopy trees to build nests in). Species was not observed in the study area during field investigations.
Riparia riparia	Bank Swallow	THR	THR	THR	G5	S4B	OBBA	Sand, clay or gravel riverbanks or steep riverbank cliffs; lakeshore bluffs or easily crumbled sand or gravel; gravel pits, road cuts, grassland or cultivated fields that are close to water. Nesting sites are limiting factor for species presence.	**Not Present**: Nest burrows were not observed along Tuck Creek in the study area. Small areas of steep, eroded creek bank were present but with no evidence of being used by Bank Swallow.
Hirundo rustica	Barn Swallow	THR	THR	THR	G5	S4B	Aquafor 2020[2], OBBA	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, or on rock faces and caves.	**Confirmed Present**: Observed foraging in Lansdown Park, although nesting was not observed. Several culverts and overpasses throughout the study area could potentially provide nesting habitat during future breeding seasons.
Chlidonias niger	Black Tern	-	-	SC	G4G5	S3B	OBBA	Prefers marshes where they build floating nests in colonies in shallow water. Cattails are often used as nest material (Government of Ontario, 2019 - 1).	**Not Present**: Cattail marshes within the study area do not have high levels of standing water conducive to breeding habitat. Species was not observed in the study area during breeding bird surveys.
Nycticorax nycticorax	Black-crowned Night Heron	-	-	-	G5	S3B, S3N	Aquafor 2020, iNaturalist	Preferred habitat for this species typically includes aquatic features such as estuaries, marshes, streams, lakes, and reservoirs with abundant aquatic vegetation used for foraging. Roosting and nesting are colonial, and occur in trees often associated with cattails or other wetlands, such as on an island or over water.	**Confirmed Present**: Observed foraging in creek at Frog Survey Station F, though nesting habitat was not observed.

[1] Species record obtained from the Ontario Breeding Bird Atlas (OBBA) database, sourced using the Atlas Data Summary Tool - data squares 17NJ90, 17NH99, 17PH09 and 17PJ00
[2] Species observed by Aquafor Beech staff during field investigations in 2020

Species		COSEWIC Status	SARA Status	ESA Status	G-Rank	S-Rank	Data Source	Habitat Requirements (MNRF, 2000 unless otherwise sourced)	Assessment of Species Occurrence in Study Area
Scientific Name	**Common Name**								
Hydroprogne caspia	Caspian Tern	-	-	-	G5	S3B	OBBA	A coastal breeder often utilizing beaches and islands with open flat areas. This species migrates inland using rivers, estuaries and other aquatic features and overwinters near salt water in coastal zones.	**Not Present:** Species was not observed in the study area during breeding bird surveys. No suitable open coastal habitat is present within the study area.
Setophaga cerulea	Cerulean Warbler	END	END	THR	G4	S3B	iNaturalist	Prefers mature deciduous woodland of Great Lakes- St. Lawrence and Carolinian forests, sometimes coniferous; swamps or bottomlands with large trees; area sensitive species needing extensive areas of forest (>100 ha).	**Unlikely Present**: Potentially suitable habitat within the study area is not of sufficient size to support this area-sensitive species. Cerulean Warbler was not observed during breeding bird surveys.
Chaetura pelagica	Chimney Swift	THR	THR	THR	G5	S4B, S4N	OBBA	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.	**Not Present**: Species was not observed in the study area during breeding bird surveys, and the study area contains no buildings with chimneys that may be used for nesting.
Chordeiles minor	Common Nighthawk	THR	THR	SC	G5	S4B	OBBA	Open ground; clearings in dense forests; ploughed fields; gravel beaches or barren areas with rocky soils; open woodlands; flat gravel roofs.	**Not Present**: Species was not observed in the study area during breeding bird surveys. Open ground and clearings suitable for nesting were not found in the study area.
Sturnella magna	Eastern Meadowlark	THR	THR	THR	G5	S4B	OBBA	Open grasslands with dense ground cover, hay fields, meadows, fallow fields. Generally requires large tracts of grassland (>50 ha) but has been observed to use mosaics of smaller grassland areas, pastures, and similar. The MNRF defines general habitat as the nest and suitable habitat within 300 metres of a nest or centre of defended territory (MNRF 2013).	**Not Present**: Species was not observed in the study area during breeding bird surveys. Large open fields and grasslands are absent from the study area.
Setophaga palmarum hypochrysea	Eastern Palm Warbler	-	-	-	G5TU	S1B	iNaturalist 2018	Breeds in boreal forest habitat such as in bogs with scattered evergreen trees and thick ground cover. May use trees and shrubs such as in fencerows, open fields and forest edges during migration.	**Not Present:** Species was not observed in the study area during breeding bird surveys. Boreal forest habitat is not available in the study area and it is likely that the nearby iNaturalist record (Bronte Beach Park) may represent an individual that was migrating.
Contopus virens	Eastern Wood-Pewee	SC	SC	SC	G5	S4B	Aquafor 2020, MNRF 2017[3], OBBA, iNaturalist	Associated with deciduous and mixed forests. Within mature and intermediate age stands it prefers areas with little understory vegetation as well as forest clearings and edges.	**Confirmed Present**: Possible breeder in deciduous forest habitat centrally located in the study area (e.g. near Lansdown and Ireland Parks).
Sterna forsteri	Forster's Tern	-	-	-	G5	S2B	OBBA	Typically breeds in large wetlands with open expanses, such as salt or freshwater marshes, sometimes with floating vegetation or islands. Most often winters close to the ocean coast.	**Not Present:** Species was not observed in the study area during breeding bird surveys. No suitable open water wetland habitat is present within the study area.

[3] Species occurrence flagged by MNRF as part of correspondence for Aquafor's previous "Tuck Creek at Headon Road Species at Risk Summary Report", 2018

Species		COSEWIC Status	SARA Status	ESA Status	G-Rank	S-Rank	Data Source	Habitat Requirements (MNRF, 2000 unless otherwise sourced)	Assessment of Species Occurrence in Study Area
Scientific Name	**Common Name**								
Larus marinus	Great Black-backed Gull	-	-	-	G5	S2B	iNaturalist 2015	Breeds colonially along Atlantic coastlines or the great lakes in areas where they are isolated from predation, such as on islands or piers. Winters on the open sea, coastlines or in landfills where forage is abundant.	**Not Present:** Species was not observed in the study area during breeding bird surveys. No suitable coastal habitat is present within the study area. It is likely that the iNaturalist record may represent a transient individual.
Ardea alba	Great Egret	-	-	-	G5	S2B	OBBA	Nests in colonies within lakes, ponds, marshes, estuaries, impoundments, and islands. Uses large trees or shrubs for stick nests, most often in locations where predation is limited. Foraging occurs in similar shallow aquatic habitat containing fish.	**Not Present:** Species was not observed in the study area during breeding bird surveys. No suitable wetland habitat is present within the study area.
Rallus elegans	King Rail	END	END	END	G5	S2B	OBBA	Prefers densely vegetated shallow marshes with open standing water that transitions to shrubby areas. This species is mainly associated with coastal wetlands, but will also inhabit isolated wetlands (Government of Ontario, 2019 - 2).	**Not Present:** The study area does not contain open or shrubby wetland habitats suitable for this species.
Ixobrychus exilis	Least Bittern	THR	THR	THR	G4G5	S4B	OBBA	Deep marshes, swamps, bogs; marshy borders of lakes, ponds, streams, ditches; dense emergent vegetation of cattail, bulrush, sedge; nests in cattails; intolerant of loss of habitat and human disturbance.	**Not Present**: Marshes and swamps with sufficient depth and density of vegetation and lack of human disturbance are not present in the study area.
Clangula hyemalis	Long-tailed Duck	-	-	-	G5	S3B	iNaturalist 2019	An arctic species that breeds near wetlands and winters on large waterbodies such as lakes or open ocean.	**Not Present:** Preferred arctic habitat and open water are not present within the study area.
Colinus virginianus	Northern Bobwhite	END	END	END	G5	S1	OBBA	In Ontario, the northern bobwhite breeds in early successional habitats. This species requires a combination of three habitat types: woody cover such as thickets, fencerows or woodland edges that have tangles of vines and/or shrubs (winter forage and year-round cover), cropland with corn, soybeans or small grains and clover or grass (foraging) and grassland (nesting). These birds nest on the ground in a shallow depression lined with grasses and other dead vegetation (Brennan 1999). The distribution of native populations are restricted to southwestern Ontario. It is generally believed that the only natural population of this species in Ontario occurs on Walpole Island.	**Not Present:** The study area is lot located in an area of Southwestern Ontario where native populations are found.

Species		COSEWIC Status	SARA Status	ESA Status	G-Rank	S-Rank	Data Source	Habitat Requirements (MNRF, 2000 unless otherwise sourced)	Assessment of Species Occurrence in Study Area
Scientific Name	**Common Name**								
Contopus cooperi	Olive-sided Flycatcher	SC	THR	SC	G4	S4B	iNaturalist 2015	In Ontario, olive-sided flycatcher breeding habitat consists of natural openings in coniferous or mixed forests, including bogs, burns, riparian zones, and cutover areas. They are also found in semi-open forest stands and early successional forest when tall snags and residual live trees are present. In the boreal forest it is often associated with muskeg, bogs, fens and swamps dominated by spruce and tamarack. Open areas with tall trees or snags for perching are used for foraging (COSEWIC 2007 - 1). Nests are usually built on horizontal branches of conifers (Peck and James 1987).	**Not Present:** Species was not observed during breeding bird surveys. Preferred habitat features are not present in the study area, and nearest iNaturalist observation is located in Paletta Lakefront Park.
Falco peregrinus	Peregrine Falcon	-	SC	SC	G4	S3B	OBBA	In Ontario, peregrine falcon breeds in areas containing suitable nesting locations and sufficient prey resources. Such habitat includes both natural locations containing cliff faces (heights of 50 - 200 m preferred) and also anthropogenic landscapes including urban centres containing tall buildings, open pit mines and quarries, and road cuts. Peregrine Falcons nest on cliff ledges and crevices and building ledges, often located near water. Nests consist of a simple scrape in the substrate (COSEWIC 2007 - 2).	**Not Present:** Suitable nesting features are not present within the study area.
Charadrius melodus	Piping Plover	END	END	END	G3	S1B	iNaturalist 2017	This species exclusively nests on dry sandy or gravelly beaches above the high-water mark and wave action.	**Not Present:** Known breeding habitat of Piping Plover is restricted to the Georgian Bay and Lake Huron shorelines, outside of the study area.
Protonotaria citrea	Prothonotary Warbler	END	END	END	G5	S1B	OBBA	In Ontario, the prothonotary warbler breeds in mature and semi-mature, deciduous swamp forest with a closed canopy, and large expanses of relatively deep, open standing water. Swamps are typically dominated by silver maple, black ash, yellow birch, and black gum. These birds nest in tree cavities, favouring small, shallow holes often situated at low heights in dead or dying trees. Nests are typically situated over standing or slow-moving water. Artificial nest boxes are also readily accepted. This species is area sensitive and is seldom found in forests less than 100 ha in size (COSEWIC 2007).	**Not Present**: Woodlands within the study area are not conducive to breeding (i.e. insufficient in size and lacking swamp habitat feature). Species was not observed in the study area during field investigations.
Progne subis	Purple Martin	-	-	-	G5	S3S4B	OBBA	In their natural habitat, this species previously nested in dead tree snags containing cavities, usually previously excavated by woodpeckers. Currently, eastern Martins have started nesting almost exclusively in nest boxes supplied by humans. Foraging takes place in open areas such as over fields, meadows, ponds, watercourses and within cities.	**Not Present**: Species was not observed in the study area and no nest boxes were observed in the vicinity. Natural habitat (e.g., cavity trees) are present at various locations in woodlands, but given this species' strong preference for human structures it is considered unlikely for nesting to occur.

Species		COSEWIC Status	SARA Status	ESA Status	G-Rank	S-Rank	Data Source	Habitat Requirements (MNRF, 2000 unless otherwise sourced)	Assessment of Species Occurrence in Study Area
Scientific Name	**Common Name**								
Aythya americana	Redhead	-	-	-	G5	S2B, S4N	OBBA, iNaturalist 2020	Most often breeds in wetlands or ponds with abundant emergent vegetation in the Midwest prairie region, although have been known to use large marshes in Canada. The female chooses a site close to a larger marsh or lake where the she can raise her young once they have left the nest. This species migrates in large flocks utilizing large expanses of open water, including the great lakes.	**Not Present:** Suitable wetland nesting features and large expanses of open water are not present within the study area. Nearest iNaturalist records occur close to the Lake Ontario shoreline.
Melanerpes erythrocephalus	Red-Headed Woodpecker	THR	THR	SC	G5	S4B	OBBA	Found in a variety of habitats, including oak and beech forests, grasslands, forest edges, orchards, pastures, riparian forests, roadsides, urban parks, golf courses, cemeteries, beaver ponds and burns (COSEWIC, 2007). Requires cavity trees with at least 40 cm DBH; requires about 4 ha for a territory.	**Possibly Present**: Species was not observed in the study area. Potentially suitable habitat is present (particularly near Lansdown and Ireland Parks). As this species makes use of a wide variety of habitat features and types; Red-headed Woodpecker could feasibly occur in the study area in future, although there is no evidence that it is currently present.
Podiceps grisegena	Red-necked Grebe	-	-	-	G5	S3B, S4N	NHIC[4], OBBA, iNaturalist 2020	Primarily nests on large lakes with shallow areas containing abundant vegetation for cover and little human disturbance, although they have also been known to use a variety of other features such as wetlands, small lakes, wide ditches and small lakes. Will use a variety of habitats for migration, such as rivers, lakes, bays and open ocean, and typically winter along coastlines.	**Not Present:** Suitable lacustrine/aquatic nesting habitat is are not present within the study area. Nearest iNaturalist records occur close to the Lake Ontario shoreline.
Asio flammeus	Short-eared Owl	SC	SC	SC	G5	S2N S4B	OBBA	Grasslands, open areas or meadows that are grassy or bushy; marshes, bogs or tundra; both diurnal and nocturnal habits; ground nester; destruction of wetlands by drainage for agriculture is an important factor in the decline of this species; home range 25 -125 ha; requires 75-100 ha of contiguous open habitat.	**Not Present:** Species was not observed during breeding bird surveys. Preferred habitat (i.e., large tracts of grassland) is not present in the study area.
Vireo griseus	White-eyed Vireo	-	-	-	G5	S2B	OBBA, iNaturalist 2017	Typically found breeding in scrubland habitat, such as deciduous shrub thickets, overgrown fields and pastures, forest edges, young regenerating forests, brambles and shrubby riparian zones.	**Possibly Present**: Species was not observed in the study area during breeding bird surveys, although habitat in the vicinity may be suitable for this species (e.g. forest edges, young cultural woodland, etc.). Nearest iNaturalist records occur in Paletta Lakefront Park.
Hylocichla mustelina	Wood Thrush	THR	THR	SC	G5	S4B	OBBA, NHIC, eBird 2020	Nests mainly in second-growth and mature deciduous and mixed forests, with saplings and well-developed understory layers. Prefers large forest mosaics, but may also nest in small forest fragments.	**Possibly Present**: Species was not observed in the study area during breeding bird surveys. The most recent eBird record could potentially be a migrant, although habitat in the vicinity is suitable for this species.

[4] Species record obtained from the Natural Heritage Information Centre (NHIC) database, accessed via the online Make-a-Map: Natural Heritage Areas tool.

Species		COSEWIC Status	SARA Status	ESA Status	G-Rank	S-Rank	Data Source	Habitat Requirements (MNRF, 2000 unless otherwise sourced)	Assessment of Species Occurrence in Study Area
Scientific Name	**Common Name**								
Icteria virens	Yellow-breasted Chat	END	END	END	G5	S1B	OBBA	Breeds in early successional, shrub-thicket habitats including woodland edges, regenerating old fields, railway and hydro right-of-ways, young coniferous reforestations, and wet thickets bordering wetlands. Tangles of grape (*Vitis* spp.) and raspberry (*Rubus* spp.) vines are features of most breeding sites. There is some evidence that the yellow-breasted chat is an area sensitive species. Nests are located in dense shrubbery near to the ground.	**Possibly Present**: Species was not detected during field investigations. Potentially suitable habitat is present in open field or woodland edges throughout the study area, particularly where grape vines are present.
INVERTEBRATES									
Enallagma anna	River Bluet	-	-	-	G5	S2	Aquafor 2020	A riverine species typically found along small streams or creeks with slow flow and a riparian component. The only *Enallagma* species known to prefer streams and rivers instead of ponds and open water.	**Confirmed Present**: This species was observed in grassy margins of creek adjacent to Lansdown Park, potentially also elsewhere in the creek corridor.
Danaus plexippus	Monarch	END	SC	SC	G5	S2N, S4B	iNaturalist 2020, OBA[5]	Exist primarily where Milkweed (*Asclepias spp.*) (obligate larval host plant) and other wildflowers exist. This includes abandoned farmland, roadsides and other open spaces.	**Confirmed Present:** Confirmed photographic records are available for this species on the iNaturalist website for the vicinity of the study area. Suitable breeding habitat containing Milkweed is also present.
Neoscona crucifera	Hentz's Orbweaver	-	-	-	GNR	S3S4	iNaturalist 2019	A largely nocturnal species that mainly inhabits moist woodlands, but is sometimes found in anthropogenic landscapes as well, particularly close to artificial light that attracts flying insects near which it will build its web.	**Confirmed Present**: Species was not detected during field investigations, but presence of suitable moist woodland habitat and recent records in Ireland Park indicates this species is present.
Pieris virginiensis	West Virginia White	-	-	SC	G3?	S3	OBA	Moist, deciduous woodlands. Requires the presence of toothwort (*Cardamine* spp.) as larval host plant.	**Unlikely Present**: Toothwort species were only identified in small numbers within the study area.
Xenox tigrinus	Tiger Bee Fly	-	-	-	GNR	S3S4	iNaturalist 2019	Often found near wooden structures (e.g. fence posts) where its larval host - the Carpenter Bee (*Xylocopa* spp.) builds its nest (evidence as round holes in the wood). The female Tiger Bee Fly deposits an egg in an active Carpenter Bee nest, where its own hatched larvae will consume the larvae of the Carpenter Bee.	**Confirmed Present**: Species was not detected during field investigations, but presence of woody structures (e.g. trees) that could host its preferred prey, and a recent record within the study area adjacent Lansdown Park indicate this species is present.
MAMMALS									

[5] Species record obtained from the Ontario Butterfly Atlas (OBA) database, sourced using the online mapping tool - data square 17NJ90

Species		COSEWIC Status	SARA Status	ESA Status	G-Rank	S-Rank	Data Source	Habitat Requirements (MNRF, 2000 unless otherwise sourced)	Assessment of Species Occurrence in Study Area
Scientific Name	**Common Name**								
Myotis leibii	Eastern Small-footed Myotis	-	-	END	G4	S2S3	MNRF 2017	Overwintering habitat: Caves and mines that remain above 0°C. 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.	**Maternity Habitat - Potentially Present**: The presence of fractured shale and large cobble (particularly surrounding creek banks in some areas) may provide underground burrows or crevices. **Overwintering Habitat - Not Present:** Caves and mines are not present within the study area.
Myotis lucifugus	Little Brown Myotis	END	END	END	G5	S4	MNRF 2017	Overwintering habitat: Caves and mines that remain above freezing. Maternal roosts: Often associated with buildings (attics, barns, etc.). Occasionally found in trees (>25 cm dbh).	**Maternity Habitat - Potentially Present**: Large-diameter trees featuring suitable cavities, cracks or flaking bark were identified in wooded portions of the study area. **Overwintering Habitat - Not Present:** Caves and mines are not present within the study area.
Myotis septentrionalis	Northern Myotis	END	END	END	G4	S3	MNRF 2017	Overwintering habitat: Caves and mines that remain above 0°C. Maternal Roosts: Often associated with cavities of large diameter trees (>25 cm dbh). Occasionally found in structures (attics, barns etc.)	
Perimyotis subflavus	Tricoloured Bat	END	END	END	G5	S3?	MNRF 2017	Overwintering habitat: Caves and mines that remain above 0°C. Maternal Roosts: Can be in trees or dead clusters of leaves or arboreal lichens on trees; oaks and maples preferred. May also use barns or similar structures.	**Maternity Habitat - Potentially Present**: Large-diameter oaks and maples with potential for Tricolored Bat habitat were identified in wooded portions of the study area. **Overwintering Habitat - Not Present:** Caves and mines are not present within the study area.
PLANTS									
Carya glabra	Pignut Hickory	-	-	-	G5	S3	Aquafor 2020	Pignut Hickory is often found growing in association with other Hickories and Oaks, typically in moist, fertile soils of bottomland hardwood forests, upland slopes or on valley ridges.	**Confirmed Present**: One mature individual of this species was confirmed along the top of the valley slope adjacent to Lansdown Park. Potential for additional individuals is possible - particularly saplings, which may be overlooked in the presence of other young *Carya* spp.
Uvularia perfoliata	Perfoliate Bellwort	-	-	-	G5	S1S2	NHIC	Prefers upland deciduous woodlands with moist, loamy soil and moderate sun exposure provided by gaps in the canopy.	**Unlikely Present:** No Perfoliate Bellwort were observed during spring botanical inventories.
Juglans cinerea	Butternut	END	END	END	G4	S2?	NHIC	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. MECP considers Butternut habitat to be any suitable lands within 50 m of a Butternut tree.	**Not Present:** Species was not identified on the site during field investigations.

Species		COSEWIC Status	SARA Status	ESA Status	G-Rank	S-Rank	Data Source	Habitat Requirements (MNRF, 2000 unless otherwise sourced)	Assessment of Species Occurrence in Study Area
Scientific Name	**Common Name**								
Cornus florida	Eastern Flowering Dogwood	END	END	END	G2G3	S2	NHIC, iNaturalist 2016	Grows in the understory of dry to rich deciduous forests, especially on hillsides and riverbanks. It prefers sandy acidic soils but occasionally is found in loams, clays and organic soils. This species is restricted to the Carolinian zone of southern Ontario.	**Unlikely Present:** Species was not identified on the site during field investigations. Location of the closest iNaturalist record is obscured.
REPTILES AND AMPHIBIANS									
Crotalus horridus	Timber Rattlesnake	EXT	EXT	EXT	G4	SX	NHIC	The most recent Ontario record occurred in the Niagara Gorge in the 1940s. Timber rattlesnake's preferred habitat is coniferous or deciduous forests with rocky slopes and ledges.	**Not Present**: This species is known to be extirpated.
Ambystoma jeffersonianum	Jefferson Salamander	END	END	END	G4	S2	NHIC	Damp shady deciduous forest, swamps, moist pasture, lakeshores; temporary woodland pools for breeding; hides under leaf litter, stones or in decomposing logs.	**Unlikely Present**: Suitable vernal pools for breeding were not observed in wooded portions of the site.
Graptemys geographica	Northern Map Turtle	SC	SC	SC	G5	S3	iNaturalist 2020	Large bodies of water with soft bottoms and aquatic vegetation, basks on logs or rocks or on beaches and grassy edges. Uses soft soil or clean dry sand for nest sites, may nest some distance from water.	**Unlikely Present**: The study area lacks large, permanent bodies of water that would appeal to this species. Location of the closest iNaturalist record is obscured.
Chelydra serpentina	Snapping Turtle	SC	SC	SC	G5	S3	iNaturalist 2017	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.	**Unlikely Present**: The majority of wetland and aquatic habitat on the site is considered unsuitable for this species as the only marsh (Driftwood Park) lacks permanent standing water of any depth, and the watercourse is generally shallow and contains large substrates. Substrates within the riparian areas are frequently also composed of large cobble and shale, which are not ideal nesting conditions for this species. The nearest iNaturalist record occurs near Queensway Park in an urban setting.
FISH									
Anguilla rostrata	American Eel	THR	-	END	G4	S1?	NHIC	American Eel is native to the Lake Ontario, St. Lawrence River and Ottawa River watersheds. Their current distribution includes lakes Huron, Erie, and Superior and their tributaries. The Ottawa River population is considered extirpated. The preferred habitat of the American eel is cool water of lakes and streams with muddy or silty substrates in water temperatures between 16 and 19°C. The American eel is a catadromous fish that lives in fresh water until sexual maturity then migrates to the Sargasso Sea to spawn.	**Unlikely Present**: Suitable aquatic habitat for this species (e.g. muddy or silty substrate) is not present in the study area; Watercourses present are warm/coolwater, shallow and generally contain large substrates such as large cobble.

Brennan, L.A. 1999. Northern Bobwhite (Colinus virginianus) The Birds of North America Online (A. Poole, Ed.). Ithica: Cornell Lab of Ornithology. URL: http://bna.cornell.edu/bna/species/397

COSEWIC. 2007(1) COSEWIC assessment and status report on the Olive-sided Flycatcher Contopus cooperi in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vii + 25 pp.

COSEWIC. 2007(2) COSEWIC assessment and update status report on the Peregrine Falcon Falco peregrinus (pealei subspecies – Falco peregrinus and pealei anatum/tundrius – Falco peregrinus anatum/tundrius) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vii + 45 pp.

Government of Ontario. 2019 (1) *Black Tern*. Retrieved April 25, 2019 from: https://www.ontario.ca/page/black-tern

Government of Ontario. 2019 (2) *King Rail*. Retrieved April 25, 2019 from: https://www.ontario.ca/page/king-rail

Fisheries and Oceans Canada. 2020. *Aquatic Species At Risk Map*. Online resource. Retrieved December 17, 2020 from: http://www.dfo-mpo.gc.ca/species-especes/sara-lep/map-carte/index-eng.html

Peck, G. K. and R. D. James. 1987. The breeding birds of Ontario: nidiology and distribution. Volume 2: Passerines. Life Science Miscellaneous Publications, Royal Ontario Museum, Toronto, ON. 397 pp.

Whitehead, D. R. and T. Taylor. 2002. Acadian Flycatcher (Empidonax virescens). The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; URL: http://bna.birds.cornell.edu/bna/species/614

Appendix D –

Archaeological and Cultural Heritage Assessment Report

STAGE 1 ARCHAEOLOGICAL ASSESSMENT
TUCK CREEK EROSION CONTROL
PART OF LOTS 12-15, CON 1 SDS
AND PART OF LOT 11, CONS 2-3 SDS
(FORMER TOWNSHIP OF NELSON, COUNTY OF HALTON)
CITY OF BURLINGTON
REGIONAL MUNICIPALITY OF HALTON, ONTARIO

ORIGINAL REPORT

Prepared for:

Aquafor Beech Ltd.
55 Regal Road, Unit 3
Guelph, ON N1K 1B6

Archaeological Licence #P1066 (Lytle)
Ministry of Heritage, Sport, Tourism and Culture Industries PIF# P1066-0154-2020
ASI File: 20EA-146

27 October 2020

ASI Providing Archaeological & Cultural Heritage Services
528 Bathurst Street Toronto, ONTARIO M5S 2P9
416-966-1069 F 416-966-9723 asiheritage.ca

Stage 1 Archaeological Assessment
Tuck Creek Erosion Control
Part of Lots 12-15, Con 1 SDS
and Part of Lot 11, Cons 2-3 SDS
(Former Township of Nelson, County of Halton)
City of Burlington
Regional Municipality of Halton, Ontario

EXECUTIVE SUMMARY

Archaeological Services Inc. (ASI) was contracted by Aquafor Beech Ltd. to conduct a Stage 1 Archaeological Assessment (Background Research and Property Inspection) as part of the Tuck Creek Erosion Control EA in the City of Burlington. Tuck Creek exhibits varying conditions throughout its length, ranging from an entirely natural state to portions which have undergone some degree of channelization. Substantial erosion has taken place along many portions of Tuck Creek, generally in the areas left in a natural or partially natural condition. This Stage 1 Study Area consists of three segments of Tuck Creek, including erosion sites associated with this project:

- Segment 1: Harvester Road to hydro corridor;
- Segment 2: Palmer Drive to CN Rail; and
- Segment 3: Dundas Street to Headon Road

The Stage 1 background study determined that 26 previously registered archaeological sites are located within one kilometre of the Study Area. The property inspection determined that parts of the Study Area exhibits archaeological potential and will require Stage 2 assessment.

In light of these results, the following recommendations are made:

1. The Study Area exhibits archaeological potential. These lands require Stage 2 archaeological assessment by test pit survey at five metre intervals, where appropriate, prior to any proposed impacts to the property;

2. The remainder of the Study Area does not retain archaeological potential on account of deep and extensive land disturbance, low and wet conditions, slopes in excess of 20 degrees or being previously assessed. These lands do not require further archaeological assessment; and,

3. Should the proposed work extend beyond the current Study Area, further Stage 1 archaeological assessment should be conducted to determine the archaeological potential of the surrounding lands.

ASI

PROJECT PERSONNEL

Senior Project Manager:	Lisa Merritt, MSc. (P094) *Partner / Director* *Environmental Assessment Division*
Project Coordinator:	Hannah Brouwers, Hon. BA (R1270) *Archaeologist / Project Administrator* *Environmental Assessment Division*
	Katrina Thach, Hon. BA (R1225) *Archaeologist / Project Coordinator* *Environmental Assessment Division*
Project Director (Licensee):	Jessica Lytle, MSc (P1066) *Associate Archaeologist / Project Manager* *Environmental Assessment Division*
Project Manager:	Eliza Brandy, MA (R1109) *Associate Archaeologist / Project Manager* *Environmental Assessment Division*
Field Director:	Jessica Lytle
Report Preparation:	Eliza Brandy
	Danielle Bella, Hon. BA *Archaeologist / Technical Writer* *Environmental Assessment Division*
Graphics:	Andrew Clish, BES (P046) *Senior Archaeologist / Senior Field Director, Laboratory & Fieldwork Services* *Operations Division*
	Eric Bongelli, MA *Archaeologist / Geomatics Specialist* *Operations Division*
	Robin Latour, MPhil, PDip *Associate Archaeologist / Geomatics Specialist* *Operations Division*
Report Reviewer:	Lisa Merritt

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1.0 PROJECT CONTEXT

Archaeological Services Inc. (ASI) was contracted by Aquafor Beech Ltd. to conduct a Stage 1 Archaeological Assessment (Background Research and Property Inspection) as part of the Tuck Creek Erosion Control EA in the City of Burlington (Figure 1). Tuck Creek exhibits varying conditions throughout its length, ranging from an entirely natural state to portions which have undergone some degree of channelization. Substantial erosion has taken place along many portions of Tuck Creek, generally in the areas left in a natural or partially natural condition. This Stage 1 Study Area consists of three segments of Tuck Creek, including erosion sites associated with this project (see Figures 11-16: areas outlined in yellow):

- Segment 1: Harvester Road to hydro corridor;
- Segment 2: Palmer Drive to CN Rail; and
- Segment 3: Dundas Street to Headon Road

All activities carried out during this assessment were completed in accordance with the *Ontario Heritage Act* (1990, as amended in 2018) and the 2011 *Standards and Guidelines for Consultant Archaeologists* (S & G), administered by the Ministry of Heritage, Sport, Tourism and Culture Industries (MHSTCI 2011), formerly the Ministry of Tourism, Culture and Sport.

1.1 Development Context

All work has been undertaken as required by the *Environmental Assessment Act,* RSO (Ministry of the Environment 1990 as amended 2010) and regulations made under the Act, and are therefore subject to all associated legislation. This project is being conducted in accordance with the Municipal Engineers' Association document *Municipal Class Environmental Assessment* (2000 as amended in 2007, 2011 and 2015).

The *Archaeological Master Plan for the Regional Municipality of Halton* (ASI 1998) and the 2008 Update (ASI 2008) were also consulted.

Authorization to carry out the activities necessary for the completion of the Stage 1 archaeological assessment was granted by Aquafor Beech Ltd. on July 28, 2020.

1.2 Historical Context

The purpose of this section, according to the S & G*,* Section 7.5.7, Standard 1, is to describe the past and present land use and the settlement history and any other relevant historical information pertaining to the Study Area. A summary is first presented of the current understanding of the Indigenous land use of the Study Area. This is then followed by a review of the historical Euro-Canadian settlement history.

1.2.1 Indigenous Land Use and Settlement

Southern Ontario has been occupied by human populations since the retreat of the Laurentide glacier approximately 13,000 years before present (BP) (Ferris 2013). Populations at this time would have been highly mobile, inhabiting a boreal-parkland similar to the modern sub-arctic. By approximately 10,000

BP, the environment had progressively warmed (Edwards and Fritz 1988) and populations now occupied less extensive territories (Ellis and Deller 1990).

Between approximately 10,000-5,500 BP, the Great Lakes basins experienced low-water levels, and many sites which would have been located on those former shorelines are now submerged. This period produces the earliest evidence of heavy wood working tools, an indication of greater investment of labour in felling trees for fuel, to build shelter, and watercraft production. These activities suggest prolonged seasonal residency at occupation sites. Polished stone and native copper implements were being produced by approximately 8,000 BP; the latter was acquired from the north shore of Lake Superior, evidence of extensive exchange networks throughout the Great Lakes region. The earliest evidence for cemeteries dates to approximately 4,500-3,000 BP and is indicative of increased social organization, investment of labour into social infrastructure, and the establishment of socially prescribed territories (Ellis et al. 1990; Ellis et al. 2009; Brown 1995:13).

Between 3,000-2,500 BP, populations continued to practice residential mobility and to harvest seasonally available resources, including spawning fish. The Woodland period begins around 2,500 BP and exchange and interaction networks broaden at this time (Spence et al. 1990:136, 138) and by approximately 2,000 BP, evidence exists for small community camps, focusing on the seasonal harvesting of resources (Spence et al. 1990:155, 164). By 1,500 BP there is macro botanical evidence for maize in southern Ontario, and it is thought that maize only supplemented people's diet. There is earlier phytolithic evidence for maize in central New York State by 2,300 BP - it is likely that once similar analyses are conducted on Ontario ceramic vessels of the same period, the same evidence will be found (Birch and Williamson 2013:13–15). As is clearly evident in the detailed ethnographies of Anishinaabeg populations, winter was a period during which some families would depart from the larger group as it was easier to sustain smaller populations (Rogers 1962). It is generally understood that these populations were Algonquian-speakers during these millennia of settlement and land use.

From the beginning of the Late Woodland period at approximately 1,000 BP, lifeways became more similar to that described in early historical documents. Between approximately 1000-1300 Common Era (CE), the communal site is replaced by the village focused on horticulture. Seasonal disintegration of the community for the exploitation of a wider territory and more varied resource base was still practised (Williamson 1990:317). By 1300-1450 CE, this episodic community disintegration was no longer practised and populations now communally occupied sites throughout the year (Dodd et al. 1990:343). From 1450-1649 CE this process continued with the coalescence of these small villages into larger communities (Birch and Williamson 2013). Through this process, the socio-political organization of the First Nations, as described historically by the French and English explorers who first visited southern Ontario, was developed. By 1600 CE, the communities within Simcoe County had formed the Confederation of Nations encountered by the first European explorers and missionaries. In the 1640s, the traditional enmity between the Haudenosaunee[1] and the Huron-Wendat (and their Algonquian allies such as the Nippissing and Odawa) led to the dispersal of the Huron-Wendat.

Ojibwa were first encountered by Samuel de Champlain in 1615 along the eastern shores of Georgian Bay. While he probably met Odawa, Etienne Brule later encountered other groups and by 1641, Jesuits had journeyed to Sault Sainte Marie (Thwaites 1896:11:279) and opened the Mission of Saint Peter in 1648 for the occupants of Manitoulin Island and the northeast shore of Lake Huron. The Jesuits reported

[1] The Haudenosaunee are also known as the New York Iroquois or Five Nations Iroquois and after 1722 Six Nations Iroquois. They were a confederation of five distinct but related Iroquoian–speaking groups – the Seneca, Onondaga, Cayuga, Oneida, and Mohawk. Each lived in individual territories in what is now known as the Finger Lakes district of Upper New York. In 1722 the Tuscarora joined the confederacy.

that these Algonquian peoples lived "solely by hunting and fishing and roam as far as the "Northern sea" to trade for "Furs and Beavers, which are found there in abundance" (Thwaites 1901, 33:67), and "all of these Tribes are nomads, and have no fixed residence, except at certain seasons of the year, when fish are plentiful, and this compels them to remain on the spot" (Thwaites 1896-1901: 33:153). The locations of both Iroquoian and Algonquian groups at the time of first contact are well-documented. The Nipissing lived near Lake Nipissing, which was on the historic route between Quebec and the Huron-Wendat country; some wintered with the Huron-Wendat (Thwaites 1896-1901: 14:7; 18: 229; 21:239; 23:227; 33:153). Other Algonquian-speaking groups who wintered with the Huron-Wendat included the Algonquin led by Captain Yroquet in 1615-16 (Biggar 1971:3:94); the Tontthrataronons (an Algonquin tribe), about fifteen cabins of which were wintering near the mission of Saint Jean Baptiste to the Arendaehronons in the Relation of 1640-41 (Thwaites 1896-1901: 21: 247); some Island Algonquins noted in the Relation of 1643-44 (Thwaites 1896-1901: 26:301); and a village of the Atontrataronnon Algonquins, who abandoned their country on the shores of the St. Lawrence because of attacks from the Haudenosaunee to live in safety near the village of Saint Jean Baptiste as noted in the Relation of 1643-44 (Thwaites 1896-1901: 27:37).

Shortly after dispersal of the Huron-Wendat, the Haudenosaunee established a series of settlements at strategic locations along the trade routes inland from the north shore of Lake Ontario. From east to west, these villages consisted of Ganneious, on Napanee Bay, an arm of the Bay of Quinte; Quinte, near the isthmus of the Quinte Peninsula; Ganaraske, at the mouth of the Ganaraska River; Quintio, at the mouth of the Trent River on the north shore of Rice Lake; Ganatsekwyagon (or Ganestiquiagon), near the mouth of the Rouge River; Teyaiagon, near the mouth of the Humber River; and Quinaouatoua, on the portage between the western end of Lake Ontario and the Grand River (Konrad 1981:135). Their locations near the mouths of the Humber and Rouge Rivers, two branches of the Toronto Carrying Place, strategically linked these settlements with the upper Great Lakes through Lake Simcoe. The inhabitants of these villages were agriculturalists, growing maize, pumpkins and squash, but their central roles were that of portage starting points and trading centres for Iroquois travel to the upper Great Lakes for the annual beaver hunt (Konrad 1974; Williamson et al. 2008:50–52). Ganatsekwyagon, Teyaiagon, and Quinaouatoua were primarily Seneca; Ganaraske, Quinte and Quintio were likely Cayuga, and Ganneious was Oneida, but judging from accounts of Teyaiagon, all of the villages might have contained peoples from a number of the Iroquois constituencies (ASI 2013).

E.S. Roger's chapter "Southeastern Ojibwa" in the *Smithsonian Handbook of Northamerican Indians, Northeast Volume* was constructed using both Anishinaabeg oral tradition and the European documentary record. The history of Anishinaabeg movement from along the north shore of Lake Huron and their military actions against the Haudenosaunee is based almost entirely on Anishinaabeg oral tradition provided by elders such as Kahgegagahbowh (George Copway) and Robert Paudash.

Kahgegagahbowh was born among the Mississauga in 1818 and followed a traditional lifestyle until his family converted to Christianity. He became a Methodist missionary in Canada and the US, including to the Saugeen Mission for a period, and later a popular author and lecturer (MacLeod 1992:197; Smith 2000). Rogers notes that this movement included those populations that were later known as the Chippewa, Ojibwa, Mississauga, and Saulteaux or "Southeastern Ojibwa" groups. He also noted linguistic differences between those groups split between Central Ojibwa-Odawa, spoken primarily by the Odawas of Manitoulin Island and Michigan and some Ojibwas (or Chippewas) of the Lower Peninsula of Michigan and that part of southwestern Ontario lying west of a north-south line drawn through the base of the Bruce peninsula east of which is spoken the second major dialect, spoken by Ojibwa (or Chippewa) and Mississauga. There is also sub-dialectical variation within each major dialect, and some groups and individuals whose speech is fundamentally of one type use forms characteristic of the other.

According to Kahgegagahbowh, the objectives of campaigns against the Haudenosaunee were to create a safe trade route between the French and the Ojibway, to regain the land abandoned by the Huron-Wendat and "drive the Iroquois wholly from the peninsula." Kahgegagahbowh describes more than 700 canoes meeting near Sault Ste Marie and splitting into three parties for a three-pronged attack via the Ottawa River, Lake Simcoe and along the Trent River, and the St. Clair River, and all of which had fierce engagements with the Haudenosaunee. While various editions of Kahgegagahbowh's book have these battles occurring in the mid-seventeenth century, common to all is a statement that the battles occurred around 40 years after the dispersal of the Huron-Wendat (Copway 1850:88; Copway 1851:91; Copway 1858:91). Various scholars agree with this timeline ranging from 1687, in conjunction with Denonville's attack on Seneca villages (Johnson 1986:48; Schmalz 1991:21–22) to around the mid- to late-1690s leading up to the Great Peace of 1701 (Schmalz 1977:7; Bowman 1975:20; Smith 1975:215; Tanner 1987:33; Von Gernet 2002:7–8).

Robert Paudash's 1904 account of Mississauga origins is like that of Kahgegagahbowh's and relies on oral history. It came from Paudash's father, who died at the age of 75 in 1893 and was the last hereditary chief of the Mississauga at Rice Lake. His account in turn came from his father Cheneebeesh, who died in 1869 at the age of 104 and was the last sachem or Head Chief of all the Mississaugas. He also relates a story of origin on the north shore of Lake Huron near the river that gave them their name having been founded by a party of Shawnee (Paudash 1905:7–8) and later, after the dispersal of the Huron-Wendat, carrying out coordinated attacks against the Haudenosaunee. Francis Assikinack (1858:308–309) provides similar details on battles with the Haudenosaunee. Francis Assikinack (b. 1824) was an Ojibwa of Manitoulin Island. He enrolled at Upper Canada College when he was 16 and after graduation, worked for the Indian Department as an interpreter, clerk, and teacher.

During the 1690s, the Anishinaabeg replaced, it appears by force, the Haudenosaunee who had settled after 1650 along the north shores of Lake Ontario. By the first decade of the eighteenth century, the Michi Saagiig had settled at the mouth of the Humber, near Fort Frontenac at the east end of Lake Ontario and the Niagara region and within decades were well re-established in the region. In 1736, the French estimated there were 60 men at Lake Saint Clair and 150 among small settlements at Quinte, the head of Lake Ontario, the Humber River, and Matchedash (Rogers 1978:761).

Peace was achieved between the Haudenosaunee and the Anishinaabeg Nations in August of 1701 when representatives of more than twenty Anishinaabeg Nations assembled in Montreal to participate in peace negotiations (Johnston 2004:10). During these negotiations captives were exchanged and the Iroquois and Anishinaabeg agreed to live together in peace. Peace between these nations was confirmed again at council held at Lake Superior when the Iroquois delivered a wampum belt to the Anishinaabeg Nations.

In 1763, following the fall of Quebec, New France was transferred to British control at the Treaty of Paris. The British government began to pursue major land purchases throughout Ontario in the early nineteenth century, and entered into negotiations with various Nations for additional tracts of land as the need arose to facilitate European settlement.

From the beginning of the eighteenth century to the assertion of British sovereignty in 1763, there is no interruption to Anishinaabeg control and use of southern Ontario. While hunting in the territory was shared, and subject to the permission of the various nations for access to their lands, its occupation was by Anishinaabeg until the assertion of British sovereignty, the British thereafter negotiating treaties with them. Eventually, with British sovereignty, tribal designations changed (Smith 1975:221–222; Surtees 1985:20–21). The word "Saulteux," for example, was gradually substituted by "Chippewa" while the

north shore of Lake Ontario groups became known as "Mississauga," although some observers, like John Graves Simcoe, described them as a branch of the "Chippewa" and the two terms were often used as synonyms. The nineteenth-century Mississauga also called themselves "Ojibwa," especially when addressing an English-speaking audience (Jones 1861:31).

The Study Area is within Treaty 3. In 1792, under the terms of the "Between the Lakes Purchase" signed by Sir Frederick Haldimand and the Mississaugas, the Crown acquired over one million acres of land in-part spanning westward from near modern day Niagara-on-the-Lake along the north shore of Lake Ontario to modern day Burlington. The Study Area is also within Treaty 3 ¾, signed in 1795 and confirmed in 1797 between the Mississaugas and the Crown for the parcel of 3450 acres on the present site of the City of Burlington, as chosen by Mohawk Chief Joseph Brant in recognition of his military service in the American Revolutionary War (Mississaugas of the Credit First Nation 2017; Aboriginal Affairs and Northern Development Canada 2016).

1.2.2 Euro-Canadian Land Use: Township Survey and Settlement

Historically, the Study Area is located in the Former Nelson Township, County of Halton in part of Lots 12-15 & Concession 1 South of Dundas Street (SDS) and Part of Lot 11 & Concessions 2-3 SDS.

The S & G stipulates that areas of early Euro-Canadian settlement (pioneer homesteads, isolated cabins, farmstead complexes), early wharf or dock complexes, pioneer churches, and early cemeteries are considered to have archaeological potential. Early historical transportation routes (trails, passes, roads, railways, portage routes), properties listed on a municipal register or designated under the *Ontario Heritage Act* or a federal, provincial, or municipal historic landmark or site are also considered to have archaeological potential.

For the Euro-Canadian period, the majority of early nineteenth century farmsteads (i.e., those that are arguably the most potentially significant resources and whose locations are rarely recorded on nineteenth century maps) are likely to be located in proximity to water. The development of the network of concession roads and railroads through the course of the nineteenth century frequently influenced the siting of farmsteads and businesses. Accordingly, undisturbed lands within 100 m of an early settlement road are also considered to have potential for the presence of Euro-Canadian archaeological sites.

The first Europeans to arrive in the area were transient merchants and traders from France and England, who followed Indigenous pathways and set up trading posts at strategic locations along the well-traveled river routes. All of these occupations occurred at sites that afforded both natural landfalls and convenient access, by means of the various waterways and overland trails, into the hinterlands. Early transportation routes followed existing Indigenous trails, both along the lakeshore and adjacent to various creeks and rivers (ASI 2006).

Nelson Township

The land within the Township of Nelson was acquired by the British from the Mississaugas in 1795. The first township survey was undertaken in 1806, and the first legal settlers occupied their land holdings in the same year. The township was first named "Alexander Township" in honour of Alexander Grant, the administrator of Upper Canada. In 1806, it was renamed in honour of Horatio Viscount Nelson, after his victory at Cabo Trafalgar in Spain the previous year. Nelson was initially settled by the children of Loyalists, soldiers who served during the War of 1812, and by immigrants from England, Scotland and

Ireland. By the 1840s, the township was noted for its good land and excellent farms (Smith 1846a:121; Armstrong 1985:143; Rayburn 1997:237). In 1817, it was estimated that the Township of Nelson contained sixty-eight inhabited houses, with a total population of 476. At that time it contained two grist mills and three saw mills (Smith 1851:257–258; Pope 1877:60). The oldest principal village in the township during the nineteenth century was Burlington, which had originally been named "Wellington Square." Other villages within the township during the nineteenth century included Nelson, Zimmerman, Lowville, Willbrook, Cumminsville and Kilbride (Smith 1846a:121; Crossby 1873a:92; Pope 1877:38–39). By the 1850s, Nelson had 3,792 inhabitants and was well settled with schools, churches, prosperous farms and an established system of municipal government (Smith 1851:258; Walker & Miles 1877:60). Additional prosperity came with the Toronto branch of the Great Western Railway, constructed across the township in 1854-55. In 1878, the Northern and North Western Railway constructed a rail line diagonally across the township between the towns of Burlington and Milton. This line is now owned and operated by the Canadian National Railway.

Nelson

The historic community of Nelson, presently located in the City of Burlington, is located at the cross roads of Dundas Street and Guelph Line. This post office village was laid out on fifty building lots, most of which measured fifty feet in width. The exceptions were lots 17, 18 and 50 which were slightly irregular due to the angle of the sideline road allowance. This village may have been in existence as early as 1822, when the post office was first opened here. The original name, "Hannahsville," was given in honour of Hannah Green, daughter of John and Mary Davis Green, and later the wife of Caleb Hopkins. The first known postmaster was William Chisholm in 1832. In 1846, it contained about fifty inhabitants, a store, tavern and post office. By about 1850, the population had doubled to approximately 100 inhabitants. The village then contained three churches, Episcopal, Presbyterian and Methodist. In 1851, the population stood at 125. The village was connected to Dundas, Hamilton and Toronto by coach. A period Directory listed thirty-two primary business and professional men. The trades listed included those of attorney, Presbyterian clergyman, merchants, mill owner, insurance agent, saw miller, tailors, innkeepers, wagon maker, postmaster, cabinet maker, tanners, saddlers and boot and shoe makers. By 1873, the population had decreased slightly, to about 100 inhabitants. A registered plan of this village was compiled in 1873. By 1877, the village contained a public hall which was used for the township meetings, Division courts and for other purposes. It also contained a brick schoolhouse, drill shed, hotel, harness shop and telegraph office. The annual agricultural society exhibition was held at this location. The longest serving postmaster was D.W. Springer, who held that office from April 1868 until the closure of the office in November 1913 (Smith 1846b:121, 262; Smith 1851:257; MacKay 1851:111; Crossby 1873b:208; Walker and Miles 1877:60; Emery 1967:77–80; Armstrong 1985; Turcotte 1989)

Railways

The Great Western Railway (GWR) was originally incorporated in 1834 as the London and Gore Railroad Co. and changed its name to the GWR in 1853. It received considerable promotion by Allan Napier MacNab, Isaac and Peter Buchanan, R.W. Harris and John Young. Aided by government guarantees and supported by foreign American and British investment, the GWR opened its mainline (Windsor-London-Hamilton-Niagara Falls) in 1854. By 1882, it was operating throughout southwestern Ontario and even into Michigan. In 1882 it merged with the Grand Trunk Railway (GTR) in an attempt to successfully compete with rival American railroads for American through-traffic between Michigan and New York states (Baskerville 2015).

The Hamilton Radial Electric Railway (HRER) was an electric street railway constructed between 1896 and 1906 from Hamilton to Oakville along New/Rebecca Street. It ceased operations by 1929 and the tracks were later torn up (Hamilton Transit History 2019).

1.2.3 Historical Map Review

The 1858 *Map of the County of Halton* (Tremaine 1858), and the 1877 *Illustrated Historical Atlas of the County of Halton*, Township of Nelson page (Pope 1877) were examined to determine the presence of historic features within the Study Area during the nineteenth century (Table 1; Figures 2-3).

It should be noted, however, that not all features of interest were mapped systematically in the Ontario series of historical atlases, given that they were financed by subscription, and subscribers were given preference with regard to the level of detail provided on the maps. Moreover, not every feature of interest would have been within the scope of the atlases.

In addition, the use of historical map sources to reconstruct/predict the location of former features within the modern landscape generally proceeds by using common reference points between the various sources. These sources are then geo-referenced in order to provide the most accurate determination of the location of any property on historic mapping sources. The results of such exercises are often imprecise or even contradictory, as there are numerous potential sources of error inherent in such a process, including the vagaries of map production (both past and present), the need to resolve differences of scale and resolution, and distortions introduced by reproduction of the sources. To a large degree, the significance of such margins of error is dependent on the size of the feature one is attempting to plot, the constancy of reference points, the distances between them, and the consistency with which both they and the target feature are depicted on the period mapping.

Table 1: Nineteenth-century property owner(s) and historical features(s) within or adjacent to the Study Area

		1858		*1877*	
Con #	**Lot #**	**Property Owner(s)**	**Historical Feature(s)**	**Property Owner(s)**	**Historical Feature(s)**
1 SDS	12	Gilbert Bastedo	Tuck Creek	David Bastedo	Tuck Creek
1 SDS	13	George Calvert	Tuck Creek	Jno & Wm Hayden	Tuck Creek, structure
1 SDS	14	James Ireland	Tuck Creek	Heirs of Jas Ireland	Tuck Creek
1 SDS	15	Stephen Atkinson	Nelson	Stepn Atkinson	Tuck Creek, post office, structure
2 SDS	11	Daniel Hall	Tuck Creek	Danl Hall	Tuck Creek, structure, orchard (x2)
		Jacob Cline	Tuck Creek	Jacob Cline	Tributary
3 SDS	11	Thos Alton	Tuck Creek, railway	Anson Cline	Tuck Creek, railway
		Hiram Walker	Tuck Creek	Hiram Walker	Tuck Creek

The 1858 map depicts Tuck Creek, roughly following the alignment of the Study Area. Dundas Street, Upper Middle Road, Walker's Line and Guelph Line were historically surveyed roads. The Hamilton & Toronto Railway intersects the Segment 1 Study Area in Lot 11, Concession 3 South of Dundas Street (SDS) at the south end of northern part belonging to Thomas Alton. The community of Nelson is at the

corner of Dundas Street and Guelph Line, adjacent the most northern portion of Segment 3. The 1877 map indicates the Hamilton & Toronto Railway has become the Toronto Branch of the Great Western Railway. Nelson is shown to have a post office, and a structure is indicated to be at the most northern portion of Segment 3. A structure is shown on the property of John and William Hayden on Lot 13, Concession 1, north of Tuck Creek and Segment 3. An orchard is shown within the Study Area of Segment 2, at its north end on the property of Daniel Hall on Lot 11, Concession 2. A second orchard and structure are shown to its north. The Hamilton & North Western Railway has been built and is shown south of Segment 2.

1.2.4 Twentieth-Century Mapping Review

The National Topographic System (NTS) 1909 Hamilton Sheet and 1999 Hamilton-Burlington Sheets, as well as the 1954 aerial photograph of the City of Burlington (DMD 1919; Hunting Survey Corporation Limited 1954; Natural Resources Canada 1999) were examined to determine the extent and nature of development and land uses within the Study Area (Figures 4-6).

The 1909 map shows two crossings for Tuck Creek at Dundas Street. By this time, Nelson is shown to have a hotel, blacksmith shop, school, and post office. One Structure is shown within the Study Area at the inner fork of Segment 3. Both railways are now labelled Grand Trunk Railway and have crossings for Tuck Creek where they intersect.

The 1954 aerial photograph shows the Study Area is largely open agricultural field with some treed areas. A road allowance passes through the Study Area at the fork between Guelph Line and Headon Road. The fork is in a different alignment than it is currently. The structure at the fork from the 1909 map is visible. A structure can be seen off Headon Road adjacent the north end of Segment 1. By 1999, the area surrounding the Study Area is largely built up and residential, with an industrial and commercial area from north of Mainway to south of Fairview Street. Recreational green spaces are shown within the majority of Segment 3 (Ireland Park), the northern portion of Segment 2 (Lansdown Park), and the southern part of Segment 1 (Ryerson Park).

1.3 Archaeological Context

This section provides background research pertaining to previous archaeological fieldwork conducted within and in the vicinity of the Study Area, its environmental characteristics (including drainage, soils or surficial geology and topography, etc.), and current land use and field conditions. Three sources of information were consulted to provide information about previous archaeological research: the site record forms for registered sites available online from the MHSTCI through "Ontario's Past Portal"; published and unpublished documentary sources; and the files of ASI.

1.3.1 Current Land Use and Field Conditions

A review of available Google satellite imagery since 2004 shows that the Study Area has remained relatively unchanged.

A Stage 1 property inspection was conducted on September 14, 2020. It noted that Segment 1 is located along Tuck Creek from Harvester Road to the hydro corridor south of Ryerson Park. In the north end,

Segment 1 is bounded by commercial and industrial businesses and parking lots. The southern end is bounded by residential subdivisions and Ryerson Park.

Segment 2 is located along Tuck Creek from Palmer Drive to the CN Rail. In the north, it is bounded by a residential subdivision and Lansdown Park. The south end is bounded by commercial and industrial businesses.

Segment 3 is located along Tuck Creek from Dundas Street to Headon Road, not including between Driftwood Drive to Berkshire Lane. Between Dundas Street and Driftwood Drive, Segment 3 is bounded by a residential subdivision and Driftwood Park. Between Berkshire Lane and Headon Road, Segment 3 is bounded by a residential subdivision and Ireland Park.

Channelization of Tuck Creek can be seen within Ireland Park and the Hydro Corridor in Segment 3, and the surrounding park and subdivisions have been graded. In addition, erosion control measures can be seen throughout the Study Area. Terrafix blocks can be seen within Ireland Park and north of the hydro corridor in Segment 3. Armourstones are used south of the hydro corridor in Segment 3 and south of Harvester Road in Segment 1. Gabion baskets are used north of the CN Railroad in Segment 2.

Erosion has occurred along portions of the creek generally within the natural or partially natural areas. There are seven identified erosion sites as part of this project:between the CN Railroad and Harvester Road in Segment 1; north of the CN Railroad, and between Hannibal Road and Ketelbey Court in Segment 2; north of Golden Eagle Drive, west of Keith Close, and north of Autumn Hill Court in Segment 3.

1.3.2 Geography

In addition to the known archaeological sites, the state of the natural environment is a helpful indicator of archaeological potential. Accordingly, a description of the physiography and soils are briefly discussed for the Study Area.

The S & G stipulates that primary water sources (lakes, rivers, streams, creeks, etc.), secondary water sources (intermittent streams and creeks, springs, marshes, swamps, etc.), ancient water sources (glacial lake shorelines indicated by the presence of raised sand or gravel beach ridges, relic river or stream channels indicated by clear dip or swale in the topography, shorelines of drained lakes or marshes, cobble beaches, etc.), as well as accessible or inaccessible shorelines (high bluffs, swamp or marsh fields by the edge of a lake, sandbars stretching into marsh, etc.) are characteristics that indicate archaeological potential.

Water has been identified as the major determinant of site selection and the presence of potable water is the single most important resource necessary for any extended human occupation or settlement. Since water sources have remained relatively stable in Ontario since 5,000 BP (Karrow and Warner 1990:Figure 2.16), proximity to water can be regarded as a useful index for the evaluation of archaeological site potential. Indeed, distance from water has been one of the most commonly used variables for predictive modeling of site location.

Other geographic characteristics that can indicate archaeological potential include: elevated topography (eskers, drumlins, large knolls, and plateaux), pockets of well-drained sandy soil, especially near areas of heavy soil or rocky ground, distinctive land formations that might have been special or spiritual places,

such as waterfalls, rock outcrops, caverns, mounds, and promontories and their bases. There may be physical indicators of their use, such as burials, structures, offerings, rock paintings or carvings. Resource areas, including; food or medicinal plants (migratory routes, spawning areas) are also considered characteristics that indicate archaeological potential (S & G, Section 1.3.1).

The Study Area is located within the escarpment, drumlinized till plains, shale plains, and sand plains (Figure 7) of the Niagara Escarpment, South Slope, and Iroquois Plain physiographic regions of southern Ontario (Chapman and Putnam 1984).

The Niagara Escarpment is by far one of the most prominent features in southern Ontario, and extends from the Niagara River to the northern tip of the Bruce Peninsula, continuing through the Manitoulin Islands (Chapman and Putnam 1984:114-122). Vertical cliffs along the brow mostly outline the edge of the dolostone of the Lockport and Amabel Formations, which the slopes below are carved in red shale. Flanked by landscapes of glacial origin, the rock-hewn topography stands in striking contrast, and its steep-sided valleys are strongly suggestive of non-glacial regions. From Queenston, on the Niagara River, westward to Ancaster, the escarpment is a simple topographic break separating the two levels of the Niagara Peninsula.

The South Slope physiographic region (Chapman and Putnam 1984:172-174) is the southern slope of the Oak Ridges Moraine. The South Slope meets the Moraine at heights of approximately 300 metres above sea level, and descends southward toward Lake Ontario, ending, in some areas, at elevations below 150 metres above sea level. Numerous streams descend the South Slope, having cut deep valleys in the till.

The Iroquois Plain physiographic region of southern Ontario is a lowland region bordering Lake Ontario. This region is characteristically flat, and formed by lacustrine deposits laid down by the inundation of Lake Iroquois, a body of water that existed during the late Pleistocene. This region extends from the Trent River, around the western part of Lake Ontario, to the Niagara River, spanning a distance of 300 km (Chapman and Putnam 1984:190). The old shorelines of Lake Iroquois include cliffs, bars, beaches and boulder pavements. The old sandbars in this region are good aquifers that supply water to farms and villages. The gravel bars are quarried for road and building material, while the clays of the old lake bed have been used for the manufacture of bricks (Chapman and Putnam 1984:196).

Figure 8 depicts surficial geology for the Study Area. The surficial geology mapping demonstrates that the Study Area is underlain by clay to silt-textured till derived from glaciolacustrine deposits or shale, Paleozoic bedrock, and by coarse-textured glaciolacustrine deposits of sand, gravel, minor silt and clay (Ontario Geological Survey 2010). A glacial flute lies south of the northernmost portion of Segment 3. Soils in the Study Area consist of the imperfectly drained gray-brown luvisols Chinguacousy clay loam, Chinguacousy rock phase clay loam, and Brady sandy loam, as well as the well drained gray-brown luvisol Oneida clay loam (Figure 9).

The Study Area follows Tuck Creek, a watershed approximately 10.6 square kilometres in size, originating on the Niagara Escarpment and flowing southeast through the City of Burlington into Lake Ontario, ranging from natural to channelized conditions throughout its course (Aquafor Beech Ltd. 2012). Tuck Creek is part of the Burlington Urban Creeks watershed. The Burlington Urban Creeks watershed is one of 14 smaller watersheds along the north shore of Lake Ontario that make up the Urban Creek Watershed; spanning mainly the cities of Burlington and Oakville (Conservation Halton 2008). Originating below the Niagara Escarpment, the Urban Creek watershed drains southeast into Burlington Bay and Lake Ontario. The vast majority of the Urban Creek watershed is heavily developed, roads and utility corridors cross the majority of its waterways.

1.3.3 Previous Archaeological Research

In Ontario, information concerning archaeological sites is stored in the Ontario Archaeological Sites Database (OASD) maintained by the MHSTCI. This database contains archaeological sites registered within the Borden system. Under the Borden system, Canada has been divided into grid blocks based on latitude and longitude. A Borden block is approximately 13 km east to west, and approximately 18.5 km north to south. Each Borden block is referenced by a four-letter designator, and sites within a block are numbered sequentially as they are found. The Study Area under review is located in Borden blocks *AiGx* and *AiGw.*

According to the OASD, 26 previously registered archaeological sites are located within one kilometre of the Study Area, two of which are within 50 metres of the Study Area (MHSTCI 2020). A summary of the sites is provided below.

Table 2: List of previously registered sites within one kilometre of the Study Area

Borden #	Site Name	Cultural Affiliation	Site Type	Researcher
AiGw-27	Rosehouse	Woodland	Campsite	Unknown 1959
AiGw-79	Fisher	Archaic	Campsite	Roberts 1976
AiGw-82	George Alton	Archaic	Unknown	Roberts 1976
AiGw-83	Ross Segsworth	Pre-Contact Indigenous	Findspot	Roberts 1976
AiGw-84	Mount	Archaic	Campsite	Roberts 1976
AiGw-123	Tuck	Unknown	Unknown	Roberts 1976
AiGw-124	Tara	Paleo, Late	Camp	Pihl 1980
AiGw-125	80-403-2	Pre-Contact Indigenous	Findspot	Pihl 1980
AiGw-200	n/a	Pre-Contact Indigenous	Findspot	MIA 1987
AiGw-201	n/a	Woodland, Early	Findspot	MIA 1987
AiGw-268	Silvan	Archaic, Late	Tool manufacturing	ASI 1994
AiGw-313	n/a	Archaic, Late	Scatter	HA 1996, 1998
AiGw-314	Nextfield	Pre-Contact Indigenous	Scatter	AMAA 1996
AiGw-383	Shiloh	Pre-Contact Indigenous	Hunting	Archeoworks 2003
AiGw-514	n/a	Archaic, Late	Findspot	FAC 2008
AiGx-34	Cultivated Field	Unknown	Unknown	Roberts 1976
AiGx-35	Guelph Line	Unknown	Unknown	Roberts 1976
AiGx-36	Max Featherstone	Unknown	Unknown	Roberts 1976
AiGx-37	Hartley	Unknown	Unknown	Roberts 1976
AiGx-38	*Watson 2*	*Unknown*	*Unknown*	*Roberts 1976*
AiGx-39	Ireland	Paleo, Late;	Camp	Roberts 1976

Borden #	Site Name	Cultural Affiliation	Site Type	Researcher
		Woodland, Late; Iroquoian		
AiGx-63	n/a	Pre-Contact Indigenous	Camp	ASI 1981
AiGx-74	*Ganong*	*Euro-Canadian*	*Midden*	*MIA 1981, 1984*
AiGx-75	n/a	Pre-Contact Indigenous	Findspot	MIA 1981
AiGx-76	n/a	Pre-Contact Indigenous	Camp	MIA 1981
AiGx-429	n/a	Euro-Canadian	Homestead	ASI 2016
AiGx-430	n/a	Euro-Canadian	Homestead	ASI 2016

Sites in *italics* are within 50 m

AMM=A. M. Archaeological Associates
FAC – Fisher Archaeological Consultants Inc.
HA – Horizon Archaeology
MIA – Museum of Indian Archaeology (now London Museum of Archaeology)

The Watson 2 (AiGx-38) and Ganong (AiGx-74), are within 50 metres of the Study Area, and according to background research the Ganong site has been subject to excavation and does not retain Cultural Heritage Value or Interest (CHVI).

Previous assessments associated with the construction of Highway 407 overlap with the current Study Area. Two early reports on archaeological assessments within the Study Area were for Phases 1 and 2 of MTO's Preliminary Design Report of the Highway 403 Freeman Interchange to Highway 403/Oakville Link completed by Rob Pihl for the Museum of Indian Archaeology (now the London Museum of Archaeology) in 1980-1981 (Pihl 1982). The Phase 1 and 2 surveys identified seven sites and 56 findspots. More intensive archaeological survey of the corridor was conducted by Mary Ambrose in 1983 (Ambrose 1984). This work involved the testing of ten sites identified by Pihl. Subsequent to this testing, the Ganong site (AiGx-74) was recommended for further work and consequently salvage excavated in 1984 (1993).

The Watson 2 site (AiGx-38) was excavated by Arthur Roberts in 1995 and the OASD notes the collection of unknown cultural affiliation and site type has been lost or discarded. The easting and northing provided by the OASD indicates the Watson 2 site (AiGx-38) is located in the Autumn Hill Crescent subdivision. This site was destroyed by past subdivision construction.

According to the background research, eight previous reports detail fieldwork within 50 m of the Study Area.

- ASI (1996) conducted a Stage 2 AA of a proposed townhouse development, overlapping the Study Area southwest of Fowler Court. A test pit survey was conducted at five-metre intervals, which did not encounter cultural material. It was recommended to be free of further archaeological concern. 96-019

- ASI (2009) conducted a Stage 1 AA of the Dundas Street Transportation corridor, overlapping the current Study Area south of Dundas Street and east of Guelph Line. Background research and a property inspection were conducted, determining the overlapping project area was low and wet,

and sloped. It was recommended to be cleared of further archaeological concern. P057-477-2008, P057-545-2009

- ASI (2011) conducted a Stage 1 AA of the Dundas Street Bus Rapid Transit Planning Study. Background research was conducted, and it was recommended that the route be reviewed to determine potential impacts to archaeological resources once the preferred alternative be chosen. P094-032-2011

- ASI (2015) conducted a Stage 1-2 AA of the Tuck Creek Restoration, overlapping the current Study Area at the Centennial Bikeway Bridge. A test pit survey was conducted at five-metre intervals. No archaeological resources were recovered, and no further archaeological assessment was recommended. P1066-0001-2015

- ASI (2017) conducted a Stage 1 AA of the GO Rail Network Electrification TPAP, overlapping the current Study Area at the Lakeshore West GO corridor. Background research determined the overlapping project area includes an active GO railway line on disturbed land. No further archaeological assessment was recommended. P057-0834-2016

- ASI (2018) conducted a Stage 1 AA of the Tuck Creek Flood Assessment and Crossing Upgrades, overlapping the current Study Area from Fairview Street to the Centennial Bikeway. Background research and field review determined Stage 2 archaeological assessment would be required along the southwest bank of Tuck Creek within the existing park. P094-0265-2017

- ASI (2020) conducted a Stage 1 AA of the Metrolinx OnCorr Non-Priority Works, Lakeshore West corridor, overlapping the current Study Area at the railway corridor north of Fairview Street. The background research and property inspection determined that part of the overlapping area would require a Stage 2 archaeological assessment.

- Stantec (2019) conducted a Stage 1-2 AA of the TransCanada Southern Ontario Cathodic Protection Program, overlapping the Current Study Area south of the bridge entrance to Ireland Park from Owen Lane. Test pit survey was conducted at five-metre intervals. No archaeological resources were identified, and no further archaeological assessment was recommended. P362-0217-2018, P362-0224-2018, P362-0228-2018, P362-0229-2018, P362-0230-2018, P362-0231-2018, and P362-0232-2018

2.0 FIELD METHODS: PROPERTY INSPECTION

A Stage 1 property inspection must adhere to the S & G, Section 1.2, Standards 1-6, which are discussed below. The entire property and its periphery must be inspected. The inspection may be either systematic or random. Coverage must be sufficient to identify the presence or absence of any features of archaeological potential. The inspection must be conducted when weather conditions permit good visibility of land features. Natural landforms and watercourses are to be confirmed if previously identified. Additional features such as elevated topography, relic water channels, glacial shorelines, well-drained soils within heavy soils and slightly elevated areas within low and wet areas should be identified and documented, if present. Features affecting assessment strategies should be identified and documented such as woodlots, bogs or other permanently wet areas, areas of steeper grade than indicated on topographic mapping, areas of overgrown vegetation, areas of heavy soil, and recent land disturbance such as grading, fill deposits and vegetation clearing. The inspection should also identify and document

structures and built features that will affect assessment strategies, such as heritage structures or landscapes, cairns, monuments or plaques, and cemeteries.

The Stage 1 archaeological assessment property inspection was conducted under the field direction of Jessica Lytle (P1066) of ASI, on September 14, 2020, in order to gain first-hand knowledge of the geography, topography, and current conditions and to evaluate and map archaeological potential of the Study Area. It was a visual inspection from publicly accessible lands/public right-of-ways only and did not include excavation or collection of archaeological resources. Fieldwork was conducted when weather conditions were deemed clear with good visibility, per S & G Section 1.2., Standard 2. Field observations are compiled onto the existing conditions of the Study Area in Section 7.0 (Figures 11-16) and associated photographic plates are presented in Section 8.0 (Plates 1-20).

3.0 ANALYSIS AND CONCLUSIONS

The historical and archaeological contexts have been analyzed to help determine the archaeological potential of the Study Area. Results of the analysis of the Study Area property inspection and background research are presented in Section 3.1.

3.1 Analysis of Archaeological Potential

The S & G, Section 1.3.1, lists criteria that are indicative of archaeological potential. The Study Area meets the following criteria indicative of archaeological potential:

- Previously identified archaeological sites (See Table #2);
- Water sources: primary, secondary, or past water source (Tuck Creek);
- Early historic transportation routes (Dundas Street, Upper Middle Road, Walker's Line and Guelph Line);
- Proximity to early settlements (Nelson); and
- Well-drained soils (Oneida clay loam)

According to the S & G, Section 1.4 Standard 1e, no areas within a property containing locations listed or designated by a municipality can be recommended for exemption from further assessment unless the area can be documented as disturbed. The Municipal Heritage Register was consulted and no properties within the Study Area are Listed or Designated under the Ontario Heritage Act.

The *Archaeological Master Plan for the Regional Municipality of Halton* (ASI 1998) and the 2008 Update (ASI 2008) indicate that the Study Area exhibits archaeological potential.

These criteria are indicative of potential for the identification of Indigenous and Euro-Canadian archaeological resources, depending on soil conditions and the degree to which soils have been subject to deep disturbance.

The property inspection determined that parts of the Study Area exhibits archaeological potential. These areas will require Stage 2 archaeological assessment prior to any development. According to the S & G Section 2.1.2, test pit survey is required on terrain where ploughing is not viable, such as wooded areas, properties where existing landscaping or infrastructure would be damaged, overgrown farmland with heavy brush or rocky pasture, and narrow linear corridors up to 10 metres wide (Plate 20; Figures 13-16:

areas highlighted in green).

Part of the Study Area has been previously assessed and does not require further archaeological assessments (Figures 12, 15-16: areas highlighted in red).

The property inspection determined that some of lands within the Study Area are sloped in excess of 20 degrees, and according to the S & G Section 2.1 do not retain potential (Plates 2, 9-14, 16, 18, 21; Figures 11, 13-15: areas highlighted in pink). A part of the Study Area is located in low and wet conditions, and according to the S & G Section 2.1 does not retain potential (Plates 1, 2; Figure 11-15: areas highlighted in blue). The remainder of the Study Area has been subjected to deep soil disturbance events including segments of channelization of Tuck Creek, construction of the road right-of-ways (ROWs), and artificial drainage; and according to the S & G Section 1.3.2 do not retain archaeological potential (Plates 3-8, 15, 17, 19, 22 ; Figures 11-15: areas highlighted in yellow). These areas do not require further survey.

3.2 Conclusions

The Stage 1 background study determined that 26 previously registered archaeological sites are located within one kilometre of the Study Area. The property inspection determined that parts of the Study Area exhibit archaeological potential and will require Stage 2 assessment.

4.0 RECOMMENDATIONS

In light of these results, the following recommendations are made:

1. The Study Area exhibits archaeological potential. These lands require Stage 2 archaeological assessment by test pit survey at five metre intervals, prior to any proposed impacts;

2. The remainder of the Study Area does not retain archaeological potential on account of deep and extensive land disturbance, slopes in excess of 20 degrees or being previously assessed. These lands do not require further archaeological assessment; and,

3. Should the proposed work extend beyond the current Study Area, further Stage 1 archaeological assessment should be conducted to determine the archaeological potential of the surrounding lands.

NOTWITHSTANDING the results and recommendations presented in this study, ASI notes that no archaeological assessment, no matter how thorough or carefully completed, can necessarily predict, account for, or identify every form of isolated or deeply buried archaeological deposit. In the event that archaeological remains are found during subsequent construction activities, the consultant archaeologist, approval authority, and the Cultural Programs Unit of the MHSTCI should be immediately notified.

5.0 ADVICE ON COMPLIANCE WITH LEGISLATION

ASI also advises compliance with the following legislation:

- This report is submitted to the Ministry of Heritage, Sport, Tourism and Culture Industries as a condition of licensing in accordance with Part VI of the *Ontario Heritage Act*, RSO 1990, c 0.18. The report is reviewed to ensure that it complies with the standards and guidelines that are issued by the Minister, and that the archaeological field work and report recommendations ensure the conservation, preservation and protection of the cultural heritage of Ontario. When all matters relating to archaeological sites within the project area of a development proposal have been addressed to the satisfaction of the Ministry of Heritage, Sport, Tourism and Culture Industries, a letter will be issued by the ministry stating that there are no further concerns with regard to alterations to archaeological sites by the proposed development.

- It is an offence under Sections 48 and 69 of the *Ontario Heritage Act* for any party other than a licensed archaeologist to make any alteration to a known archaeological site or to remove any artifact or other physical evidence of past human use or activity from the site, until such time as a licensed archaeologist has completed archaeological field work on the site, submitted a report to the Minister stating that the site has no further cultural heritage value or interest, and the report has been filed in the Ontario Public Register of Archaeology Reports referred to in Section 65.1 of the *Ontario Heritage Act.*

- Should previously undocumented archaeological resources be discovered, they may be a new archaeological site and therefore subject to Section 48 (1) of the *Ontario Heritage Act*. The proponent or person discovering the archaeological resources must cease alteration of the site immediately and engage a licensed consultant archaeologist to carry out archaeological fieldwork, in compliance with sec. 48 (1) of the *Ontario Heritage Act*.

- The *Cemeteries Act*, R.S.O. 1990 c. C.4 and the *Funeral, Burial and Cremation Services Act*, 2002, S.O. 2002, c.33 (when proclaimed in force) require that any person discovering human remains must notify the police or coroner and the Registrar of Cemeteries at the Ministry of Consumer Services.

6.0 REFERENCES CITED

Aboriginal Affairs and Northern Development Canada
2016 Treaty Texts – Upper Canada Land Surrenders. https://www.aadnc-aandc.gc.ca/eng/1370372152585/1370372222012.

Ambrose, M.T.
1984 *An Archaeological Assessment of Highway 403*. Report on file with the Ontario Ministry of Heritage, Sport, Tourism and Culture Industries, Toronto.

Aquafor Beech Ltd.
2012 *Tuck Creek Erosion Control Municipal Class Environmental Assessment Final Report*. https://www.burlington.ca/en/services-for-you/resources/Environmental_Assessments/Tuck_Creek_Erosion/2012_06_21_TuckReport.pdf.

Armstrong, F.H.
1985 *Handbook of Upper Canadian Chronology*. Dundurn Press, Toronto.

ASI, (Archaeological Services Inc.)
1996 *A Stage 2 Archaeological Assessment of Proposed Townhouse Development, 24T-95010/B Part of Lot 11, Concession 3 S.D.S Geographic Township of Nelson, City of Burlington, Regional Municipality of Halton*. Report on file with the Ontario Ministry of Heritage, Sport, Tourism and Culture Industries, Toronto.

1998 *Archaeological Master Plan for the Regional Municipality of Halton.*

2006 *Historical Overview and Assessment of Archaeological Potential Don River Watershed, City of Toronto*. Report on file with the Ontario Ministry of Heritage, Sport, Tourism and Culture Industries, Toronto.

2008 *Master Plan of Archaeological Resources of the Regional Municipality of Halton 2008 Update*. Report on file with the Ontario Ministry of Heritage, Sport, Tourism and Culture Industries, Toronto.

2009 *Stage 1 Archaeological Resource Assessment Dundas Street Transportation Corridor from Brant Street to Proudfoot Trail Class Environmental Assessment City of Burlington & Town of Oakville, Ontario*. Report on file with the Ontario Ministry of Heritage, Sport, Tourism and Culture Industries, Toronto.

2011 *Stage 1 Archaeological Assessment Background Study, Dundas Street Bus Rapid Transit Planning Study Brant Street to Trafalgar Road, City of Burlington and Town of Oakville, Regional Municipality of Halton*. Report on file, City of Toronto Heritage Preservation Services and Ontario Ministry of Culture, Toronto.

2013 *Archaeological Potential Model for Durham Region*.

2015 *Stage 1 & 2 Archaeological Assessment (Background Study and Property Assessment) Tuck Creek Restoration – Construction Access and Staging Area Municipal Class Environmental Assessment Part of Lot 11, Concession 3 South of Dundas Street Former Township of Nelson, City of Burlington, Regional Municipality of Halton, Ontario*. Report on file with the Ontario Ministry of Heritage, Sport, Tourism and Culture Industries, Toronto.

2017 *Stage 1 Archaeological Assessment GO Rail Network Electrification TPAP City of Toronto, Regional Municipalities of Peel, Halton, York and Durham, County of Simcoe, Ontario*. Report on file with the Ontario Ministry of Heritage, Sport, Tourism and Culture Industries, Toronto.

2018 *Stage 1 Archaeological Assessment Tuck Creek Flood Assessment and Crossing Upgrades Part of Lot 11, Concession 3 SDS (Former Township of Nelson) County of Halton City of Burlington Regional Municipality of Halton, Ontario*.

2019 *Stage 1-2 Archaeological Assessment: TransCanada Southern Ontario Cathodic Protection Program (R133+0.00, R134A+10.69, R136+11.62, R137+10.99, R141+23.53, R206A+9.20, and R210+7.83) Various Lots and Concessions, Multiple Lower Tier Municipalities, Multiple Upper Tier Municipalities*.

2020 *Stage 1 Archaeological Assessment Metrolinx OnCorr Non-Priority Works – Lakeshore West Corridor Various Lots and Concessions (Former Townships of York and Etobicoke, County of York; Former Townships of Toronto, County of Peel; Former Township of Trafalgar and Nelson, County of Halton; Former Township of Barton and Saltfleet, County of Wentworth; Former Township of Stamford, County of Welland) City of Toronto, City of Mississauga, Town of Oakville, City of Burlington, City of Hamilton and City of Niagara Falls, Ontario*. Report on file with the Ontario Ministry of Heritage, Sport, Tourism and Culture Industries, Toronto.

Assikinack, F.
1858 Legends and Traditions of the Odawa Indians. *The Canadian Journal, Second Series* III:115–125.

Baskerville, P.
2015 Great Western Railway. *The Canadian Encyclopedia*. http://www.thecanadianencyclopedia.com/en/article/great-western-railway/.

Birch, J., and R.F. Williamson
2013 *The Mantle Site: An Archaeological History of an Ancestral Wendat Community*. Rowman & Littlefield Publishers, Inc., Latham.

Bowman, I.
1975 *History of the Peninsula Portage and Canoe Route: Colpoy's Bay to Lake Huron - with an Overview of Indian Occupation of the Bruce Peninsula.* Toronto.

Brown, J.
1995 On Mortuary Analysis – with Special Reference to the Saxe-Binford Research Program. In *Regional Approaches to Mortuary Analysis*, L. A. Beck, ed, pp. 3–23. Plenum Press, New York.

Chapman, L.J., and F. Putnam
1984 *The Physiography of Southern Ontario*. Vol. 2. Ontario Geologic Survey, Special Volume. Ontario Ministry of Natural Resources, Toronto.

Conservation Halton
2008 *Urban Creeks and Supplemental Monitoring. Long Term Environmental Monitoring Program*.

Copway, G.
1850 *The Traditional History and Characteristic Sketches of the Ojibway Nation*. Charles Gilpin, London.

1851 *The Traditional History and Characteristic Sketches of the Ojibway Nation.* Benjamin B. Mussey & Co., Boston.

1858 *Indian Life and Indian History*. Albert Colby and Company, Boston.

Crossby, P.A.
1873a *Lovell's Gazetteer of British North America.* John Lovell, Montreal.

1873b *Lovell's Gazetteer of British North America*. John Lovell, Montreal.

DMD, (Department of Militia and Defence)
1919 Hamilton Sheet. National Topographic System.

Dodd, C.F., D.R. Poulton, P.A. Lennox, D.G. Smith, and G.A. Warrick
1990 The Middle Ontario Iroquoian Stage. In *The Archaeology of Southern Ontario to A.D. 1650*, C. J. Ellis and N. Ferris, eds, pp. 321–360. Occasional Publication of the London Chapter OAS Number 5. Ontario Archaeological Society Inc., London, ON.

Edwards, T.W.D., and P. Fritz
1988 Stable-Isotope Palaeoclimate Records from Southern Ontario, Canada: Comparison of Results from Marl and Wood. *Canadian Journal of Earth Sciences* 25:1397–1406.

Ellis, C.J., and D.B. Deller
1990 Paleo-Indians. In *The Archaeology of Southern Ontario to A.D. 1650*, C. J. Ellis and N. Ferris, eds, pp. 37–64. Occasional Publication of the London Chapter OAS Number 5. Ontario

Archaeological Society Inc., London, ON.

Ellis, C.J., I.T. Kenyon, and M.W. Spence
1990 The Archaic. In *The Archaeology of Southern Ontario to A.D. 1650*, C. J. Ellis and N. Ferris, eds, pp. 65–124. Occasional Publication of the London Chapter OAS Number 5. Ontario Archaeological Society Inc., London, ON.

Ellis, C.J., P.A. Timmins, and H. Martelle
2009 At the Crossroads and Periphery: The Archaic Archaeological Record of Southern Ontario. In *Archaic Societies: Diversity and Complexity across the Midcontinent.*, T. D. Emerson, D. L. McElrath, and A. C. Fortier, eds, pp. 787–837. State University of New York Press, Albany, New York.

Emery, C.
1967 *From Pathway to Skyway; a History of Burlington*. Confederation Centennial Committee of Burlington, Burlington.

Ferris, N.
2013 Place, Space, and Dwelling in the Late Woodland. In *Before Ontario: The Archaeology of a Province*, pp. 99–111. McGill-Queen's University Press. http://www.jstor.org/stable/j.ctt32b7n5.15.

Hamilton Transit History
2019 The Hamilton Radial Electric Railway (HRER). *Hamilton Transit History*. http://www.trainweb.org/hamtransithist/HRER.html.

Hunting Survey Corporation Limited
1954 Digital Aerial Photographs, Southern Ontario 1954. http://maps.library.utoronto.ca/data/on/AP_1954/index.html.

Johnson, I.V.B.
1986 The Early Mississauga Treaty Process, 1781-1819 in Historical Perspective. PhD Dissertation, University of Toronto.

Johnston, D.
2004 *Connecting People to Place: Great Lakes Aboriginal in Cultural Context*. Unpublished paper prepared for the Ipperwash Commission of Inquiry. http://www.attorneygeneral.jus.gov.on.ca/inquiries/ipperwash/transcripts.pdf.

Jones, P.
1861 *History of the Ojebway Indians : With Especial Reference to Their Conversion to Christianity*. A. W. Bennett, London. https://archive.org/details/historyofojebway00jonerich.

Karrow, P.F., and B.G. Warner
1990 The Geological and Biological Environment for Human Occupation in Southern Ontario. In *The Archaeology of Ontario to A.D. 1650*, pp. 5–36. Occasional Publications 5. London Chapter, Ontario Archaeological Society, London.

Konrad, V.A.
1974 Iroquois Villages on the North Shore of Lake Ontario, 1665-1687. presented at the Fall Meeting of the Ontario Historical Geographers, November 9, Carleton University, Ottawa, Ontario.

1981 An Iroquois Frontier: The North Shore of Lake Ontario during the Late Seventeenth Century. *Journal of Historical Geography* 7(2):129–144.

MacKay, R.
1851 *The Canada Directory: Containing the Names of the Professional and Business Men of Every Description in the Cities, Towns, and Principal Villages of Canada.* John Lovell, Montreal.

MacLeod, P.
1992 The Anishinabeg Point of View: The History of the Great Lakes Region to 1800 in Nineteenth-Century Mississauga, Odawa, and Ojibwa Historiography. *Canadian Historical Review* 73(2):194–210.

Métis National Council
n.d. The Métis Nation. <http://www.metisnation.ca/index.php/who-are-the-metis>.

n.d. Métis Historic Timeline. http://www.metisnation.org/culture-heritage/m%C3%A9tis-timeline/.

MHSTCI, (Ministry of Heritage, Sport, Tourism and Culture Industries)
1990 *Ontario Heritage Act, R.S.O. 1990, c. O.18 [as Amended in 2019]*.

2020 Ontario's Past Portal. *PastPortal*. https://www.pastport.mtc.gov.on.ca.

Ministry of the Environment
1990 Environmental Assessment Act, R.S.O. Province of Ontario.

Ministry of Tourism and Culture
2011 *Standards and Guidelines for Consultant Archaeologists*. Cultural Programs Branch, Ontario Ministry of Tourism and Culture, Toronto.

Mississaugas of the Credit First Nation
2017 The Brant Tract Purchase (Treaty 8). http://mncfn.ca/treaty8/.

Municipal Engineers Association
2000 *Municipal Class Environmental Assessment, Last Amended 2015*.

Natural Resources Canada
1999 Hamilton-Burlington Sheet. National Topographic System.

Ontario Geological Survey
2010 Surficial Geology of Southern Ontario. Miscellaneous Release — Data 128 – Revised.

http://www.geologyontario.mndm.gov.on.ca/mndmaccess/mndm_dir.asp?type=pub&id=MRD128-REV.

Paudash, R.
1905 The Coming of the Mississagas. *Ontario Historical Society Papers and Records* 6(190).

Pihl, R.H.
1982 *Final Report on the Phase I and II Archaeological Assessment of the Highway 403 Project from Highway 5 to Oakville Link*. Report on file with the Ontario Ministry of Heritage, Sport, Tourism and Culture Industries, Toronto.

Pope, J.H.
1877 Illustrated Historical Atlas of the County of Halton, Ont. Walker and Miles, Toronto.

Rayburn, A.
1997 *Place Names of Ontario*. University of Toronto Press, Toronto.

Rogers, E.S.
1978 Southeastern Ojibwa. In *Handbook of North American Indians: The Northeast*, 15:. Smithsonian Institution, Washington.

Schmalz, P.S.
1977 *The History of the Saugeen Indians*. Ontario Historical Society, Ottawa.

1991 *The Ojibwa of Southern Ontario*. University of Toronto Press.

Smith, D.B.
1975 Who Are the Mississauga? *Ontario History* 67(4):311–222.

2000 Kahgegagahbowh. *Dictionary of Canadian Biography Online*. http://www.biographi.ca/009004-119.01-e.php?&id_nbr=4517.

Smith, W.H.
1846a *Smith's Canadian Gazetteer, Comprising Statistical and General Information Respecting All Parts of the Upper Province, or Canada West*. H. & W. Rowsell, Toronto.

1846b Smith's Canadian Gazetteer.

1851 *Canada: Past, Present and Future, Being a Historical, Geographical, Geological and Statistical Account of Canada West.* Vol. 1. Thomas Maclear, Toronto.

Spence, M.W., R.H. Pihl, and C. Murphy
1990 Cultural Complexes of the Early and Middle Woodland Periods. In *The Archaeology of Southern Ontario to A.D. 1650*, C. J. Ellis and N. Ferris, eds. Occasional Publication of the

London Chapter OAS Number 5. Ontario Archaeological Society Inc., London.

Stone, L.M., and D. Chaput
1978 History of the Upper Great Lakes. In *Handbook of North American Indians*, Bruce G. Trigger, ed, pp. 602–609. Smithsonian Institution, Washington.

Supreme Court of Canada
2003 *R. v. Powley*. September 19. https://scc-csc.lexum.com/scc-csc/scc-csc/en/item/2076/index.do.

2016 *Daniels v. Canada (Indian Affairs and Northern Development)*. April 14. https://scc-csc.lexum.com/scc-csc/scc-csc/en/item/15858/index.do.

Surtees, R.
1985 *A Cartographic Analysis of Indian Settlements and Reserves in Southern Ontario and Southern Quebec, 1763-1867. Research Branch, Indian and Northern Affairs Canada, Ottawa.*

Tanner, H. H., ed,
1987 *Atlas of the Great Lakes Indian History*. Oklahoma University Press, Norman.

Thwaites, R.G.
1896 *The Jesuit Relations and Allied Documents: Travel and Explorations of the Jesuit Missionaries in New France, 1610-1791; the Original French, Latin, and Italian Texts, with English Translations and Notes*. 73 vols. Burrows Brothers, Cleveland.

Tremaine, G.R.
1858 Tremaine's Map of the County of Halton, Canada West. George C. Tremaine, Oakville.

Turcotte, D.
1989 *Burlington: Memories of Pioneer Days*. Burlington Historical Society, Burlington.

Von Gernet, A.
2002 *'Within the Prick'd Line': The Historical Context of the 1701 Deed from the Iroquois to the King of England of a Vast Tract of Land. Report Prepared for the Province of Ontario.*

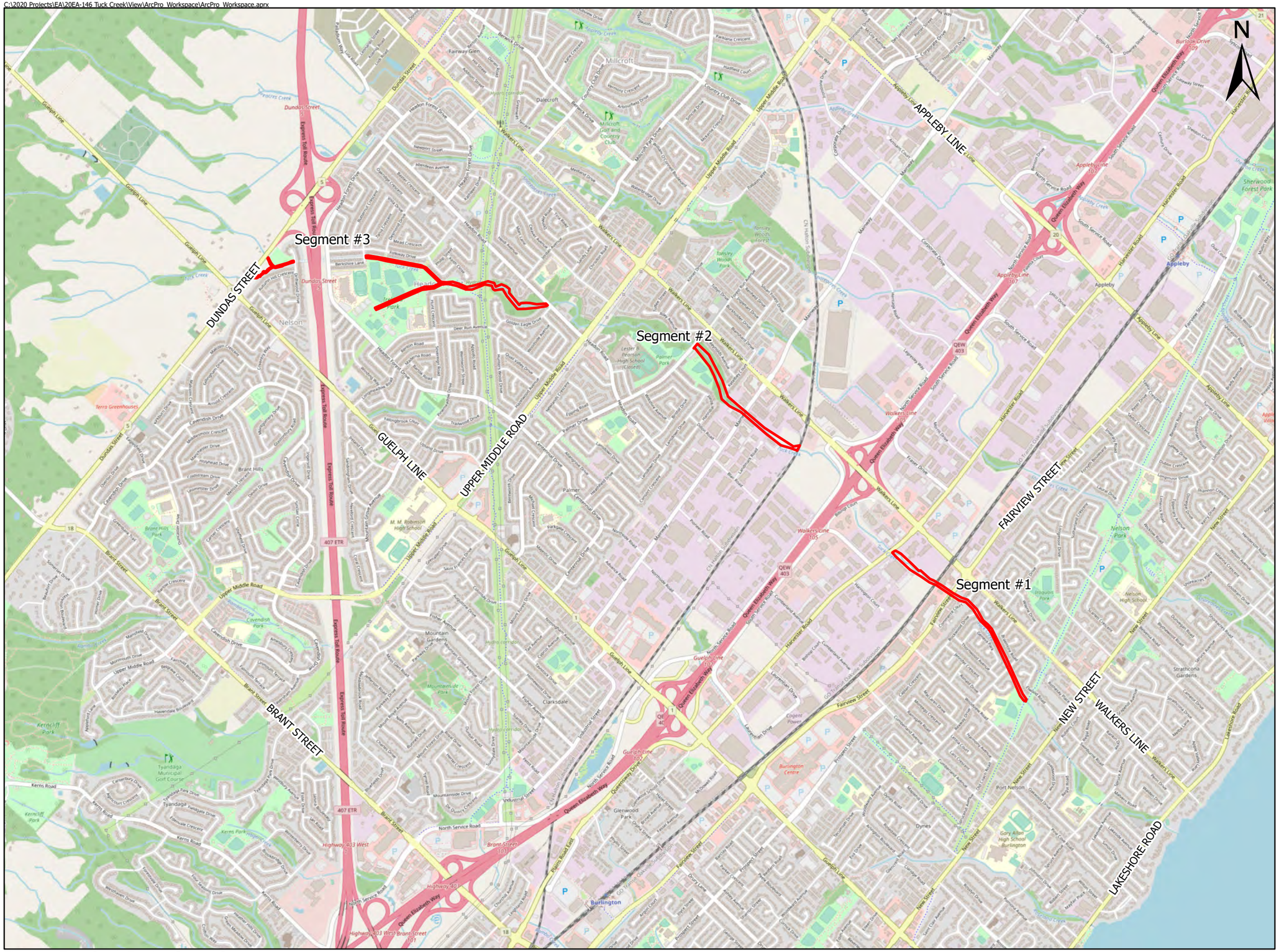
Walker and Miles
1877 Illustrated Historical Atlas of the County of Peel, Ont. Walker and Miles, Toronto.

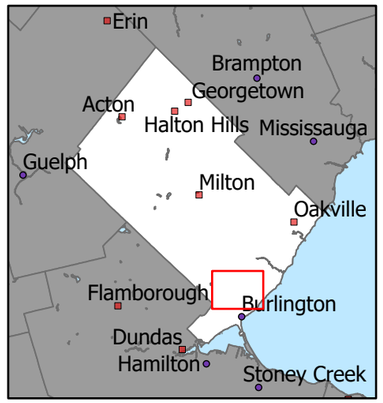
Williamson, R.F.
1990 The Early Iroquoian Period of Southern Ontario. In *The Archaeology of Southern Ontario to A.D. 1650*, C. J. Ellis and N. Ferris, eds, pp. 291–320. Occasional Publication of the London Chapter OAS Number 5. Ontario Archaeological Society Inc., London.

Williamson, R.F., D.A. Robertson, M.S. Cooper, R.I. MacDonald, S.J. Austin, and R.H. Pihl
2008 Life and Death at the Quarry: The Early Woodland Archaeology of the Peace Bridge Site. *Ontario Archaeology* 85–88:39–68.

7.0 MAPS

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STUDY AREA

Sources:© OpenStreetMap (and) contributors, CC-BY-SA

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Page Size: 11 x 17

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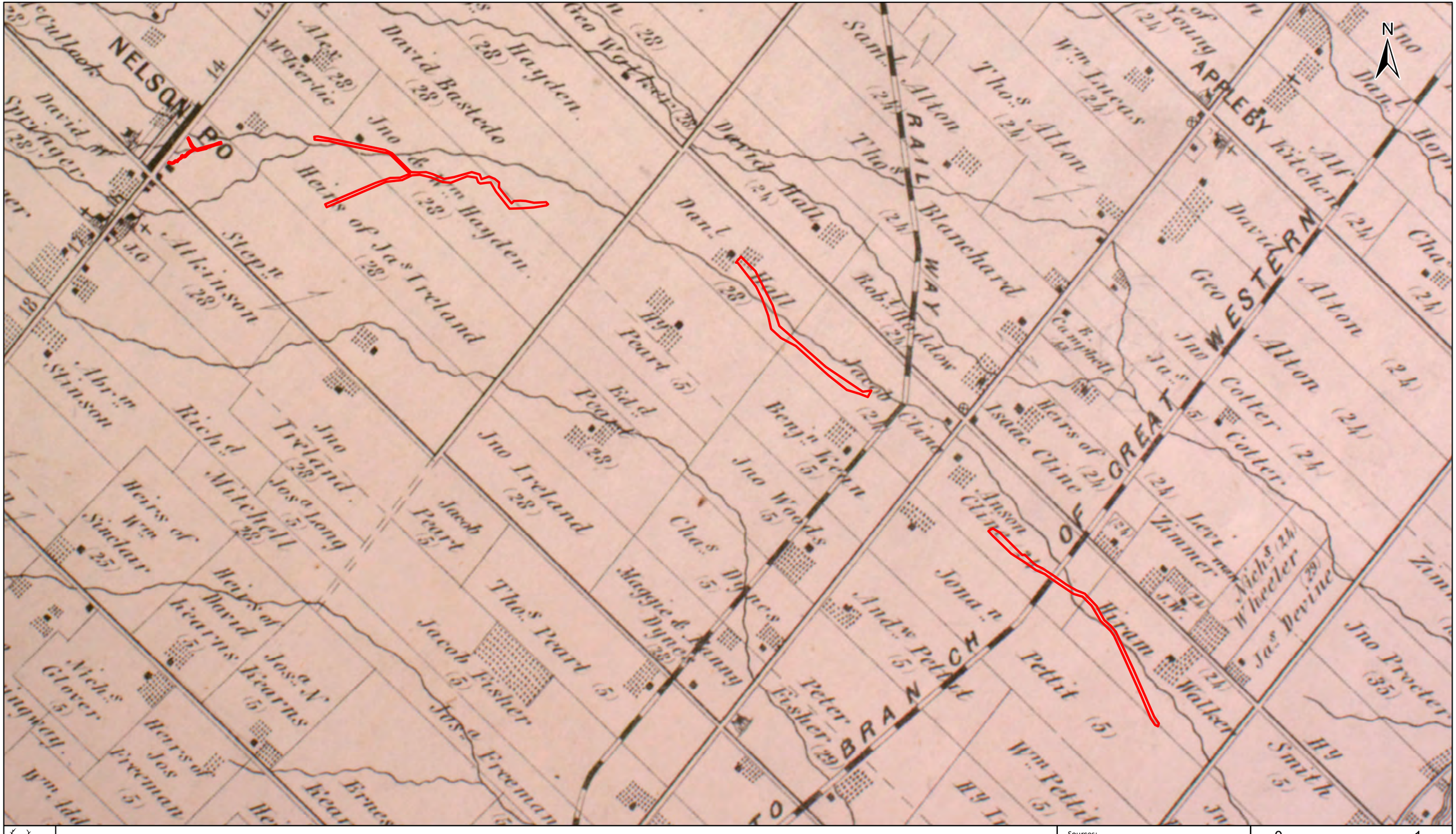
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Providing Archaeological & Cultural Heritage Services
528 Bathurst Street Toronto, ONTARIO M5S 2P9
T 416-966-1069 F 416-966-9723 asiheritage.ca

Figure 1: Tuck Creek Erosion Control Study Area


N
NELSON
APPLEBY
Wm McCay
Gilbert Bastedo
T. Cooper
Jonathon Hall
Thomas Alton
Wm Lucas
Thos Atkinson
David Alton
Thomas Alton
John Cotter
James W. Cotter
Mr. Carter
Isaac Cuke
Wmetine
Heirs of the Late Deane
Capt. Owen Robert
Hiram Smith
Thos Alton
A. F. Pettit
Peter Fisher
Samuel Dynes
William Wood
Thomas Peart
Vickers Peart
J. H. Fisher
Joshua Freeman
Mrs Kerns
David Kerns
Mrs M. Sinclair
Richd Mitchel
Joseph Ireland
Stephen Atkinson
James Ireland
Geo. Culbert
Robert Haddow
Jacob Zine
Daniel Holt
Geo. Dale
Richard Mitchel
Samuel Stinson
Nicholas Glover
Joseph Freeman
Dr. Carter
Thos Walker
Jno. M.
Isaac
Tom.
Hiram
Capt.
Hen. R. Springer
Lt. Cullock
Wm
Jno
Thos
Wm
Jno
Geo
Thos
Jno
Jno
Jno


N
NELSON
P.O
RAIL WAY
GREAT WESTERN
BRANCH
Geo Wortman (28)
David Bastedo (28)
Hayden.
Jno & Wm Hayden. (28)
Heirs of Jas Ireland (28)
Alex. McKerlie (28)
David Hall (24)
Thos Blanchard (24)
Thos Allon (24)
Wm Lucas (24)
Sam.l Allon (24)
Rob.t Reddow (24)
Jacob Hall (28)
Dan.l Hall (28)
Jno Allon (24)
Daniel Allon (24)
Geo Allon (24)
Jno Allon (24)
Jas Allon (24)
Colter (24)
Colter (24)
Levi Zimmer (24)
Wm Walker (24)
Jas Devine (29)
Jno Procter (35)
Hy Smith (5)
Wm Pettit (5)
Pettit (5)
Andw Pelt (5)
Jona.n Pelt
Peter Fisher (29)
Jacob Fisher (5)
Thos Peard (5)
Jacob Peart (5)
Hy Peart (5)
Jno Woods (5)
Benja Beem (5)
Jno Ireland (28)
Jno Trelaven (28)
Richd Mitchell (28)
Jno Allenson (28)
Stephen (28)
Jno Allenson (28)
Jno Stinson
Abrm Stinson
Heirs of Wm Sinclair (25)
Heirs of Jos Freeman (5)
Jos. Freeman (5)
Jos.a Long (5)
Heirs of Henry Bearss (5)
Jos.h Bearss (5)
Mich.l Glover (5)
Jno Glover (5)
Wm Idd
Highway
Jno Freeman (5)
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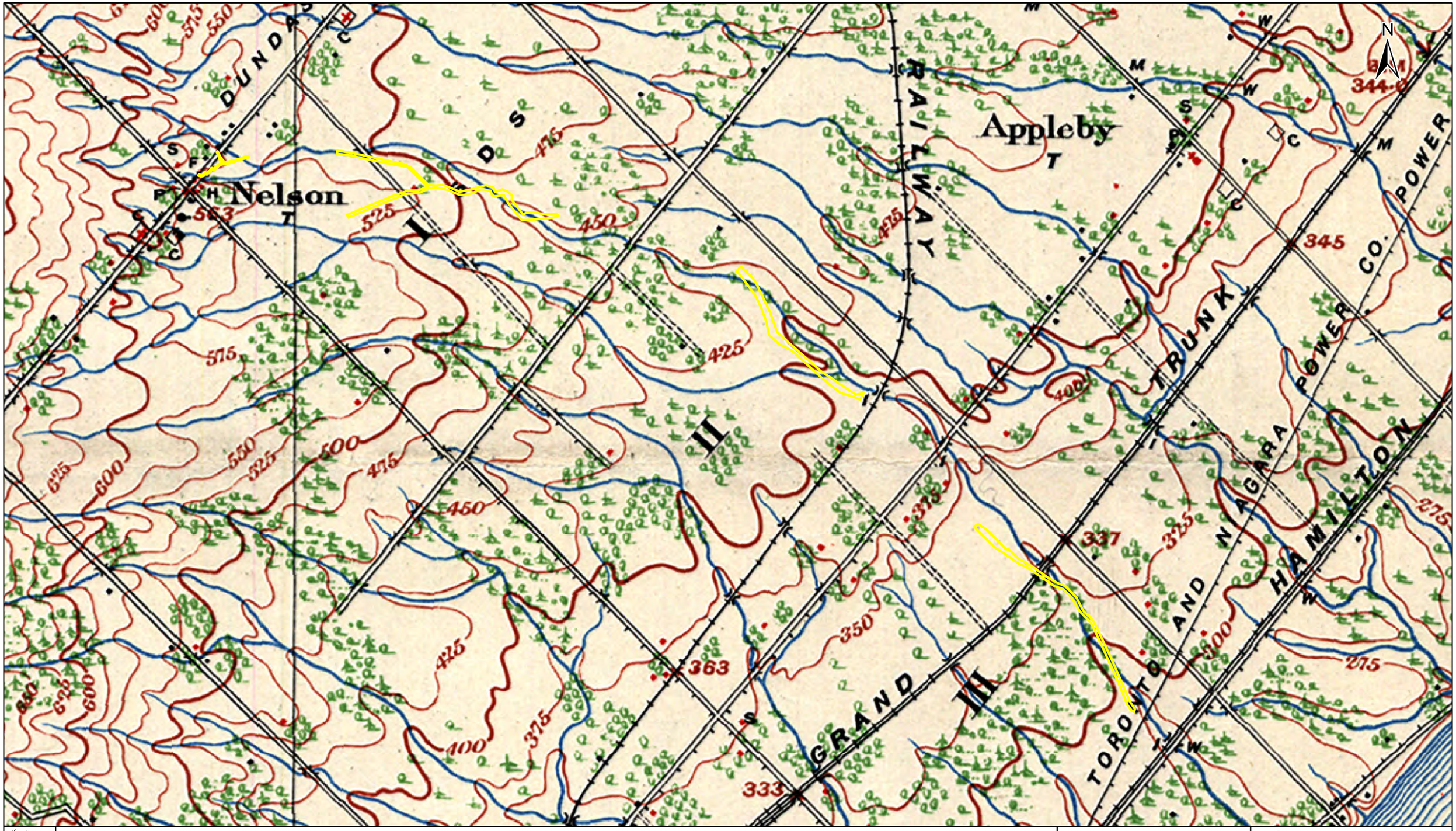
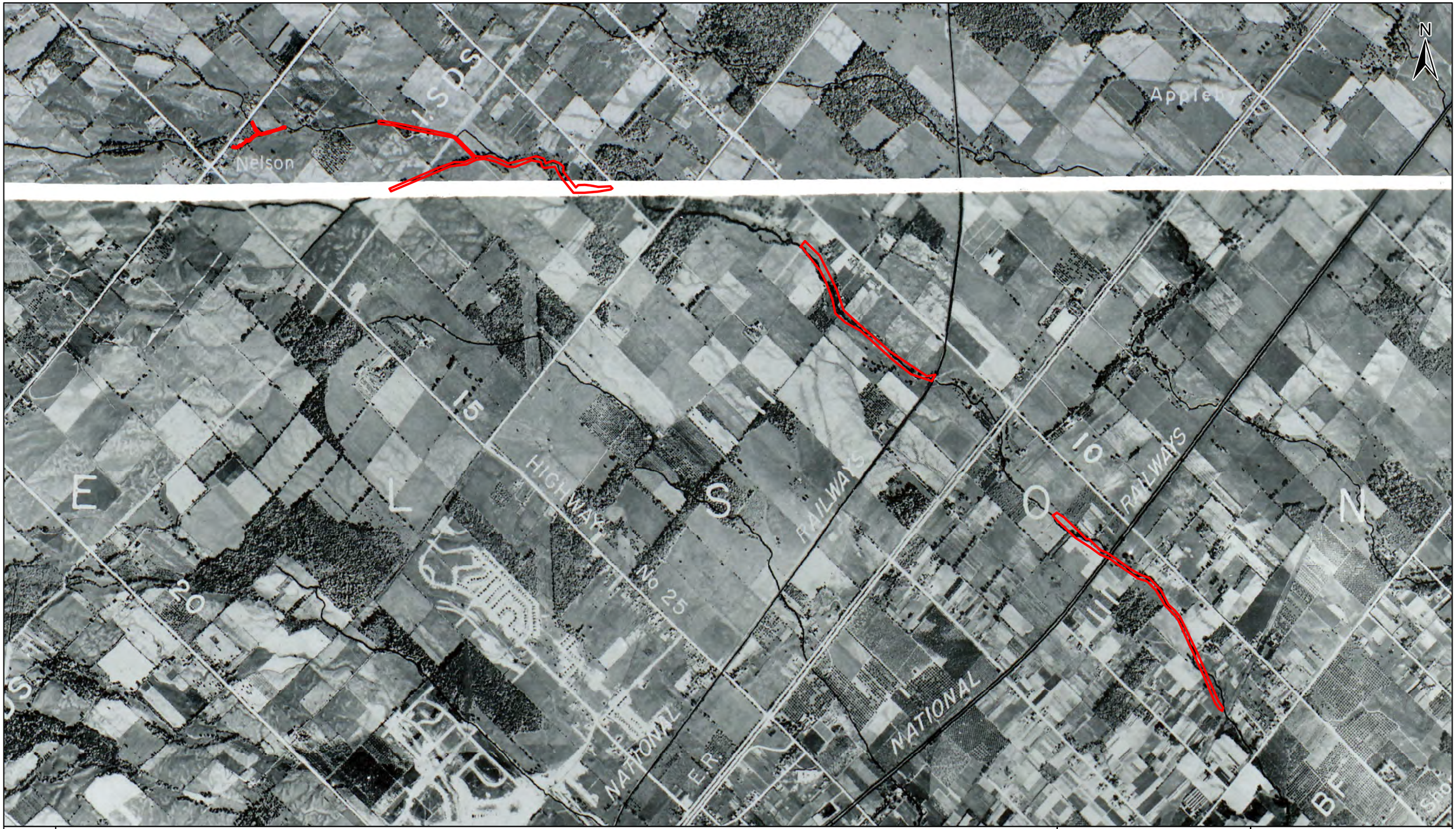


Figure 4: Study Area (Approximate Location) Overlaid on the 1909 NTS Hamilton Sheet



STUDY AREA

Sources:

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Figure 5: Study Area (Approximate Location) Overlaid on the 1954 Aerial Photography

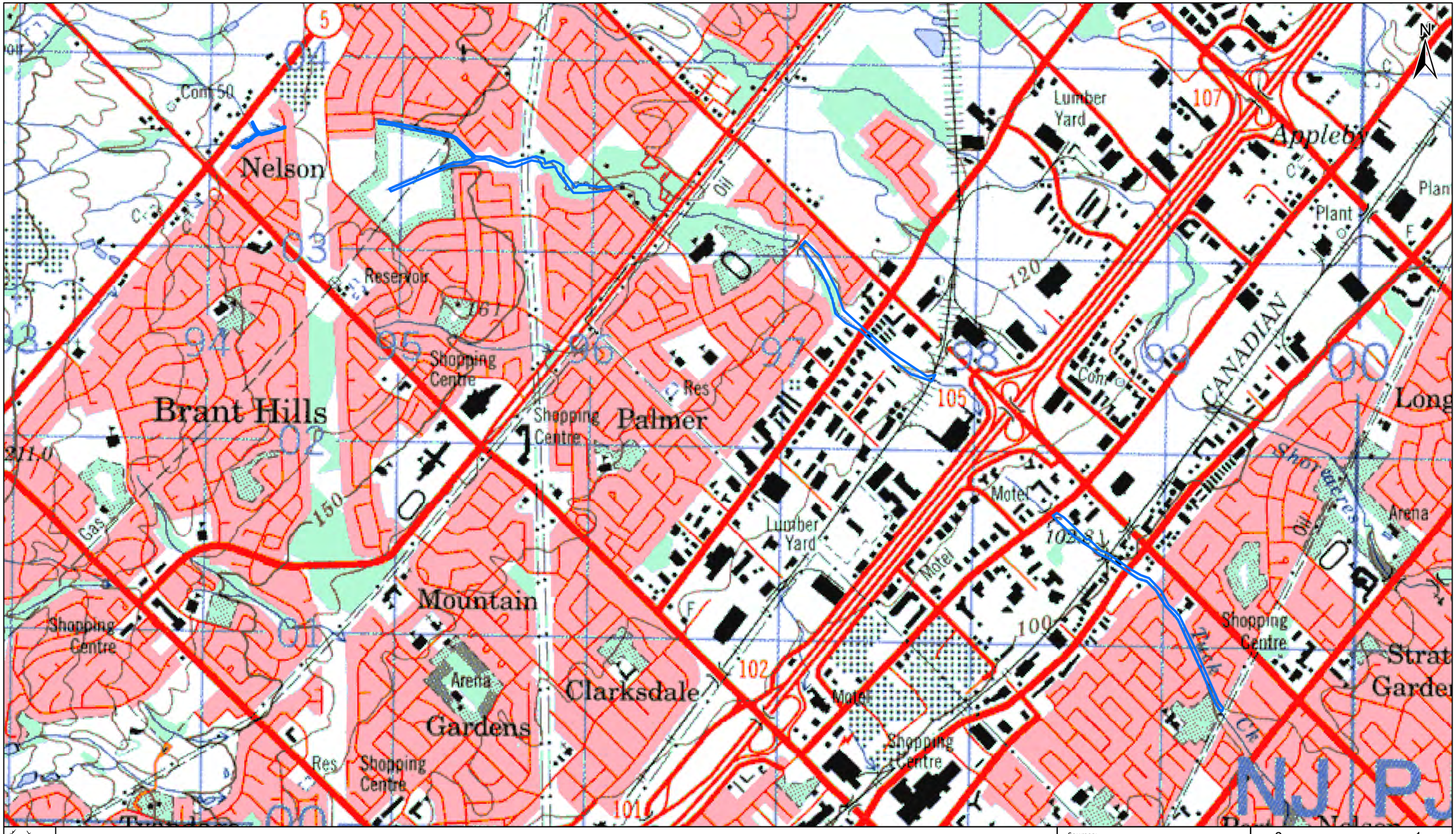
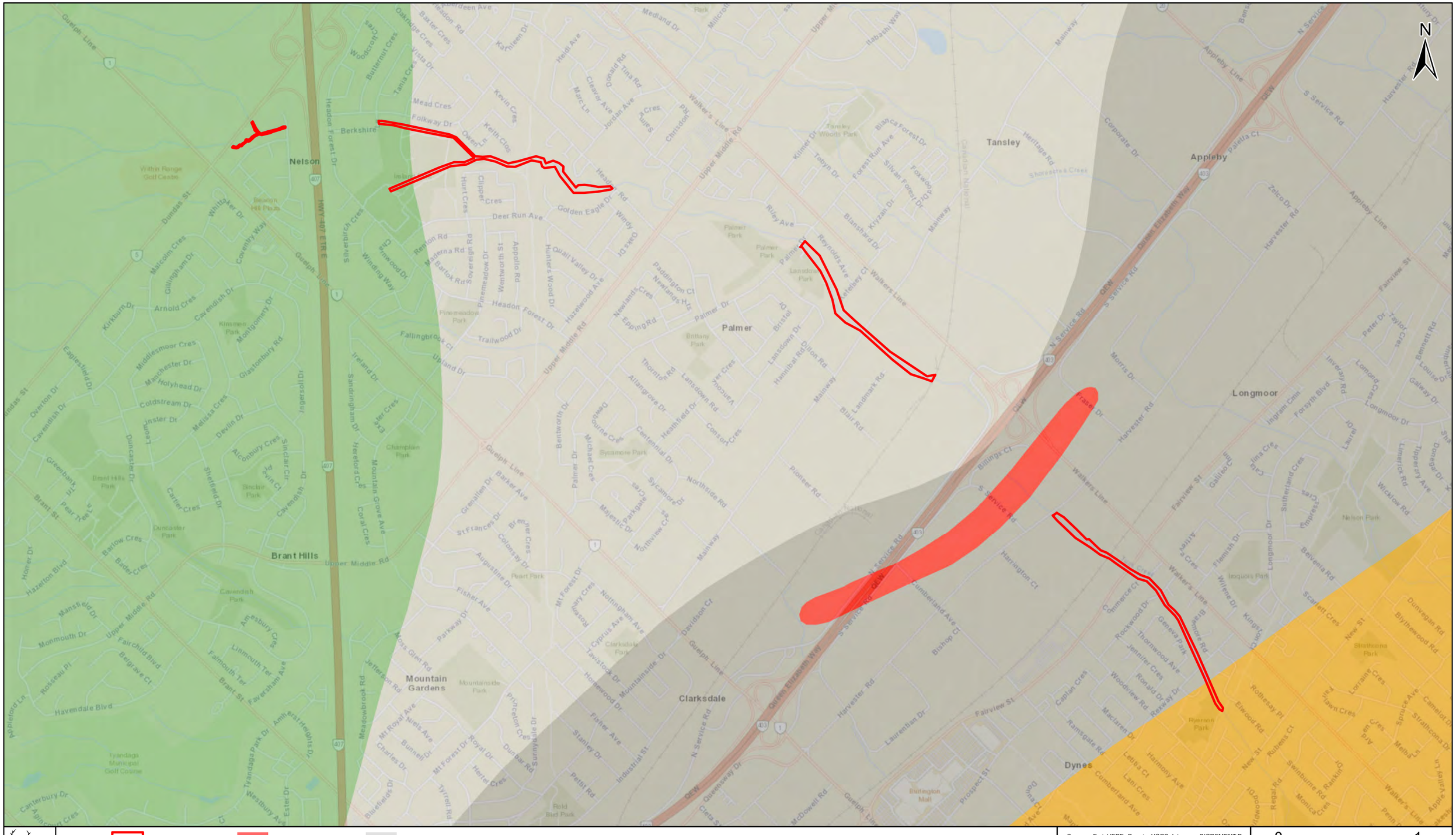


Figure 6: Study Area (Approximate Location) Overlaid on the 1999 NTS Hamilton-Burlington



STUDY AREA

14: Beaches

11: Sand Plains

10: Shale Plains

6: Till Plains (Drumlinized)

1: Escarpments

Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

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Figure 7: Study Area - Physiographic Landforms

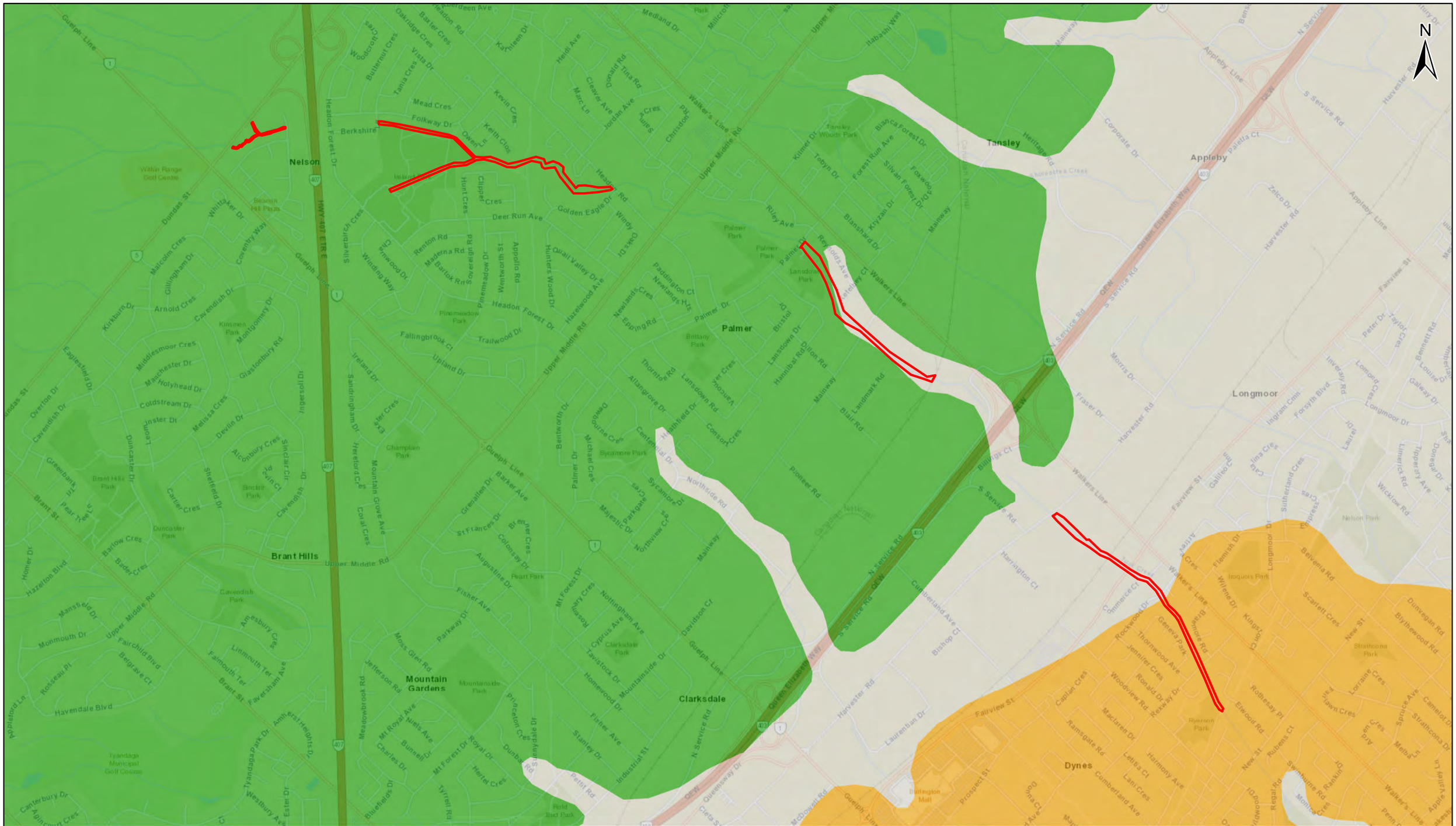


Figure 8: Study Area - Surficial Geology

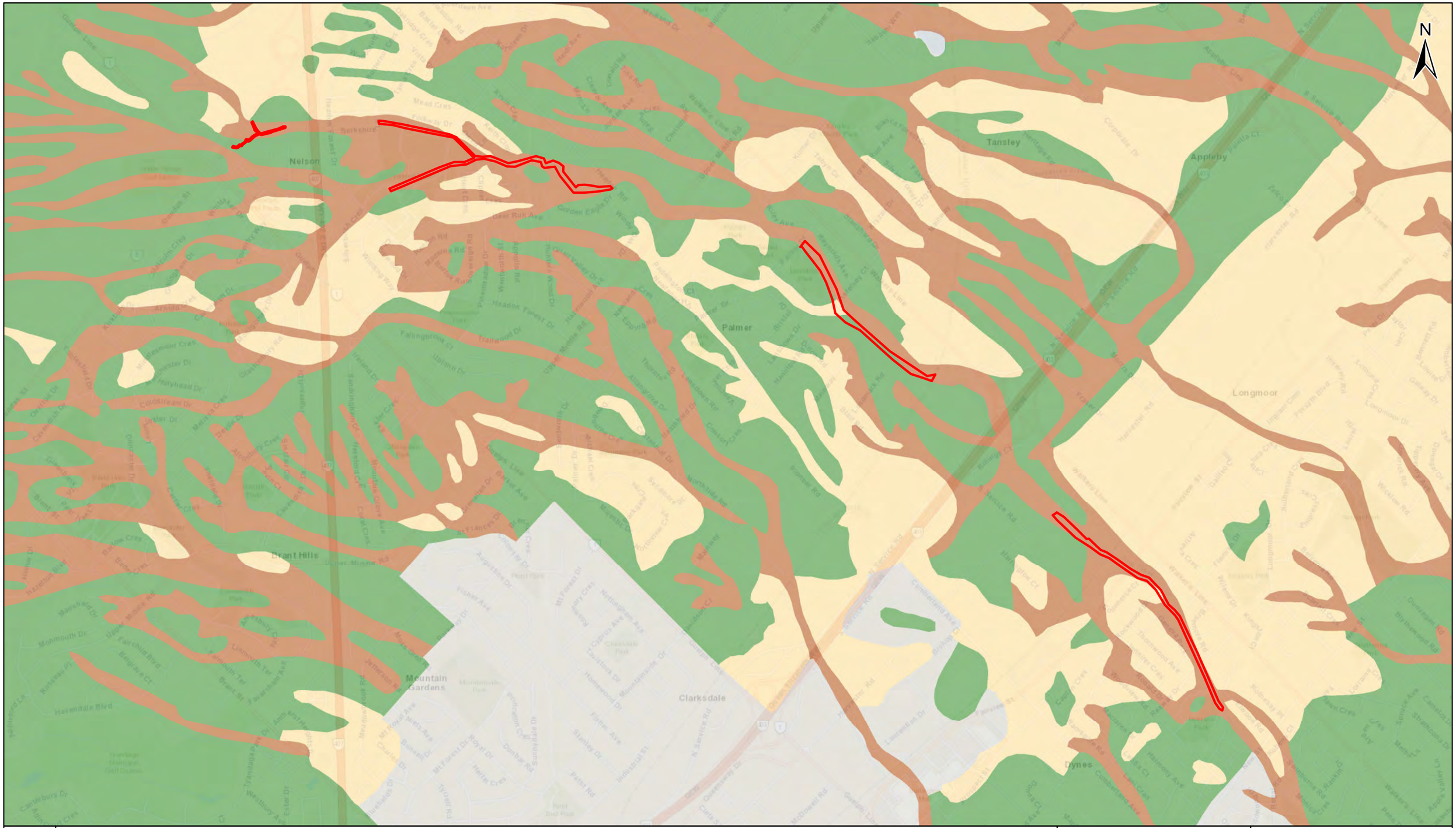


Figure 9: Study Area - Soil Drainage

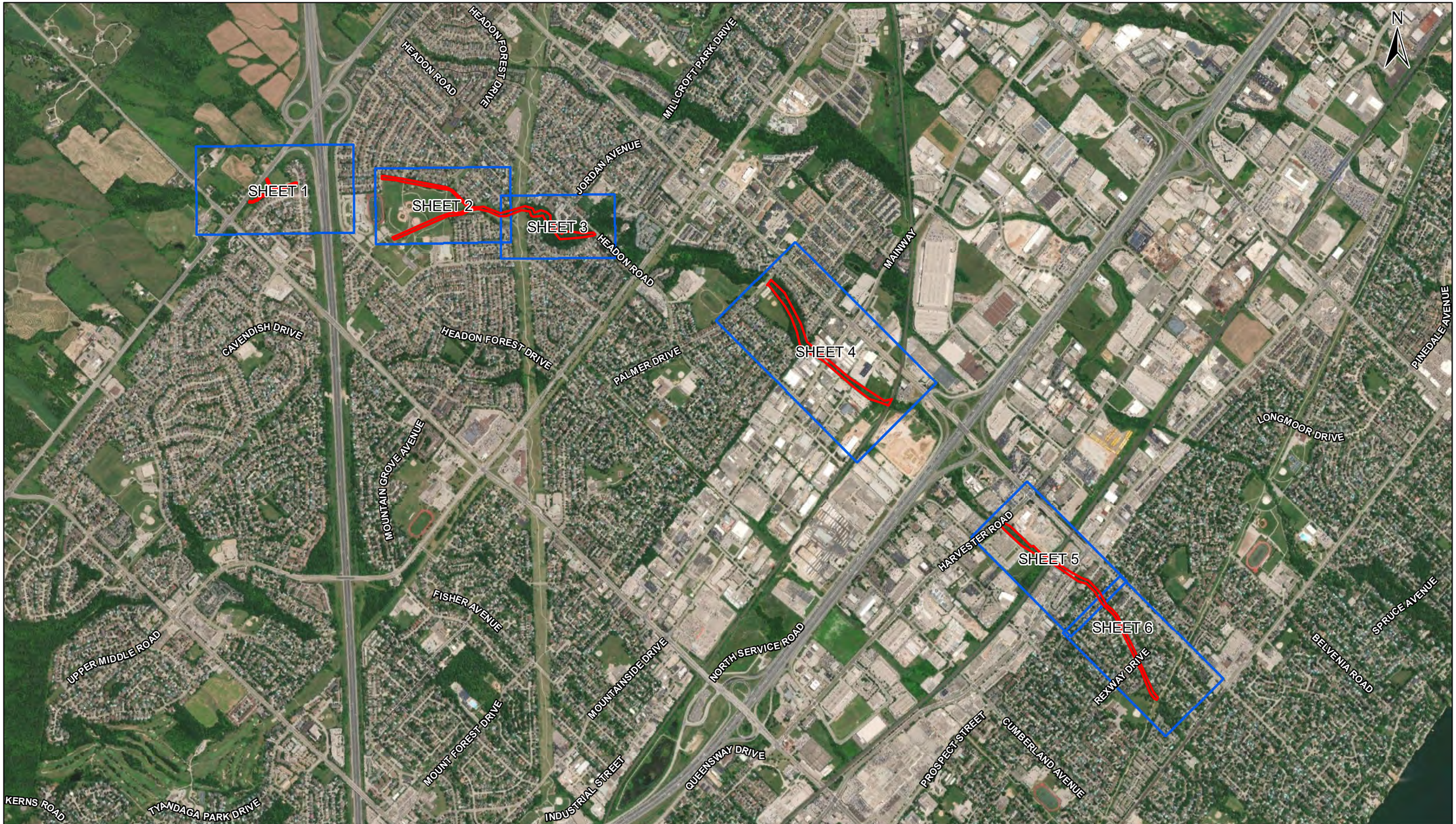


Figure 10: Tuck Creek Erosion Control - Results of Stage 1 (Key Map)



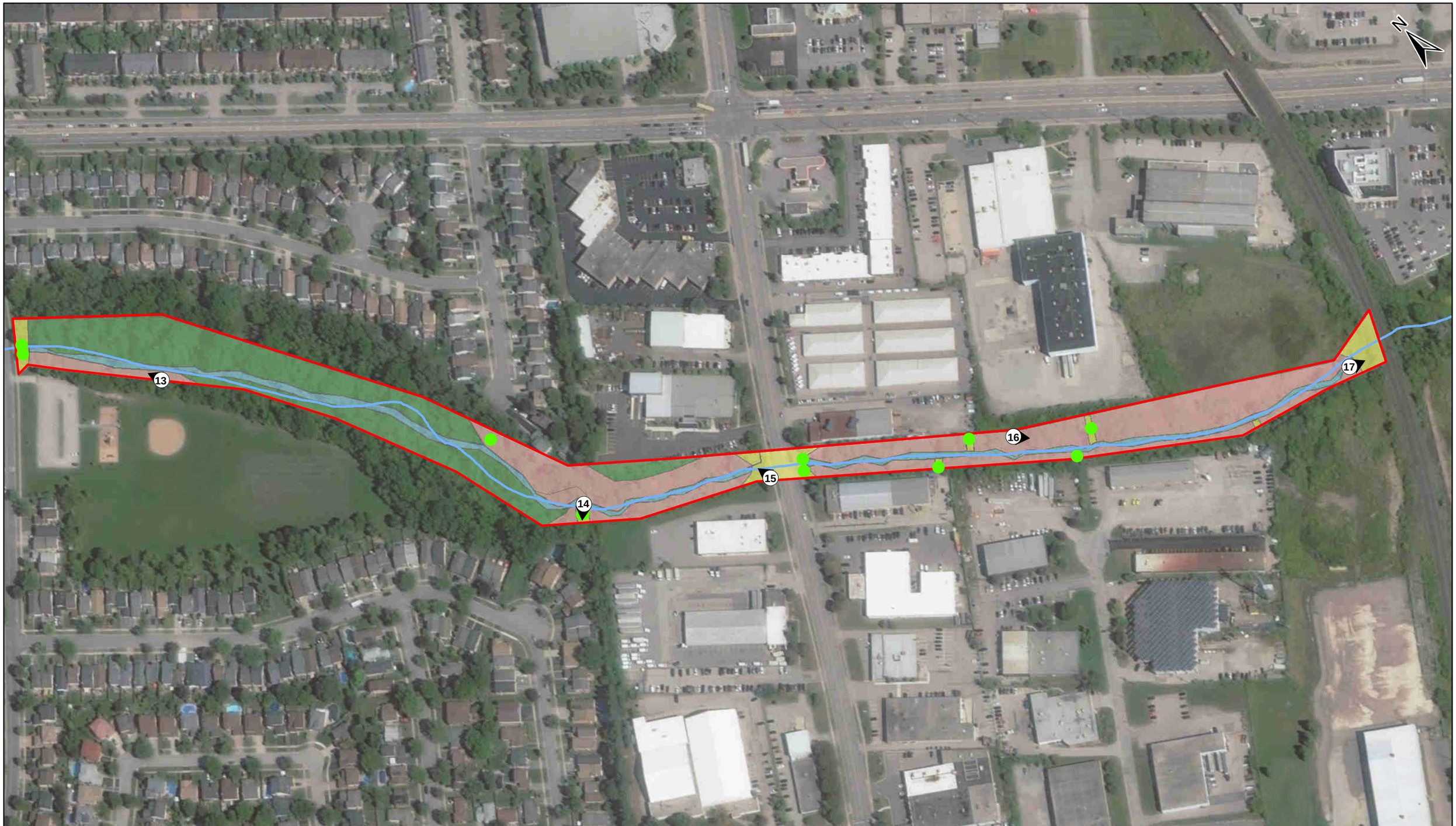
Figure 11: Tuck Creek Erosion Control - Results of Stage 1 (Sheet 1)



Figure 12: Tuck Creek Erosion Control - Results of Stage 1 (Sheet 2)



Figure 13: Tuck Creek Erosion Control - Results of Stage 1 (Sheet 3)



STUDY AREA
SEWER OUTFALL
HALTON_WATERCOURSE
TEST PIT SURVEY REQUIRED
NATURAL SLOPE: NO POTENTIAL
DISTURBED: NO POTENTIAL
LOW AND WET
PHOTO LOCATION AND DIRECTION

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Projection: NAD 1983 UTM Zone 17N
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ASI PROJECT NO.: 20EA-146
DATE: 10/27/2020
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FILE: 20EA146_Fig10_

Figure 14: Tuck Creek Erosion Control - Results of Stage 1 (Sheet 4)

ASI 1996

ASI 2020

ASI 2018

ASI 2017

18

19

20

21

22

STUDY AREA

HALTON_WATERCOURSE

PREVIOUSY ASSESSED

DISTURBED: NO POTENTIAL

PHOTO LOCATION AND DIRECTION

SEWER OUTFALL

TEST PIT SURVEY REQUIRED

NATURAL SLOPE: NO POTENTIAL

LOW AND WET

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Projection: NAD 1983 UTM Zone 17N
Scale: 1:2,000
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ASI PROJECT NO.: 20EA-146
DATE: 10/27/2020

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FILE: 20EA146_Fig10

Figure 15: Tuck Creek Erosion Control - Results of Stage 1 (Sheet 5)



Figure 16: Tuck Creek Erosion Control - Results of Stage 1 (Sheet 6)

8.0 IMAGES



Plate 1: (Segment 3) View of Tuck Creek in Driftwood Park; Area is low and wet, no potential



Plate 2: (Segment 3) View of Tuck Creek in Driftwood Park; Area is sloped and low and wet, no potential



Plate 3: (Segment 3) View of Tuck Creek in Driftwood Park; Area is disturbed, no potential



Plate 4: (Segment 3) View of Tuck Creek channelized through Ireland Park; Area is disturbed, no potential



Plate 5: (Segment 3) View of Tuck Creek channelized through Ireland Park; Area is disturbed, no potential



Plate 6: (Segment 3) View of Tuck Creek channelized through Ireland Park; Area is disturbed, no potential



Plate 7: (Segment 3) View of terrafix blocks channelizing Tuck Creek through Ireland Park; Area is disturbed, no potential



Plate 8: (Segment 3) View of terrafix blocks channelizing Tuck Creek through Ireland Park; Area is disturbed, no potential



Plate 9: (Segment 3) View of Tuck Creek north of Edgebank Court; Area is sloped, no potential



Plate 10: (Segment 3) View of armourstone north of Golden Eagle Drive; Area is sloped and low and wet, no potential



Plate 11: (Segment 3) View north of Golden Eagle Drive; Area is sloped, no potential



Plate 12: (Segment 3) View of armourstone north of Golden Eagle Drive; Area is sloped and low and wet, no potential



Plate 13: (Segment 2) View of Tuck Creek in Lansdown Park; Area is sloped and low and wet, no potential



Plate 14: (Segment 2) View of Tuck Creek north of Mainway; Area is disturbed, no potential



Plate 15: (Segment 2) View of Tuck Creek north of Mainway; Area is disturbed, no potential



Plate 16: (Segment 2) View towards Canadian National; Area is sloped, no potential



Plate 17: (Segment 1) View of Tuck Creek towards railway; Area is disturbed and low and wet, no potential



Plate 18: (Segment 1) View south of Harvester Road; Area is disturbed and sloped, no potential



Plate 19: (Segment 1) View of Tuck Creek; Area is disturbed, no potential



Plate 20: (Segment 1) View of Tuck Creek north of Fairview Street; Wooded area beyond development requires Stage 2

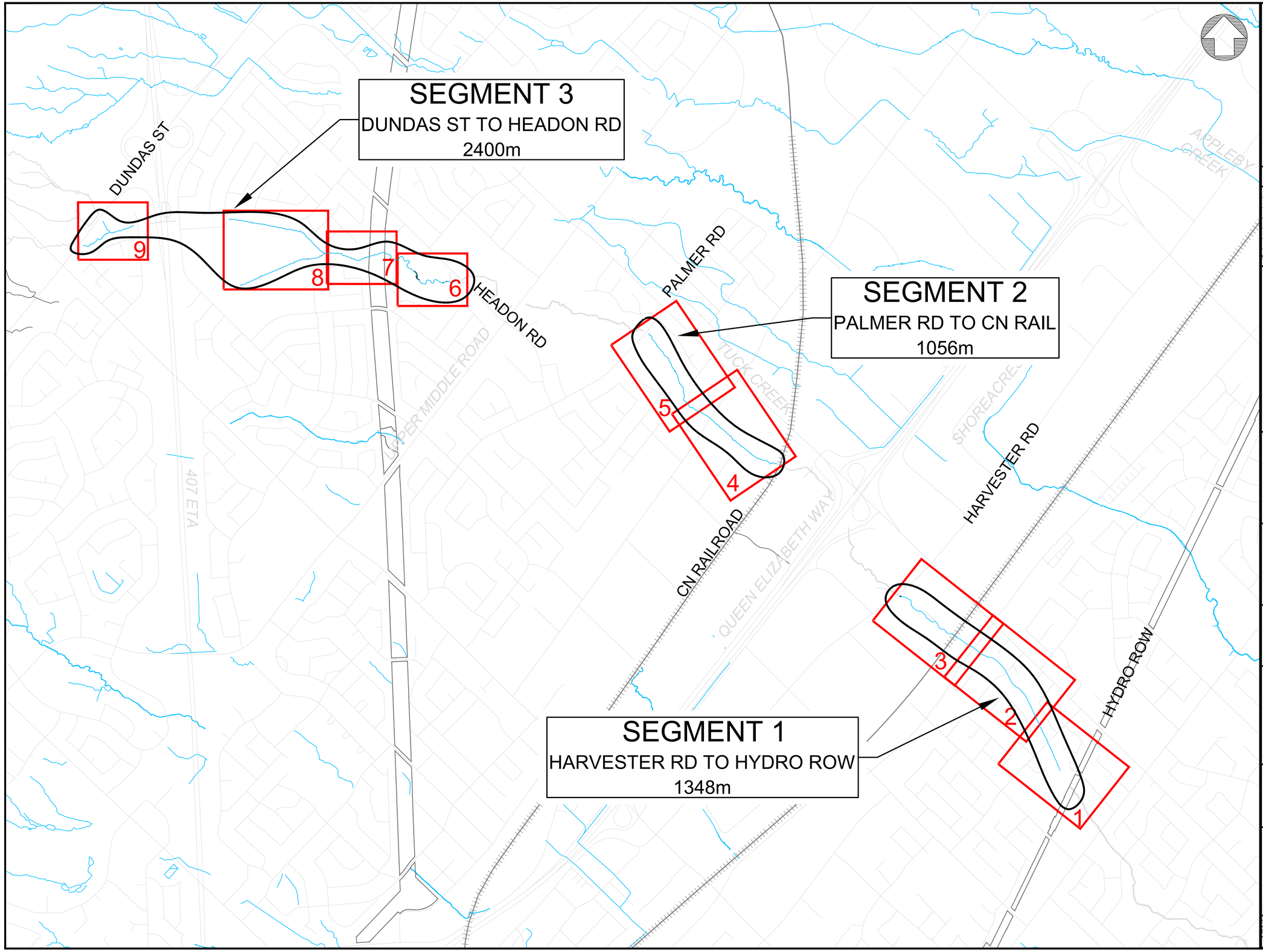


Plate 21: (Segment 1) View of Tuck Creek north of Fairview Street; Area is sloped, no potential



Plate 22: (Segment 1) View of Tuck Creek north of Fairview Street; Area is disturbed, no potential

9.0 APPENDIX A



No.	REVISION	By	DATE
1	Exisiting Conditions		2020-02-26

LEGEND

THE POSITION OF THE POLE LINES, CONDUITS, WATERMAINS, SEWERS, AND OTHER UTILITIES AND STRUCTURES ARE NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED.

BEFORE STARTING WORK

THE CONTRACTOR SHALL CONFIRM THE POSITION AND EXACT LOCATION OF ALL SUCH UTILITIES, AND SHALL ASSUME ALL LIABILITY FOR ANY DAMAGE TO THEM MADE DURING THE COURSE OF THE CONTRACT WORK.

JOB TITLE

Tuck Creek Erosion Control E.A.
BURLINGTON, ONTARIO

SHEET TITLE

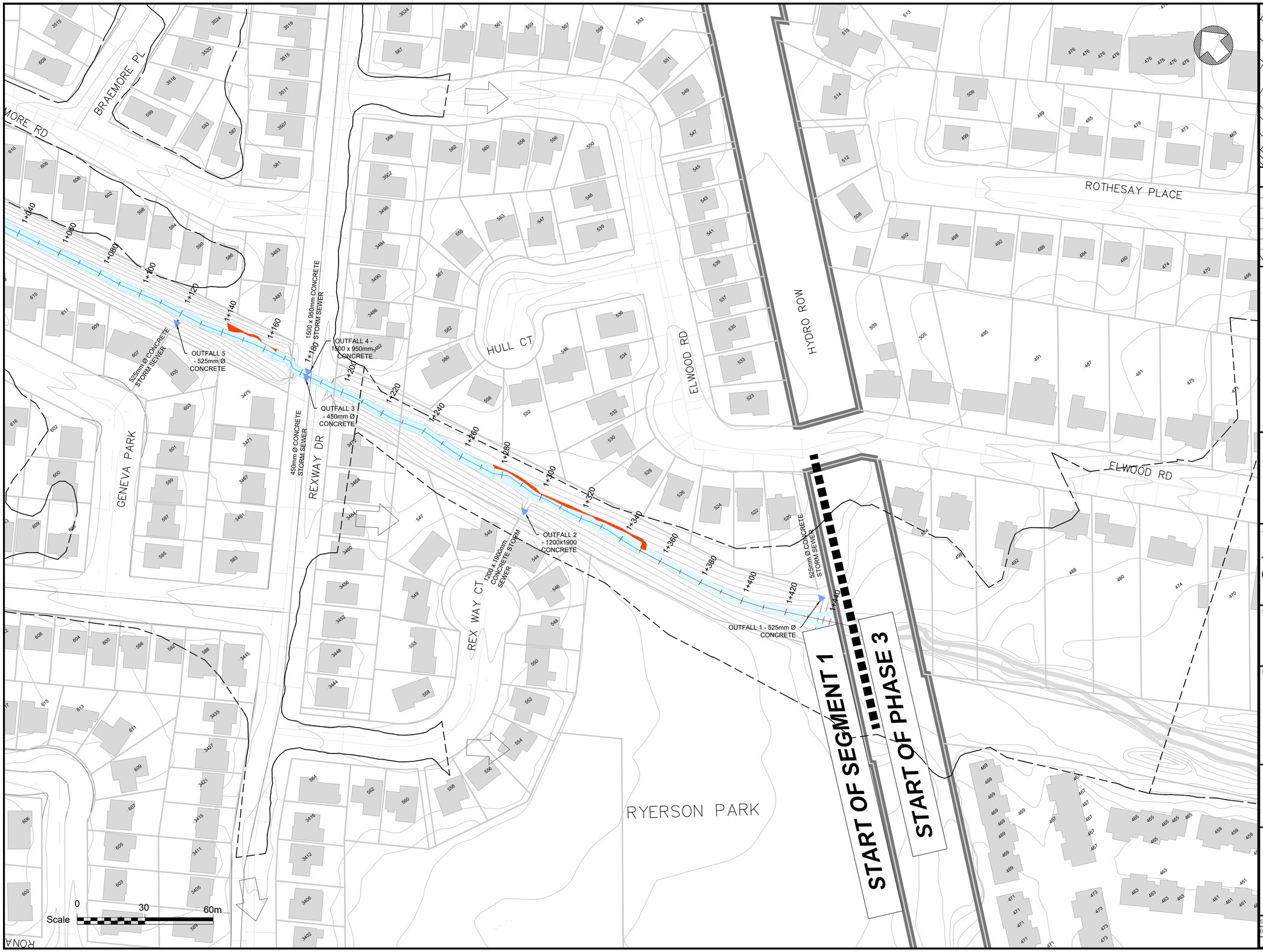
KEY MAP

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CITY OF Burlington

Aquafor Beech Limited
#6-202-2600 SKYMARK AVE
MISSISSAUGA, ONTARIO, L4W 5B2
PHONE: (905) 629-0099, FAX: (905) 629-0089

SCALE:	REVIEWED BY:	CONTRACT No.
DRAWN BY: B.S.	DESIGNED BY:	FILE No.
DATE: 10 MARCH, 2020	SHEET NO:	DRAWING No.





No.	REVISION	By	DATE
1	Exisiting Conditions		2020-02-26

LEGEND

- PROPERTY LINE
- STORMLINE
- ERODING/UNSTABLE BANK
- FLOODLINE
- TERRAFIX BLOCKS
- OUTFALL
- WOODY DEBRIS

THE POSITION OF THE POLE LINES, CONDUITS, WATERMAINS, SEWERS, AND OTHER UTILITIES AND STRUCTURES ARE NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED.

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SHEET TITLE

GENERAL PLAN
SEGMENT 1

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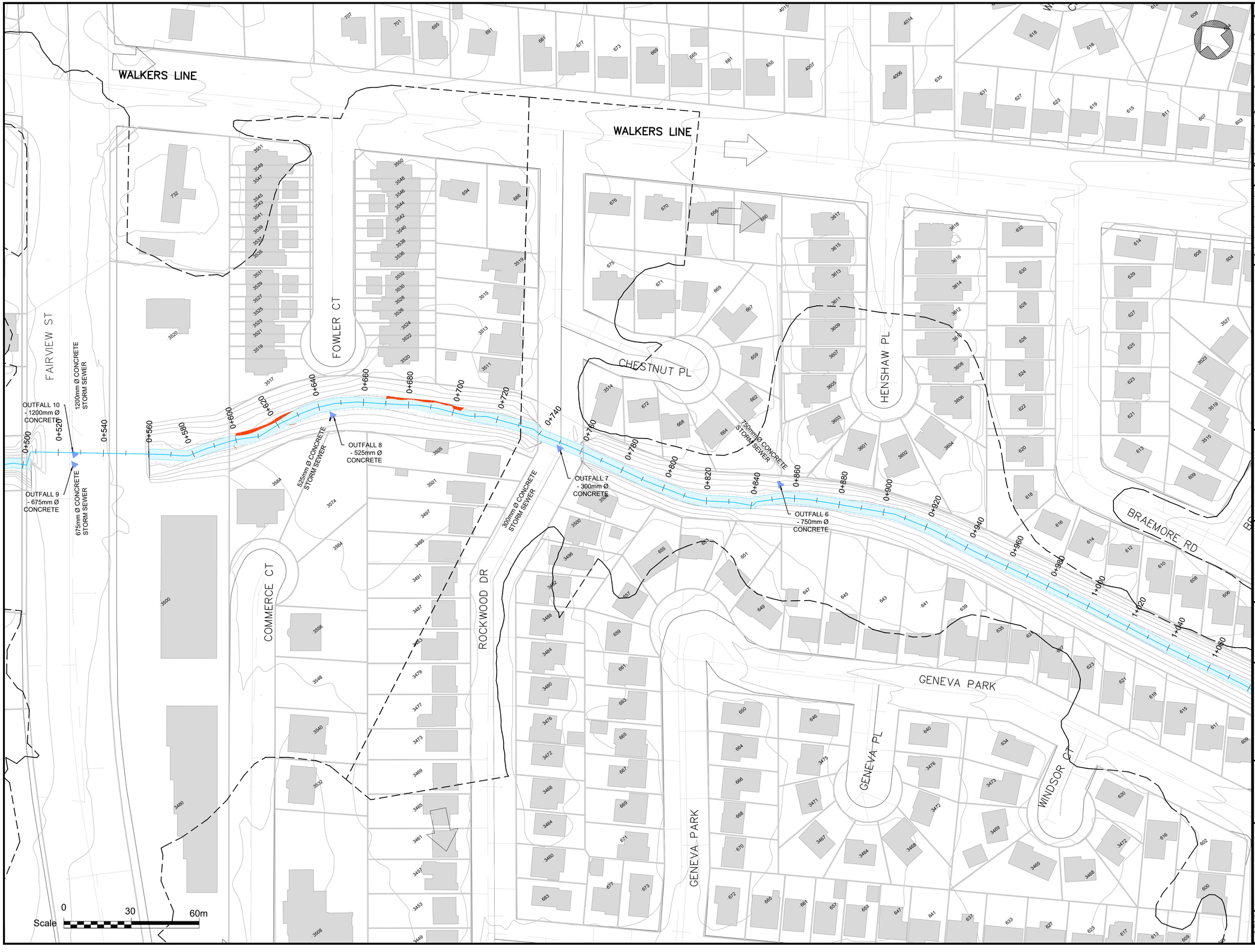
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MISSISSAUGA, ONTARIO, L4W 5B2
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No.	REVISION	By	DATE
1	Exisiting Conditions		2020-02-26

LEGEND

- PROPERTY LINE
- STORMLINE
- ERODING/UNSTABLE BANK
- FLOODLINE
- TERRAFIX BLOCKS
- OUTFALL
- WOODY DEBRIS

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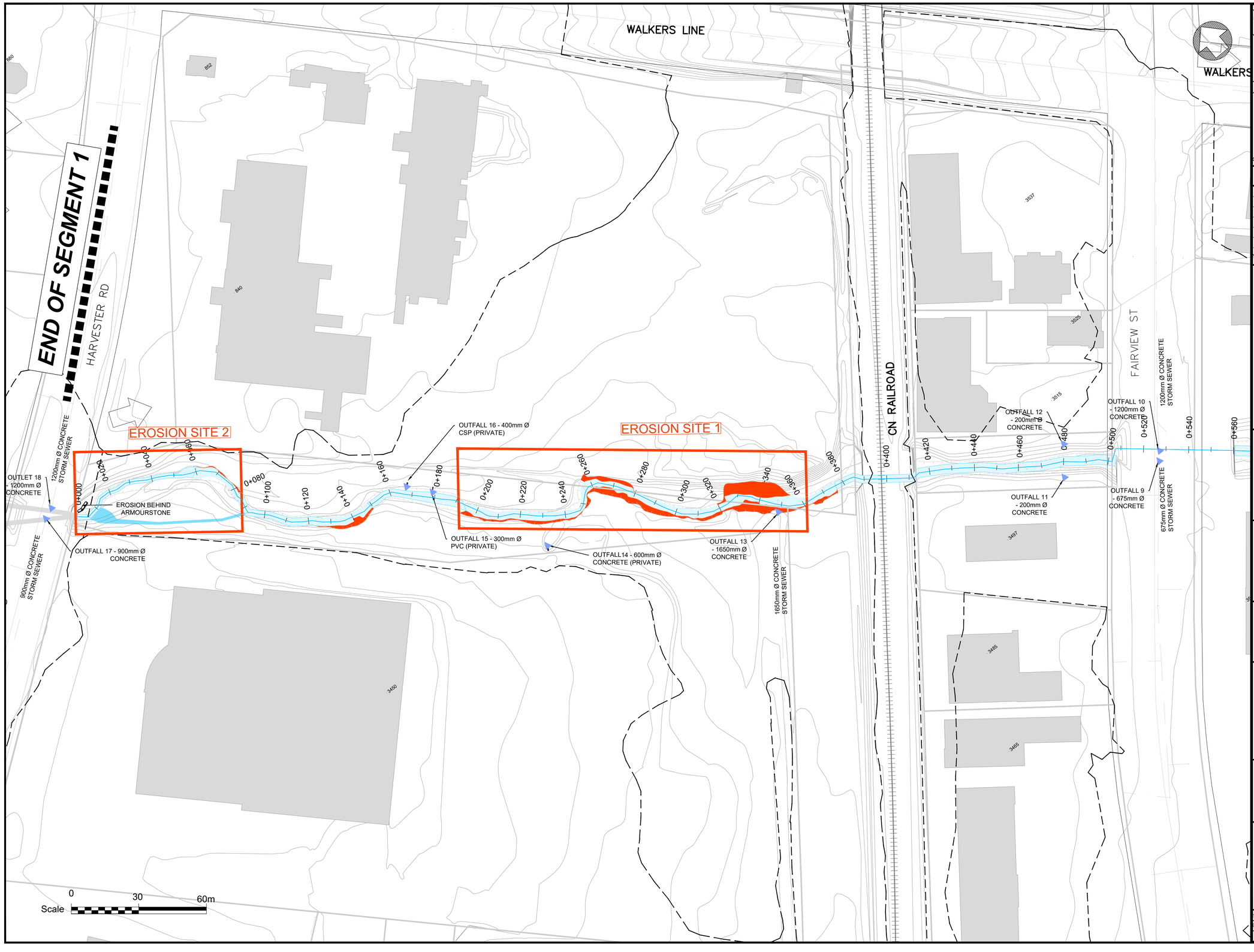
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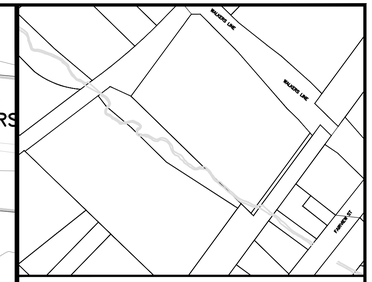
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No.	REVISION	By	DATE
1	Exisiting Conditions		2020-02-26

LEGEND

- PROPERTY LINE
- STORMLINE
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BURLINGTON, ONTARIO

SHEET TITLE

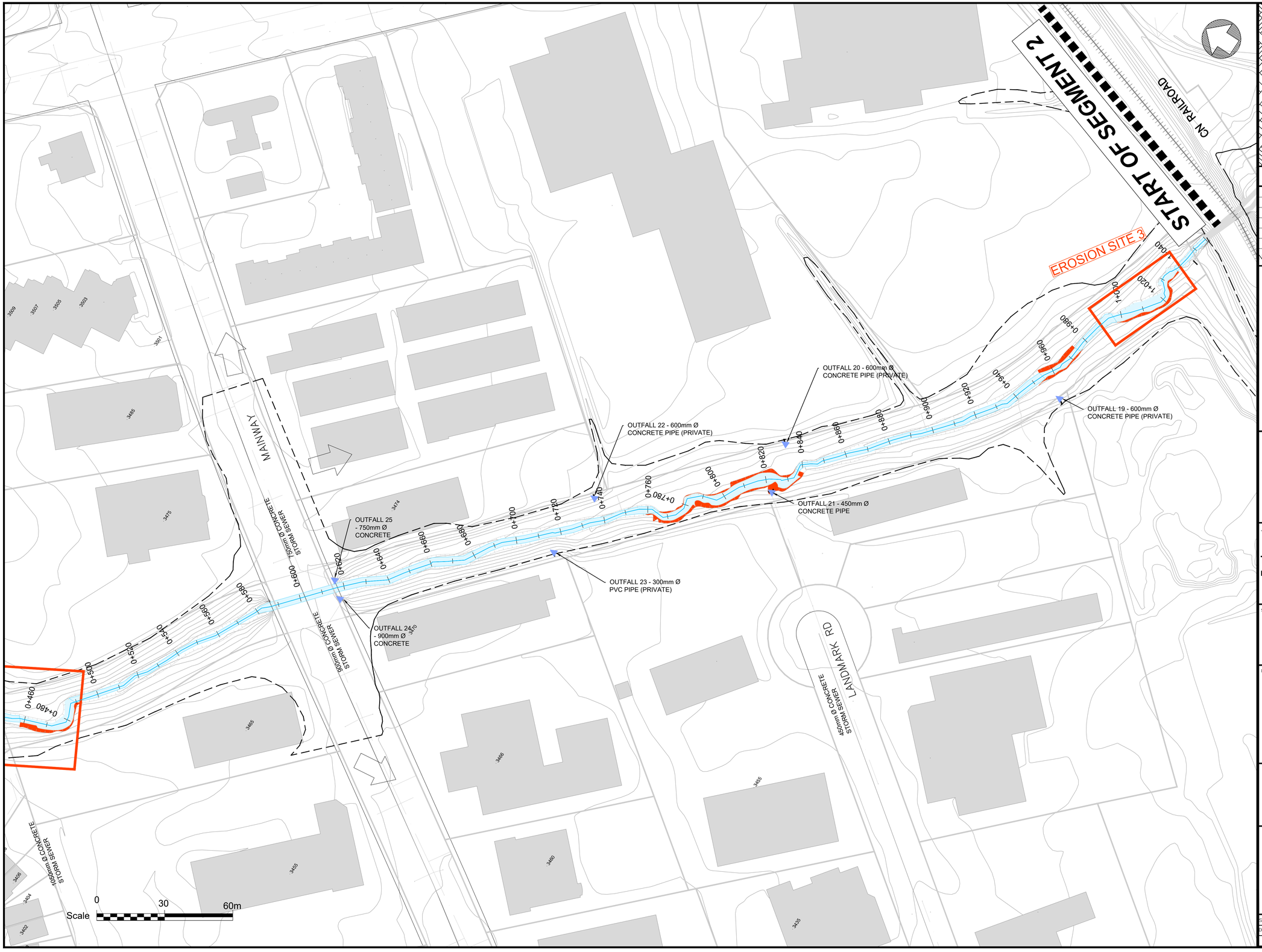
GENERAL PLAN
SEGMENT 1

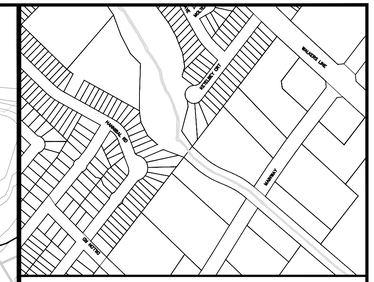
DESIGNED BY:	APPROVED BY:

CITY OF Burlington

Aquafor Beech Limited
#6-202-2600 SKYMARK AVE.
MISSISSAUGA, ONTARIO, L4W 5B2
PHONE: (905) 629-0099, FAX: (905) 629-0089

SCALE:	REVIEWED BY:	CONTRACT No.
DRAWN BY: B.S.	DESIGNED BY:	FILE No.
DATE: 10 MARCH, 2020	SHEET NO: 3 OF 9	DRAWING No.





No.	REVISION	By	DATE
1	Existing Conditions		2020-02-26

LEGEND

- PROPERTY LINE
- STORMLINE
- ERODING/UNSTABLE BANK
- FLOODLINE
- TERRAFIX BLOCKS
- OUTFALL
- WOODY DEBRIS

THE POSITION OF THE POLE LINES, CONDUITS, WATERMAINS, SEWERS, AND OTHER UTILITIES AND STRUCTURES ARE NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED.

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JOB TITLE

Tuck Creek Erosion Control E.A.

BURLINGTON, ONTARIO

SHEET TITLE

GENERAL PLAN
SEGMENT 2

DESIGNED BY:	APPROVED BY:

CITY OF Burlington

Aquafor Beech Limited
#6-202-2600 SKYMARK AVE.
MISSISSAUGA, ONTARIO, L4W 5B2
PHONE: (905) 629-0099, FAX: (905) 629-0089

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DATE: 10 MARCH, 2020	SHEET NO: 4 OF 9	DRAWING No.

WALKERS LINE

REYNOLDS AVE

MOLTER CRT

KETELBEY CRT

900mm Ø CONCRETE STORM SEWER

1350mm Ø CONCRETE STORM SEWER

OUTFALL 30 - 1350mm Ø CONCRETE

OUTFALL 29 - 600mm Ø CONCRETE

600mm Ø CONCRETE STORM SEWER

END OF SEGMENT 2

PALMER DR

0+000 0+020 0+040 0+060 0+080 0+100 0+120 0+140 0+160 0+180 0+200 0+220 0+240 WOODY DEBRIS 0+260 0+280 0+300 0+320 0+340 0+360 0+380 0+400 0+420 0+440 0+460 0+480 0+500

OUTFALL 28 - 900mm Ø CONCRETE

EROSION SITE 4

OUTFALL 27 - 825mm Ø CONCRETE

OUTFALL 26 - 1050mm Ø CONCRETE

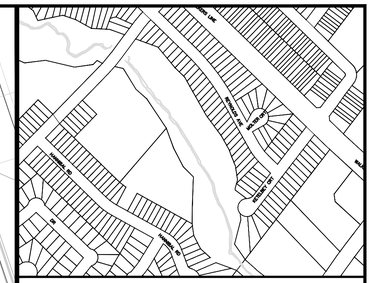
825mm Ø CONCRETE STORM SEWER

1050mm Ø CONCRETE STORM SEWER

HANNIBAL RD

HANNIBAL RD

Scale 0 30 60m



No.	REVISION	By	DATE
1	Exisiting Conditions		2020-02-26

LEGEND

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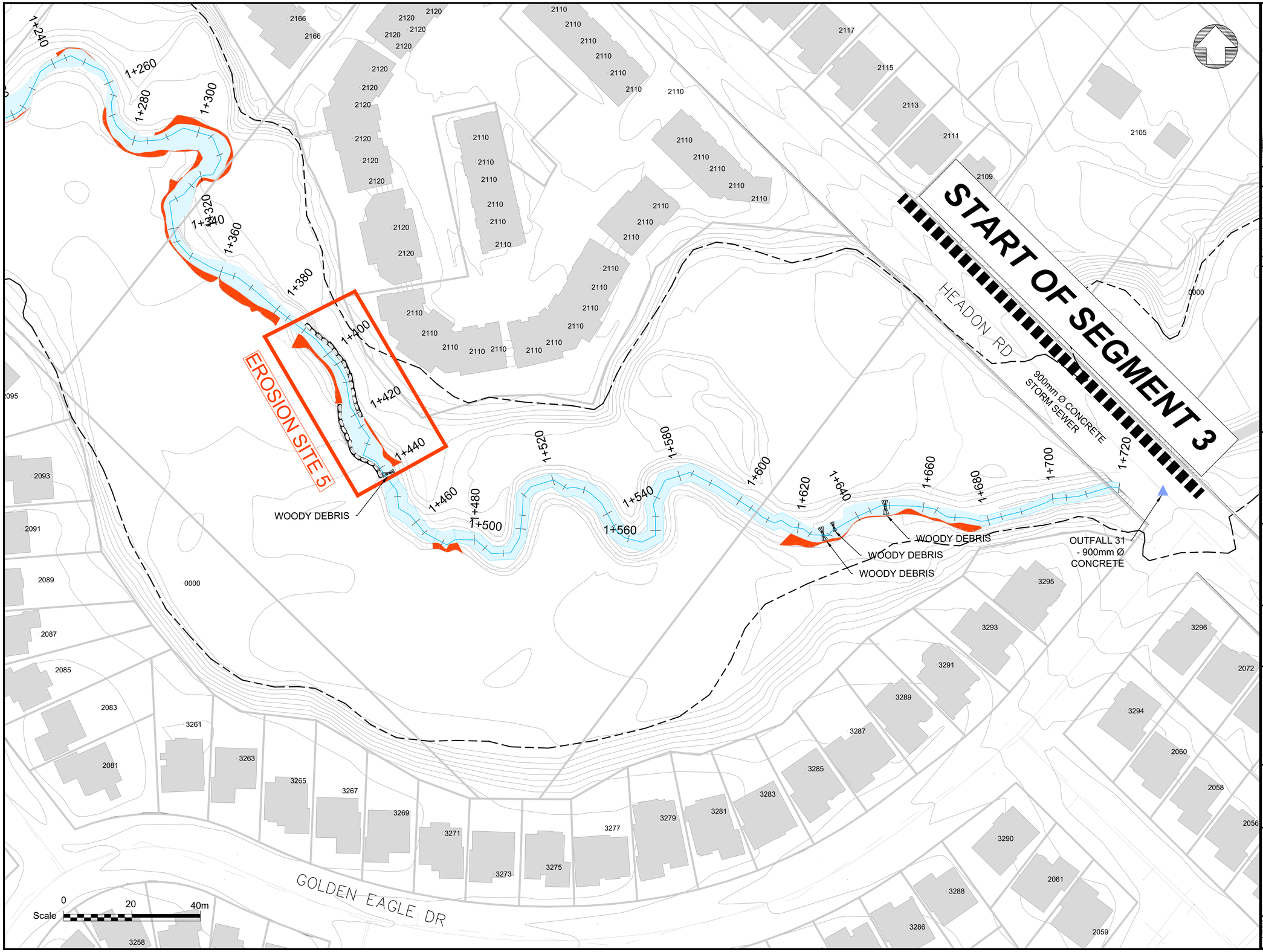
DESIGNED BY:	APPROVED BY:

CITY OF Burlington

Aquafor Beech Limited

#6-202-2600 SKYMARK AVE.
MISSISSAUGA, ONTARIO, L4W 5B2
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DATE:	10 MARCH, 2020	SHEET NO: 5 OF 9	DRAWING No.





No.	REVISION	By	DATE
1	Existing Conditions		2020-02-26

LEGEND

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- STORMLINE
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BURLINGTON, ONTARIO

SHEET TITLE

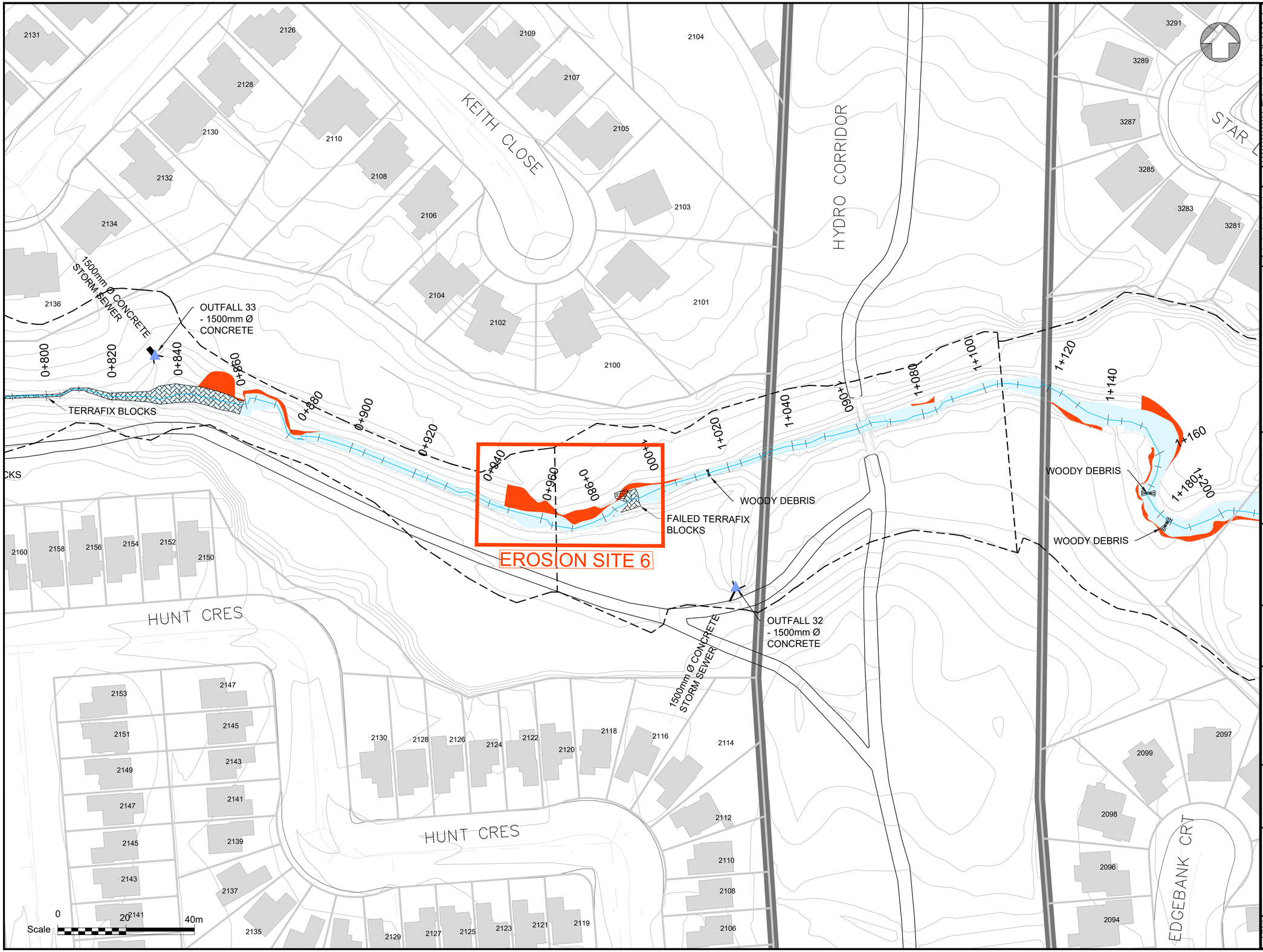
GENERAL PLAN
SEGMENT 3

DESIGNED BY:	APPROVED BY:

CITY OF Burlington

Aquafor Beech Limited
#6-202-2600 SKYMARK Ave,
MISSISSAUGA, ONTARIO, L4W 5B2
PHONE: (905) 629-0099, FAX: (905) 629-0089

SCALE:	REVIEWED BY:	CONTRACT No.
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DATE: 10 MARCH, 2020	SHEET NO: 6 OF 9	DRAWING No.





No.	REVISION	By	DATE
1	Exisiting Conditions		2020-02-26

LEGEND

- PROPERTY LINE
- STORMLINE
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SHEET TITLE

GENERAL PLAN
SEGMENT 3

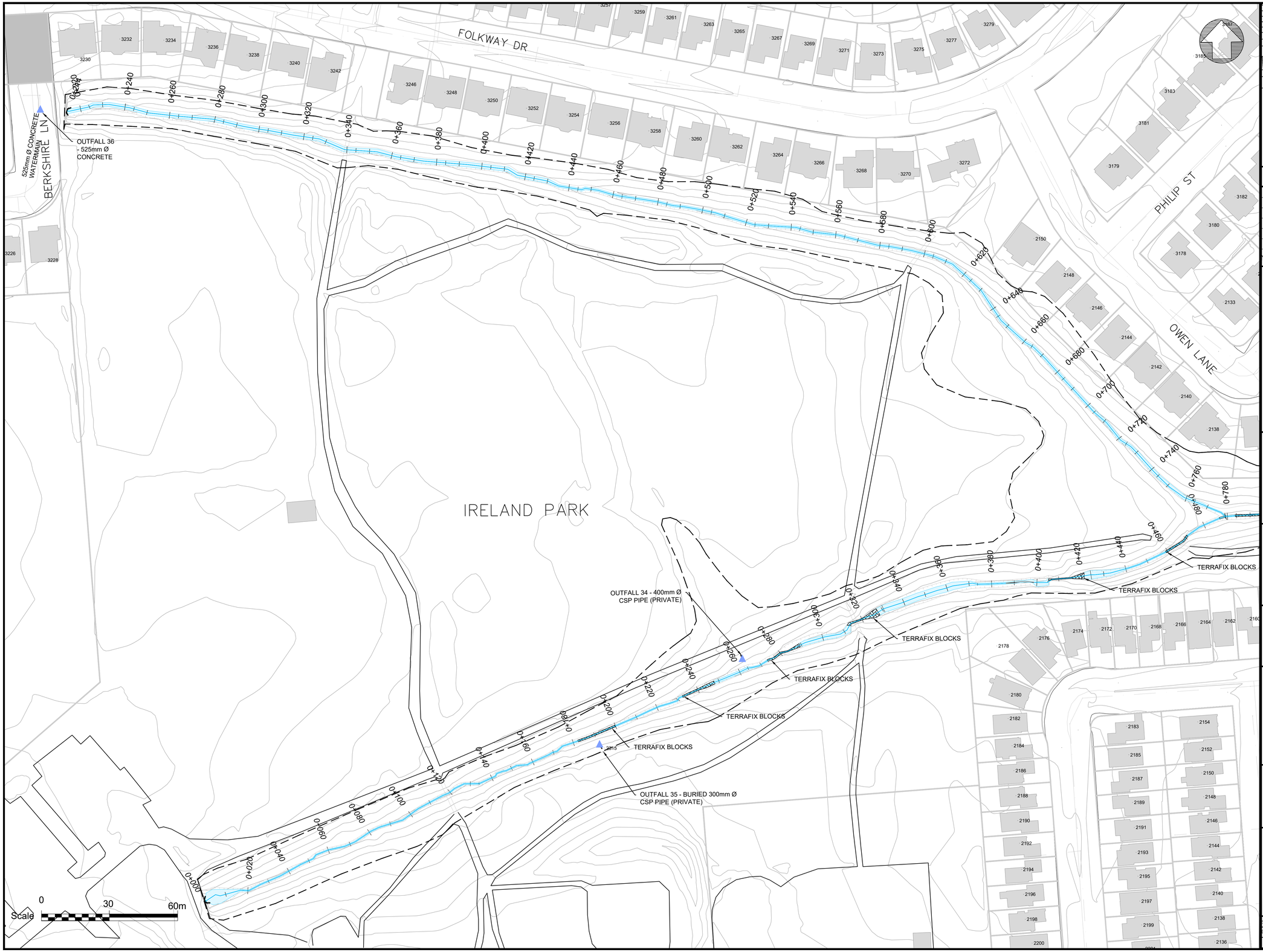
DESIGNED BY:	APPROVED BY:

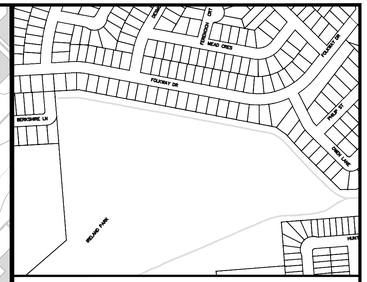
CITY OF Burlington

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DATE: 10 MARCH, 2020	SHEET NO: 7 OF 9	DRAWING No.





No.	REVISION	By	DATE
1	Existing Conditions		2020-02-26

LEGEND

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- STORMLINE
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- FLOODLINE
- TERRAFIX BLOCKS
- OUTFALL
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Tuck Creek Erosion Control E.A.

BURLINGTON, ONTARIO

SHEET TITLE

GENERAL PLAN
SEGMENT 3

DESIGNED BY:

APPROVED BY:

CITY OF Burlington

Aquafor Beech Limited
#6-202-2600 SKYMARK Ave.
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DATE: 10 MARCH, 2020	SHEET NO:8 OF 9	DRAWING No.

END OF SEGMENT 3

DUNDAS STREET

DRIFTWOOD DR

AUTUMN HILL CT

SNOWHILL CRT

EROSION SITE 7

WOODY DEBRIS

OUTFALL 38
- 450mm Ø
CONCRETE

450mm Ø CONCRETE
STORM SEWER

OUTFALL 37
- 250mm Ø
CONCRETE

250mm Ø CONCRETE
STORM SEWER

BURIED 2100mm
CONCRETE CULVERT

0+000
0+020
0+040
0+060
0+080
0+100
0+120
0+140
0+160
0+180
0+200
0+214

3075
3083
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3138
3140

0 20 40m
Scale



No.	REVISION	By	DATE
1	Existing Conditions		2020-02-26

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BURLINGTON, ONTARIO

SHEET TITLE

GENERAL PLAN
SEGMENT 3

DESIGNED BY:

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DRAWN BY: B.S.	DESIGNED BY:	FILE No.
DATE: 10 MARCH, 2020	SHEET NO:9 OF 9	DRAWING No.

Appendix A –

Existing Conditions Drawings

Evaluation Matrix for Erosion Site 1

EVALUATION CRITERIA		Maximum Score	Adjusted Maximum Score	Alternative1 Do Nothing	Alternative 2 Local Restoration Works	Alternative 3 Reach Scale Works
Physical / Natural Environment Criteria						
Mitigation of Existing Erosion Risks	Where existing erosion risks are substantial, close to the maximum score may be achievable. Where erosion risks are lower, maximum scores are not achievable. **Higher Risk**: Pending slope failure, potential loss of structures, potential impacts to critical infrastructure, etc. **Lower Risk**: Minor bed/bank erosion toward a naturalized area or non active use (vacant land), etc. Scoring is calculated based on the assigned degree of mitigation (green box) multiplied by the adjusted maximum score divided by 10.	20	20	10	30	36
		10		5	15	18
Impacts to Aquatic and/or Terrestrial Habitat	Where existing aquatic habitat is of higher quality, maximum scores are not achievable and it is also possible to achieve a negative score where harm is expected. Where the existing channel is degraded, full of rubbish/debris, has barriers to fish passage etc., maximum scores may be achievable. The degree of improvement/mitigation or impact (negative score) is scored in the green box. Greater improvements to fish and aquatic habitat would score higher. Improvements may be with respect to restoration of bed materials/substrates, riparian plantings, reduced turbidity, improved passage/connectivity. Scoring should also consider potential construction impacts (relative to existing conditions) where disruption is expected to result from construction. Where on-going degradation is expected under the do-nothing this could be considered a negative impact (negative score). Scoring is calculated based on the assigned degree of mitigation (green box) multiplied by the adjusted maximum score divided by 10. However, if a negative degree of mitigation is assigned that value is used instead for the scoring.	10	10	-1	-2	-3
		10		-1	-2	-3
	Where existing terrestrial habitat is of higher quality, maximum scores are not achievable and it is also possible to achieve a negative score when harm is expected. Where there's rubbish/debris or minimal/low quality riparian vegetation, etc., maximum scores may be achievable. The degree of improvement/mitigation or impact (negative score) is scored in the green box. Greater improvements to terrestrial habitat score higher, including increased buffers, increased planting density, inclusion of key features (e.g., raptor poles), etc. Scoring should also consider potential construction impact relative to existing conditions as well as consider the loss of habitat for interim periods. Scoring is calculated based on the assigned degree of mitigation (green box) multiplied by the adjusted maximum score divided by 10. However, if a negative degree of mitigation is assigned that value is used instead for the scoring.	10	10	0	-4	-5
		10		0	-4	-5
	Physical / Natural Environment Criteria Subtotal	**40**		**9**	**24**	**28**

EVALUATION CRITERIA		Maximum Score	Alternative1 Do Nothing	Alternative 2 Local Restoration Works	Alternative 3 Reach Scale Works
			Score	Score	Score
Technical and Engineering Criteria					
Technical Feasibility	Less complexity of the Project: Consider permitting/coordination requirements with community members and stakeholders, etc.	5	0	4	4
	Less impacts to existing infrastructure (e.g., sewers, watermains, gas, roads) .	5	4	3	2
Flooding Impacts	Greater reduction of flooding risks to public and/or private lands for longer time scores higher.	5	3	3	4
	Technical and Engineering Criteria Subtotal	**15**	**7**	**10**	**10**
Social / Cultural Environment Criteria					
Parks and Recreation	Opportunities which increase safety or utility of trails and/or outdoor recreational facilities would score h.igher (e.g., improvements to parkland, trails, etc.).	5	0	4	4
Community Disruption	Compatibility of proposed works with adjacent properties (i.e. removal or addition of features which reduces utility for neighbouring lands scores lower). As an example, removal of mature vegetation adjacent residential properties would score lower.	5	0	3	4
	Less disruption to the surrounding community and residents scores higher (e.g., consideration of traffic/road closures, access impacts to shops, etc.).	5	4	3	3
Archaeological Impacts	Less disturbance of areas with archaeological potential and cultural heritage resources scores higher.	5	4	3	3
	Social / Cultural Environment Criteria Subtotal	**20**	**8**	**13**	**14**
Economic Environment Criteria					
Construction Cost	Lower construction cost relative to other alternatives scores higher.	10	10	6	5
Operation and Maintenance Costs	Lower operations and maintenance costs relative to other alternatives scores higher.	5	4	3	2
Life Cycle Costs	Lower life cycle costs relative to the other alternatives scores higher.	5	1	3	4
Infrastructure Protection	Greater protection of existing infrastructure for a longer time scores higher.	5	1	4	4
	Economic Criteria Subtotal	**25**	**16**	**16**	**15**
Total		100	40	63	67

Evaluation Matrix for Erosion Site 2

EVALUATION CRITERIA		Maximum Score	Adjusted Maximum Score	Alternative1 Do Nothing	Alternative 2 Local Restoration Works	Alternative 3 Reach Scale Works
Physical / Natural Environment Criteria						
Mitigation of Existing Erosion Risks	Where existing erosion risks are substantial, close to the maximum score may be achievable. Where erosion risks are lower, maximum scores are not achievable. **Higher Risk**: Pending slope failure, potential loss of structures, potential impacts to critical infrastructure, etc. **Lower Risk**: Minor bed/bank erosion toward a naturalized area or non active use (vacant land), etc. Scoring is calculated based on the assigned degree of mitigation (green box) multiplied by the adjusted maximum score divided by 10.	20	20	8	32	36
		10		4	16	18
Impacts to Aquatic and/or Terrestrial Habitat	Where existing aquatic habitat is of higher quality, maximum scores are not achievable and it is also possible to achieve a negative score where harm is expected. Where the existing channel is degraded, full of rubbish/debris, has barriers to fish passage etc., maximum scores may be achievable. The degree of improvement/mitigation or impact (negative score) is scored in the green box. Greater improvements to fish and aquatic habitat would score higher. Improvements may be with respect to restoration of bed materials/substrates, riparian plantings, reduced turbidity, improved passage/connectivity. Scoring should also consider potential construction impacts (relative to existing conditions) where disruption is expected to result from construction. Where on-going degradation is expected under the do-nothing this could be considered a negative impact (negative score). Scoring is calculated based on the assigned degree of mitigation (green box) multiplied by the adjusted maximum score divided by 10. However, if a negative degree of mitigation is assigned that value is used instead for the scoring.	10	10	0	2	4
		10		0	2	4
	Where existing terrestrial habitat is of higher quality, maximum scores are not achievable and it is also possible to achieve a negative score when harm is expected. Where there's rubbish/debris or minimal/low quality riparian vegetation, etc., maximum scores may be achievable. The degree of improvement/mitigation or impact (negative score) is scored in the green box. Greater improvements to terrestrial habitat score higher, including increased buffers, increased planting density, inclusion of key features (e.g., raptor poles), etc. Scoring should also consider potential construction impact relative to existing conditions as well as consider the loss of habitat for interim periods. Scoring is calculated based on the assigned degree of mitigation (green box) multiplied by the adjusted maximum score divided by 10. However, if a negative degree of mitigation is assigned that value is used instead for the scoring.	10	10	0	-1	-2
		10		0	-1	-2
	Physical / Natural Environment Criteria Subtotal		**40**	**8**	**33**	**38**

EVALUATION CRITERIA		Maximum Score	Alternative1 Do Nothing	Alternative 2 Local Restoration Works	Alternative 3 Reach Scale Works
			Score	Score	Score
Technical and Engineering Criteria					
Technical Feasibility	Less complexity of the Project: Consider permitting/coordination requirements with community members and stakeholders, etc.	5	5	4	3
	Less impacts to existing infrastructure (e.g., sewers, watermains, gas, roads)	5	4	3	2
Flooding Impacts	Greater reduction of flooding risks to public and/or private lands for longer time scores higher	5	1	2	3
	Technical and Engineering Criteria Subtotal	**15**	**10**	**9**	**8**
Social / Cultural Environment Criteria					
Parks and Recreation	Opportunities which increase safety or utility of trails and/or outdoor recreational facilities would score higher (e.g., improvements to parkland, trails, etc.)	5	1	4	4
Community Disruption	Compatibility of proposed works with adjacent properties (i.e. removal or addition of features which reduces utility for neighbouring lands scores lower). As an example, removal of mature vegetation adjacent residential properties would score lower.	5	1	3	3
	Less disruption to the surrounding community and residents scores higher (e.g., consideration of traffic/road closures, access impacts to shops, etc.)	5	4	3	3
Archaeological Impacts	Less disturbance of areas with archaeological potential and cultural heritage resources scores higher	5	5	3	2
	Social / Cultural Environment Criteria Subtotal	**20**	**11**	**13**	**12**
Economic Environment Criteria					
Construction Cost	Lower construction cost relative to other alternatives scores higher	10	10	5	4
Operation and Maintenance Costs	Lower operations and maintenance costs relative to other alternatives scores higher	5	1	3	2
Life Cycle Costs	Lower life cycle costs relative to the other alternatives scores higher	5	1	3	4
Infrastructure Protection	Greater protection of existing infrastructure for a longer time scores higher	5	1	3	5
	Economic Criteria Subtotal	**25**	**13**	**14**	**15**
Total		100	42	69	73

Evaluation Matrix for Erosion Site 3

EVALUATION CRITERIA		Maximum Score	Adjusted Maximum Score	Alternative1 Do Nothing	Alternative 2 Local Restoration Works	Alternative 3 Reach Scale Works
Physical / Natural Environment Criteria						
Mitigation of Existing Erosion Risks	Where existing erosion risks are substantial, close to the maximum score may be achievable. Where erosion risks are lower, maximum scores are not achievable. **Higher Risk**: Pending slope failure, potential loss of structures, potential impacts to critical infrastructure, etc. **Lower Risk**: Minor bed/bank erosion toward a naturalized area or non active use (vacant land), etc. Scoring is calculated based on the assigned degree of mitigation (green box) multiplied by the adjusted maximum score divided by 10.	20	20	12	36	36
		10		6	18	18
Impacts to Aquatic and/or Terrestrial Habitat	Where existing aquatic habitat is of higher quality, maximum scores are not achievable and it is also possible to achieve a negative score where harm is expected. Where the existing channel is degraded, full of rubbish/debris, has barriers to fish passage etc., maximum scores may be achievable. The degree of improvement/mitigation or impact (negative score) is scored in the green box. Greater improvements to fish and aquatic habitat would score higher. Improvements may be with respect to restoration of bed materials/substrates, riparian plantings, reduced turbidity, improved passage/connectivity. Scoring should also consider potential construction impacts (relative to existing conditions) where disruption is expected to result from construction. Where on-going degradation is expected under the do-nothing this could be considered a negative impact (negative score). Scoring is calculated based on the assigned degree of mitigation (green box) multiplied by the adjusted maximum score divided by 10. However, if a negative degree of mitigation is assigned that value is used instead for the scoring.	10	10	-1	4	2
		10		-1	4	2
	Where existing terrestrial habitat is of higher quality, maximum scores are not achievable and it is also possible to achieve a negative score when harm is expected. Where there's rubbish/debris or minimal/low quality riparian vegetation, etc., maximum scores may be achievable. The degree of improvement/mitigation or impact (negative score) is scored in the green box. Greater improvements to terrestrial habitat score higher, including increased buffers, increased planting density, inclusion of key features (e.g., raptor poles), etc. Scoring should also consider potential construction impact relative to existing conditions as well as consider the loss of habitat for interim periods. Scoring is calculated based on the assigned degree of mitigation (green box) multiplied by the adjusted maximum score divided by 10. However, if a negative degree of mitigation is assigned that value is used instead for the scoring.	10	10	-2	4	3
		10		-2	4	3
	Physical / Natural Environment Criteria Subtotal		**40**	**9**	**44**	**41**

EVALUATION CRITERIA		Maximum Score	Alternative1 Do Nothing	Alternative 2 Local Restoration Works	Alternative 3 Reach Scale Works
			Score	Score	Score
Technical and Engineering Criteria					
Technical Feasibility	Less complexity of the Project: Consider permitting/coordination requirements with community members and stakeholders, etc.	5	5	4	2
	Less impacts to existing infrastructure (e.g., sewers, watermains, gas, roads)	5	4	3	2
Flooding Impacts	Greater reduction of flooding risks to public and/or private lands for longer time scores higher	5	1	3	3
	Technical and Engineering Criteria Subtotal	**15**	**10**	**10**	**7**
Social / Cultural Environment Criteria					
Parks and Recreation	Opportunities which increase safety or utility of trails and/or outdoor recreational facilities would score higher (e.g., improvements to parkland, trails, etc.)	5	1	4	4
Community Disruption	Compatibility of proposed works with adjacent properties (i.e. removal or addition of features which reduces utility for neighbouring lands scores lower). As an example, removal of mature vegetation adjacent residential properties would score lower.	5	1	4	4
	Less disruption to the surrounding community and residents scores higher (e.g., consideration of traffic/road closures, access impacts to shops, etc.)	5	4	4	3
Archaeological Impacts	Less disturbance of areas with archaeological potential and cultural heritage resources scores higher	5	5	4	4
	Social / Cultural Environment Criteria Subtotal	**20**	**11**	**16**	**15**
Economic Environment Criteria					
Construction Cost	Lower construction cost relative to other alternatives scores higher	10	10	4	5
Operation and Maintenance Costs	Lower operations and maintenance costs relative to other alternatives scores higher	5	1	3	2
Life Cycle Costs	Lower life cycle costs relative to the other alternatives scores higher	5	1	3	4
Infrastructure Protection	Greater protection of existing infrastructure for a longer time scores higher	5	1	3	4
	Economic Criteria Subtotal	**25**	**13**	**13**	**15**
Total		100	43	83	78

Evaluation Matrix for Erosion Site 4

EVALUATION CRITERIA		Maximum Score	Adjusted Maximum Score	Alternative1 Do Nothing	Alternative 2 Local Restoration Works	Alternative 3 Reach Scale Works
Physical / Natural Environment Criteria						
Mitigation of Existing Erosion Risks	Where existing erosion risks are substantial, close to the maximum score may be achievable. Where erosion risks are lower, maximum scores are not achievable. **Higher Risk**: Pending slope failure, potential loss of structures, potential impacts to critical infrastructure, etc. **Lower Risk**: Minor bed/bank erosion toward a naturalized area or non active use (vacant land), etc. Scoring is calculated based on the assigned degree of mitigation (green box) multiplied by the adjusted maximum score divided by 10.	20	20	4	30	34
		10		2	15	17
Impacts to Aquatic and/or Terrestrial Habitat	Where existing aquatic habitat is of higher quality, maximum scores are not achievable and it is also possible to achieve a negative score where harm is expected. Where the existing channel is degraded, full of rubbish/debris, has barriers to fish passage etc., maximum scores may be achievable. The degree of improvement/mitigation or impact (negative score) is scored in the green box. Greater improvements to fish and aquatic habitat would score higher. Improvements may be with respect to restoration of bed materials/substrates, riparian plantings, reduced turbidity, improved passage/connectivity. Scoring should also consider potential construction impacts (relative to existing conditions) where disruption is expected to result from construction. Where on-going degradation is expected under the do-nothing this could be considered a negative impact (negative score). Scoring is calculated based on the assigned degree of mitigation (green box) multiplied by the adjusted maximum score divided by 10. However, if a negative degree of mitigation is assigned that value is used instead for the scoring.	10	10	0	-1	-2
		10		0	-1	-2
	Where existing terrestrial habitat is of higher quality, maximum scores are not achievable and it is also possible to achieve a negative score when harm is expected. Where there's rubbish/debris or minimal/low quality riparian vegetation, etc., maximum scores may be achievable. The degree of improvement/mitigation or impact (negative score) is scored in the green box. Greater improvements to terrestrial habitat score higher, including increased buffers, increased planting density, inclusion of key features (e.g., raptor poles), etc. Scoring should also consider potential construction impact relative to existing conditions as well as consider the loss of habitat for interim periods. Scoring is calculated based on the assigned degree of mitigation (green box) multiplied by the adjusted maximum score divided by 10. However, if a negative degree of mitigation is assigned that value is used instead for the scoring.	10	10	0	2	3
		10		0	2	3
	Physical / Natural Environment Criteria Subtotal		**40**	**4**	**31**	**35**

EVALUATION CRITERIA		Maximum Score	Alternative1 Do Nothing	Alternative 2 Local Restoration Works	Alternative 3 Reach Scale Works
			Score	Score	Score
Technical and Engineering Criteria					
Technical Feasibility	Less complexity of the Project: Consider permitting/coordination requirements with community members and stakeholders, etc.	5	5	3	2
	Less impacts to existing infrastructure (e.g., sewers, watermains, gas, roads)	5	5	2	2
Flooding Impacts	Greater reduction of flooding risks to public and/or private lands for longer time scores higher	5	1	2	3
	Technical and Engineering Criteria Subtotal	**15**	**11**	**7**	**7**
Social / Cultural Environment Criteria					
Parks and Recreation	Opportunities which increase safety or utility of trails and/or outdoor recreational facilities would score higher (e.g., improvements to parkland, trails, etc.)	5	1	2	3
Community Disruption	Compatibility of proposed works with adjacent properties (i.e. removal or addition of features which reduces utility for neighbouring lands scores lower). As an example, removal of mature vegetation adjacent residential properties would score lower.	5	1	3	3
	Less disruption to the surrounding community and residents scores higher (e.g., consideration of traffic/road closures, access impacts to shops, etc.)	5	4	3	2
Archaeological Impacts	Less disturbance of areas with archaeological potential and cultural heritage resources scores higher	5	5	3	2
	Social / Cultural Environment Criteria Subtotal	**20**	**11**	**11**	**10**
Economic Environment Criteria					
Construction Cost	Lower construction cost relative to other alternatives scores higher	10	10	6	5
Operation and Maintenance Costs	Lower operations and maintenance costs relative to other alternatives scores higher	5	1	3	4
Life Cycle Costs	Lower life cycle costs relative to the other alternatives scores higher	5	1	3	4
Infrastructure Protection	Greater protection of existing infrastructure for a longer time scores higher	5	1	4	4
	Economic Criteria Subtotal	**25**	**13**	**16**	**17**
Total		100	39	65	69

Evaluation Matrix for Erosion Site 5

EVALUATION CRITERIA		Maximum Score	Adjusted Maximum Score	Alternative1 Do Nothing	Alternative 2 Local Restoration Works	Alternative 3 Reach Scale Works
Physical / Natural Environment Criteria						
Mitigation of Existing Erosion Risks	Where existing erosion risks are substantial, close to the maximum score may be achievable. Where erosion risks are lower, maximum scores are not achievable. **Higher Risk**: Pending slope failure, potential loss of structures, potential impacts to critical infrastructure, etc. **Lower Risk**: Minor bed/bank erosion toward a naturalized area or non active use (vacant land), etc. Scoring is calculated based on the assigned degree of mitigation (green box) multiplied by the adjusted maximum score divided by 10.	20	20	10	30	32
		10		5	15	16
Impacts to Aquatic and/or Terrestrial Habitat	Where existing aquatic habitat is of higher quality, maximum scores are not achievable and it is also possible to achieve a negative score where harm is expected. Where the existing channel is degraded, full of rubbish/debris, has barriers to fish passage etc., maximum scores may be achievable. The degree of improvement/mitigation or impact (negative score) is scored in the green box. Greater improvements to fish and aquatic habitat would score higher. Improvements may be with respect to restoration of bed materials/substrates, riparian plantings, reduced turbidity, improved passage/connectivity. Scoring should also consider potential construction impacts (relative to existing conditions) where disruption is expected to result from construction. Where on-going degradation is expected under the do-nothing this could be considered a negative impact (negative score). Scoring is calculated based on the assigned degree of mitigation (green box) multiplied by the adjusted maximum score divided by 10. However, if a negative degree of mitigation is assigned that value is used instead for the scoring.	10	10	0	-1	-4
		10		0	-1	-4
	Where existing terrestrial habitat is of higher quality, maximum scores are not achievable and it is also possible to achieve a negative score when harm is expected. Where there's rubbish/debris or minimal/low quality riparian vegetation, etc., maximum scores may be achievable. The degree of improvement/mitigation or impact (negative score) is scored in the green box. Greater improvements to terrestrial habitat score higher, including increased buffers, increased planting density, inclusion of key features (e.g., raptor poles), etc. Scoring should also consider potential construction impact relative to existing conditions as well as consider the loss of habitat for interim periods. Scoring is calculated based on the assigned degree of mitigation (green box) multiplied by the adjusted maximum score divided by 10. However, if a negative degree of mitigation is assigned that value is used instead for the scoring.	10	10	0	2	-2
		10		0	2	-2
	Physical / Natural Environment Criteria Subtotal		**40**	**10**	**31**	**26**

EVALUATION CRITERIA		Maximum Score	Alternative1 Do Nothing	Alternative 2 Local Restoration Works	Alternative 3 Reach Scale Works
			Score	Score	Score
Technical and Engineering Criteria					
Technical Feasibility	Less complexity of the Project: Consider permitting/coordination requirements with community members and stakeholders, etc.	5	5	4	2
	Less impacts to existing infrastructure (e.g., sewers, watermains, gas, roads)	5	5	4	2
Flooding Impacts	Greater reduction of flooding risks to public and/or private lands for longer time scores higher	5	1	2	4
	Technical and Engineering Criteria Subtotal	**15**	**11**	**10**	**8**
Social / Cultural Environment Criteria					
Parks and Recreation	Opportunities which increase safety or utility of trails and/or outdoor recreational facilities would score higher (e.g., improvements to parkland, trails, etc.)	5	1	3	4
Community Disruption	Compatibility of proposed works with adjacent properties (i.e. removal or addition of features which reduces utility for neighbouring lands scores lower). As an example, removal of mature vegetation adjacent residential properties would score lower.	5	1	3	4
	Less disruption to the surrounding community and residents scores higher (e.g., consideration of traffic/road closures, access impacts to shops, etc.)	5	5	3	1
Archaeological Impacts	Less disturbance of areas with archaeological potential and cultural heritage resources scores higher	5	5	3	1
	Social / Cultural Environment Criteria Subtotal	**20**	**12**	**12**	**10**
Economic Environment Criteria					
Construction Cost	Lower construction cost relative to other alternatives scores higher	10	10	6	3
Operation and Maintenance Costs	Lower operations and maintenance costs relative to other alternatives scores higher	5	1	3	4
Life Cycle Costs	Lower life cycle costs relative to the other alternatives scores higher	5	1	3	3
Infrastructure Protection	Greater protection of existing infrastructure for a longer time scores higher	5	1	4	4
	Economic Criteria Subtotal	**25**	**13**	**16**	**14**
Total		100	46	69	58

Evaluation Matrix for Erosion Site 6

EVALUATION CRITERIA		Maximum Score	Adjusted Maximum Score	Alternative1 Do Nothing	Alternative 2 Local Restoration Works	Alternative 3 Reach Scale Works
Physical / Natural Environment Criteria						
Mitigation of Existing Erosion Risks	Where existing erosion risks are substantial, close to the maximum score may be achievable. Where erosion risks are lower, maximum scores are not achievable. **Higher Risk**: Pending slope failure, potential loss of structures, potential impacts to critical infrastructure, etc. **Lower Risk**: Minor bed/bank erosion toward a naturalized area or non active use (vacant land), etc. Scoring is calculated based on the assigned degree of mitigation (green box) multiplied by the adjusted maximum score divided by 10.	20	20	4	30	38
		10		2	15	19
Impacts to Aquatic and/or Terrestrial Habitat	Where existing aquatic habitat is of higher quality, maximum scores are not achievable and it is also possible to achieve a negative score where harm is expected. Where the existing channel is degraded, full of rubbish/debris, has barriers to fish passage etc., maximum scores may be achievable. The degree of improvement/mitigation or impact (negative score) is scored in the green box. Greater improvements to fish and aquatic habitat would score higher. Improvements may be with respect to restoration of bed materials/substrates, riparian plantings, reduced turbidity, improved passage/connectivity. Scoring should also consider potential construction impacts (relative to existing conditions) where disruption is expected to result from construction. Where on-going degradation is expected under the do-nothing this could be considered a negative impact (negative score). Scoring is calculated based on the assigned degree of mitigation (green box) multiplied by the adjusted maximum score divided by 10. However, if a negative degree of mitigation is assigned that value is used instead for the scoring.	10	10	0	-1	2
		10		0	-1	2
	Where existing terrestrial habitat is of higher quality, maximum scores are not achievable and it is also possible to achieve a negative score when harm is expected. Where there's rubbish/debris or minimal/low quality riparian vegetation, etc., maximum scores may be achievable. The degree of improvement/mitigation or impact (negative score) is scored in the green box. Greater improvements to terrestrial habitat score higher, including increased buffers, increased planting density, inclusion of key features (e.g., raptor poles), etc. Scoring should also consider potential construction impact relative to existing conditions as well as consider the loss of habitat for interim periods. Scoring is calculated based on the assigned degree of mitigation (green box) multiplied by the adjusted maximum score divided by 10. However, if a negative degree of mitigation is assigned that value is used instead for the scoring.	10	10	-1	0	1
		10		-1	0	1
	Physical / Natural Environment Criteria Subtotal		**40**	**3**	**29**	**41**

EVALUATION CRITERIA		Maximum Score	Alternative1 Do Nothing	Alternative 2 Local Restoration Works	Alternative 3 Reach Scale Works
			Score	Score	Score
Technical and Engineering Criteria					
Technical Feasibility	Less complexity of the Project: Consider permitting/coordination requirements with community members and stakeholders, etc.	5	5	4	3
	Less impacts to existing infrastructure (e.g., sewers, watermains, gas, roads)	5	5	3	3
Flooding Impacts	Greater reduction of flooding risks to public and/or private lands for longer time scores higher	5	2	3	4
	Technical and Engineering Criteria Subtotal	**15**	**12**	**10**	**10**
Social / Cultural Environment Criteria					
Parks and Recreation	Opportunities which increase safety or utility of trails and/or outdoor recreational facilities would score higher (e.g., improvements to parkland, trails, etc.)	5	1	3	4
Community Disruption	Compatibility of proposed works with adjacent properties (i.e. removal or addition of features which reduces utility for neighbouring lands scores lower). As an example, removal of mature vegetation adjacent residential properties would score lower.	5	1	3	4
	Less disruption to the surrounding community and residents scores higher (e.g., consideration of traffic/road closures, access impacts to shops, etc.)	5	5	3	2
Archaeological Impacts	Less disturbance of areas with archaeological potential and cultural heritage resources scores higher	5	5	3	2
	Social / Cultural Environment Criteria Subtotal	**20**	**12**	**12**	**12**
Economic Environment Criteria					
Construction Cost	Lower construction cost relative to other alternatives scores higher	10	10	6	3
Operation and Maintenance Costs	Lower operations and maintenance costs relative to other alternatives scores higher	5	1	4	5
Life Cycle Costs	Lower life cycle costs relative to the other alternatives scores higher	5	1	3	4
Infrastructure Protection	Greater protection of existing infrastructure for a longer time scores higher	5	1	4	4
	Economic Criteria Subtotal	**25**	**13**	**17**	**16**
Total		100	40	68	79

Evaluation Matrix for Erosion Site 7

EVALUATION CRITERIA		Maximum Score	Adjusted Maximum Score	Alternative1 Do Nothing	Alternative 2 Local Restoration Works	Alternative 3 Reach Scale Works
Physical / Natural Environment Criteria						
Mitigation of Existing Erosion Risks	Where existing erosion risks are substantial, close to the maximum score may be achievable. Where erosion risks are lower, maximum scores are not achievable. **Higher Risk**: Pending slope failure, potential loss of structures, potential impacts to critical infrastructure, etc. **Lower Risk**: Minor bed/bank erosion toward a naturalized area or non active use (vacant land), etc. Scoring is calculated based on the assigned degree of mitigation (green box) multiplied by the adjusted maximum score divided by 10.	20	20	8	24	28
		10		4	12	14
Impacts to Aquatic and/or Terrestrial Habitat	Where existing aquatic habitat is of higher quality, maximum scores are not achievable and it is also possible to achieve a negative score where harm is expected. Where the existing channel is degraded, full of rubbish/debris, has barriers to fish passage etc., maximum scores may be achievable. The degree of improvement/mitigation or impact (negative score) is scored in the green box. Greater improvements to fish and aquatic habitat would score higher. Improvements may be with respect to restoration of bed materials/substrates, riparian plantings, reduced turbidity, improved passage/connectivity. Scoring should also consider potential construction impacts (relative to existing conditions) where disruption is expected to result from construction. Where on-going degradation is expected under the do-nothing this could be considered a negative impact (negative score). Scoring is calculated based on the assigned degree of mitigation (green box) multiplied by the adjusted maximum score divided by 10. However, if a negative degree of mitigation is assigned that value is used instead for the scoring.	10	10	0	1	-2
		10		0	1	-2
	Where existing terrestrial habitat is of higher quality, maximum scores are not achievable and it is also possible to achieve a negative score when harm is expected. Where there's rubbish/debris or minimal/low quality riparian vegetation, etc., maximum scores may be achievable. The degree of improvement/mitigation or impact (negative score) is scored in the green box. Greater improvements to terrestrial habitat score higher, including increased buffers, increased planting density, inclusion of key features (e.g., raptor poles), etc. Scoring should also consider potential construction impact relative to existing conditions as well as consider the loss of habitat for interim periods. Scoring is calculated based on the assigned degree of mitigation (green box) multiplied by the adjusted maximum score divided by 10. However, if a negative degree of mitigation is assigned that value is used instead for the scoring.	10	10	0	7	5
		10		0	7	5
	Physical / Natural Environment Criteria Subtotal		**40**	**8**	**32**	**31**

EVALUATION CRITERIA		Maximum Score	Alternative1 Do Nothing	Alternative 2 Local Restoration Works	Alternative 3 Reach Scale Works
			Score	Score	Score
Technical and Engineering Criteria					
Technical Feasibility	Less complexity of the Project: Consider permitting/coordination requirements with community members and stakeholders, etc.	5	5	4	2
	Less impacts to existing infrastructure (e.g., sewers, watermains, gas, roads)	5	5	4	4
Flooding Impacts	Greater reduction of flooding risks to public and/or private lands for longer time scores higher	5	2	4	3
	Technical and Engineering Criteria Subtotal	**15**	**12**	**12**	**9**
Social / Cultural Environment Criteria					
Parks and Recreation	Opportunities which increase safety or utility of trails and/or outdoor recreational facilities would score higher (e.g., improvements to parkland, trails, etc.)	5	1	4	4
Community Disruption	Compatibility of proposed works with adjacent properties (i.e. removal or addition of features which reduces utility for neighbouring lands scores lower). As an example, removal of mature vegetation adjacent residential properties would score lower.	5	1	4	3
	Less disruption to the surrounding community and residents scores higher (e.g., consideration of traffic/road closures, access impacts to shops, etc.)	5	5	4	2
Archaeological Impacts	Less disturbance of areas with archaeological potential and cultural heritage resources scores higher	5	5	4	4
	Social / Cultural Environment Criteria Subtotal	**20**	**12**	**16**	**13**
Economic Environment Criteria					
Construction Cost	Lower construction cost relative to other alternatives scores higher	10	10	8	2
Operation and Maintenance Costs	Lower operations and maintenance costs relative to other alternatives scores higher	5	1	2	4
Life Cycle Costs	Lower life cycle costs relative to the other alternatives scores higher	5	1	3	3
Infrastructure Protection	Greater protection of existing infrastructure for a longer time scores higher	5	1	4	4
	Economic Criteria Subtotal	**25**	**13**	**17**	**13**
Total		100	45	77	66

Appendix F –

Public Consultation



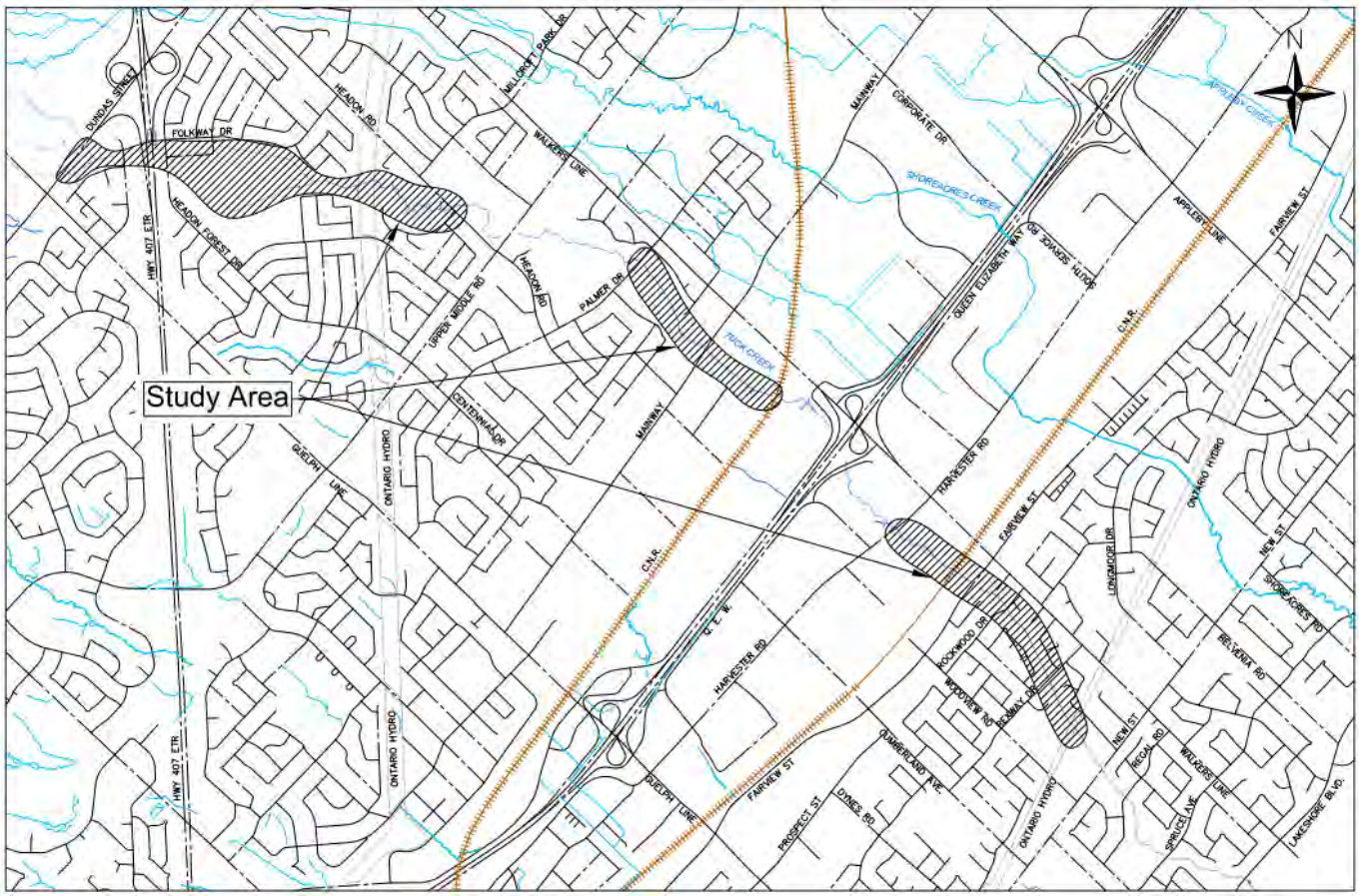
NOTICE OF STUDY COMMENCEMENT

Tuck Creek Erosion Control
Class Environmental Assessment

The Study

The City of Burlington has retained Aquafor Beech Limited to undertake a Municipal Class Environmental Assessment (EA) to study the risk of erosion related to three reaches of Tuck Creek from Dundas Street to Headon Road, Palmer Drive to CN Rail and Harvester Road to Hydro Right of Way. The objective of the study is to address erosion, protect infrastructure and private properties, and enhance the natural heritage along Tuck Creek.

Failure of existing bank protection and erosion are prevalent throughout the study area and have the potential to impact residential properties as identified in the City – Wide Creek Erosion Inventory and Erosion Assessment (2016). Alternative erosion mitigation strategies will be investigated, which will include channel restoration and stabilization of Tuck Creek. Opportunities for natural channel design and native restoration practices will be looked at. The study area is shown in the map below.



The Process
The Tuck Creek Erosion Control Municipal Class Environmental Assessment will be conducted as a Schedule B Project in accordance with the Municipal Class Environmental Assessment which is an approved process under the *Ontario Environmental Assessment Act*. The Class EA process includes public and review agency consultation, an evaluation of alternatives, an assessment of potential environmental effects of the proposed improvements, and identification of reasonable measures to mitigate any potential adverse impacts.

Public Interaction
The City will give residents, neighbourhood businesses, community members, and interested parties the chance to learn more about the project and comment at a Public Information Centre (PIC), which will be advertised in the City of Burlington webpage and Burlington Post. The PIC for this project will review the existing conditions and problems with potential solutions. It is planned for Summer, 2020.

Please contact one of our team members if you have questions or comments, or would like to be added to the project mailing list:

Arif Shahzad, M.Eng. P.Eng.
City of Burlington,
Senior Project Manager
426 Brant St., P.O. Box 5013,
Burlington, ON L7R 3Z6
905-335-7600, ext. 7486
Arif.Shahzad@burlington.ca

Robert Amos, MASc., P.Eng.
Aquafor Beech Ltd.
2600 Skymark Ave.
Building 6, Unit 2
Mississauga, ON L4W 5B2
905-629-0099, ext. 284
Amos.R@Aquaforbeech.com

Notices issued on November 7 and 17, 2019.

Ministry of the Environment, Conservation and Parks
Central Region
5775 Yonge Street, 8th Floor
North York ON M2M 4J1
Phone: 416.326.6700
Fax: 416.325.6345

Ministère de l'Environnement, de la Protection de la nature et des Parcs
Région du Centre
8e étage, 5775, rue Yonge
North York ON M2M 4J1
Tél : 416 326-6700
Téléc : 416 325-6345

Ontario

November 26, 2019 File No.: EA 01-06-02

Arif Shahzad, M.Eng., P.Eng.
Senior Project Manager
City of Burlington
426 Brant St.,m P.O. Box 5013
Burlington, ON L7R 3Z6
arif.shahzad@burlington.ca

BY EMAIL ONLY

Re: **Tuck Creek Erosion Control**
City of Burlington
Schedule B Municipal Class EA
Response to Notice of Commencement

Dear Mr. Shahzad,

This letter is in response to the Notice of Commencement for the above noted project. The Ministry of the Environment, Conservation and Parks (MECP) acknowledges that the City of Burlington has indicated that the study is following the approved environmental planning process for a Schedule B project under the Municipal Engineers Association's Municipal Class Environmental Assessment (Class EA).

The attached "Areas of Interest" document provides guidance regarding the Ministry's interests with respect to the Class EA process. Please identify the areas of interest which are applicable to the project and ensure they are addressed. Proponents who address all the applicable areas of interest can minimize potential delays to the project schedule.

The Crown has a legal duty to consult Aboriginal communities when it has knowledge, real or constructive, of the existence or potential existence of an Aboriginal or treaty right and contemplates conduct that may adversely impact that right. Before authorizing this project, the Crown must ensure that its duty to consult has been fulfilled, where such a duty is triggered. Although the duty to consult with Aboriginal peoples is a duty of the Crown, the Crown may delegate procedural aspects of this duty to project proponents while retaining oversight of the consultation process.

The proposed project may have the potential to affect Aboriginal or treaty rights protected under Section 35 of Canada's *Constitution Act* 1982. Where the Crown's duty to consult is triggered in relation to the proposed project**, the MOECC is delegating the procedural aspects of rights-based consultation to the proponent through this letter.** The Crown intends to rely on the delegated consultation process in discharging its duty to consult and maintains the right to participate in the consultation process as it sees fit.

Based on information provided to date and the Crown`s preliminary assessment the proponent is required to consult with the following communities who have been identified as potentially affected by the proposed

project:

- Mississaugas of the Credit First Nation;
- Six Nations of the Grand River; and
- Haudenosaunee Confederacy Chiefs Council

Nothing in the above guidance should prevent the proponent from reaching out to share information on the project with other Indigenous communities and organizations. Please be aware that the above community list may change as new information becomes available on project impacts and/or communities' areas of interest. This is an interest-based assessment completed based on the limited information provided to date.

Steps that the proponent may need to take in relation to Aboriginal consultation for the proposed project are outlined in the "Code of Practice for Consultation in Ontario's Environmental Assessment Process" which can be found at the following link: https://www.ontario.ca/document/consultation-ontarios-environmental-assessment-process

Additional information related to Ontario's Environmental Assessment Act is available online at: www.ontario.ca/environmentalassessments

Please also refer to the attached document "A Proponent's Introduction to the Delegation of Procedural Aspects of consultation with Aboriginal Communities" for further information.

The proponent must contact the Director of Environmental Assessment and Permissions Branch under the following circumstances subsequent to initial discussions with the communities identified by MECP:

- Aboriginal or treaty rights impacts are identified to the proponent by the communities
- The proponent has reason to believe that the proposed project may adversely affect an Aboriginal or treaty right
- Consultation has reached an impasse
- A Part II Order request or elevation request is expected

The Director of the Environmental Assessment and Permissions Branch can be notified either by email with the subject line "Potential Duty to Consult" to enviropermissions@ontario.ca or by mail or fax at the address provided below:

Email:	enviropermissions@ontario.ca Subject: Potential Duty to Consult
Fax:	416-314-8452
Address:	Environmental Assessment and Permissions Branch 135 St. Clair Avenue West, 1st Floor Toronto, ON, M4V 1P5

The MECP will then assess the extent of any Crown duty to consult for the circumstances and will consider whether additional steps should be taken, including what role the proponent will be asked to play in them.

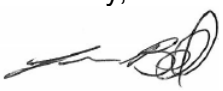
A Part II Order Request Form must be used to request a Part II Order. The Part II Order Request Form is available online on the Forms Repository website (http://www.forms.ssb.gov.on.ca) by searching "Part II Order" or "012-2206E" (the form ID number). **Please include reference to this in the Notice of Completion for this project**.

A draft copy of the Project File Report (PFR) should be sent to this office prior to the filing of

the final report, allowing a minimum of 30 days for the ministry's technical reviewers to provide comments. Please also forward the Notice of Completion and final PFR to me when completed.

Should you or any members of your project team have any questions regarding the material above, please contact me at trevor.bell@ontario.ca or 416-326-3577.

Sincerely,



Trevor Bell, B.Sc., M.Env.
Regional Environmental Assessment Coordinator
Air, Pesticides and Environmental Planning

cc: Paul Martin, Supervisor, Technical Support Section, MECP
Tina Dufresne, Manager, Halton Peel District Office, MECP
Robert Amos, Consultant Project Manager, Aquafor Beech Ltd.
Central Region EA File
A & P File

Attach: Areas of Interest
A Proponent's Introduction to the Delegation of Procedural Aspects of consultation with Aboriginal Communities

AREAS OF INTEREST

It is suggested that you check off each applicable area after you have considered / addressed it.

☐ **Species at Risk**

- The Ministry of the Environment, Conservation and Parks has now assumed responsibility of Ontario's Species at Risk program. For any questions related to subsequent permit requirements, please contact SAROntario@ontario.ca.

☐ **Planning and Policy**

- Ontario has released "A Place to Grow: Growth Plan for the Greater Golden Horseshoe (2019)" which replaces the "Growth Plan for the Greater Golden Horseshoe (2017)". More information, including the Plan, is found here: https://www.placestogrow.ca.

- Parts of the study area may be subject to the A Place to Grow: Growth Plan for the Greater Golden Horseshoe (2019), Oak Ridges Moraine Conservation Plan (2017), Niagara Escarpment Plan (2017), Greenbelt Plan (2017) or Lake Simcoe Protection Plan (2014). Applicable policies should be referenced in the PFR, and the proponent should describe how the proposed project adheres to the relevant policies in these plans.

- The Provincial Policy Statement (2014) contains policies that protect Ontario's natural heritage and water resources. Applicable policies should be referenced in the PFR, and the proponent should describe how this proposed project is consistent with these policies.

☐ **Source Water Protection (all projects)**

The Clean Water Act, 2006 (CWA) aims to protect existing and future sources of drinking water. To achieve this, several types of vulnerable areas have been delineated around surface water intakes and wellheads for every municipal residential drinking water system that is located in a source protection area. These vulnerable areas are known as a Wellhead Protection Areas (WHPAs) and surface water Intake Protection Zones (IPZs). Other vulnerable areas that have been delineated under the CWA include Highly Vulnerable Aquifers (HVAs), Significant Groundwater Recharge Areas (SGRAs), Event-based modelling areas (EBAs), and Issues Contributing Areas (ICAs). Source protection plans have been developed that include policies to address existing and future risks to sources of municipal drinking water within these vulnerable areas.

Projects that are subject to the Environmental Assessment Act that fall under a Class EA, or one of the Regulations, have the potential to impact sources of drinking water if they occur in designated vulnerable areas or near other at-risk drinking water systems (i.e. systems that are not municipal residential systems). MEA Class EA projects may include activities that, if located in a vulnerable area, could be a threat to sources of drinking water (i.e. have the potential to adversely affect the quality or quantity of drinking water sources) and the activity could therefore be subject to policies in a source protection plan. Where an activity poses a risk to drinking water, policies in the local source protection plan may impact how or where that activity is undertaken. Policies may prohibit certain activities, or they may require risk management measures for these activities. Municipal Official Plans, planning decisions, Class EA projects (where the project includes an activity that is a threat to drinking water) and prescribed instruments must conform with policies that address significant risks to drinking water and must have regard for policies that address moderate or low risks.

- As you may be aware, in October 2015, the MEA Parent Class EA document was amended to include reference to the Clean Water Act (Section A.2.10.6) and indicates that proponents undertaking a Municipal Class EA project must identify early in their process whether a project is or could potentially be occurring with a vulnerable area. **Given this requirement, please include a section in the PFR on source water protection.**

- The proponent should identify the source protection area and should clearly document how the proximity of the project to sources of drinking water (municipal or other) and any delineated vulnerable areas was considered and assessed. Specifically, the report should discuss whether or not the project is located in a vulnerable area and provide applicable details about the area.

- If located in a vulnerable area, proponents should document whether any project activities are prescribed drinking water threats and thus pose a risk to drinking water (this should be consulted on with the appropriate Source Protection Authority). Where an activity poses a risk to drinking water, the proponent must document and discuss in the PFR how the project adheres to or has regard to applicable policies in the local source protection plan. This section should then be used to inform and be reflected in other sections of the report, such as the identification of net positive/negative effects of alternatives, mitigation measures, evaluation of alternatives etc.

- While most source protection plans focused on including policies for significant drinking water threats in the WHPAs and IPZs it should be noted that even though source protection plan policies may not apply in HVAs, these are areas where aquifers are sensitive and at risk to impacts and within these areas, activities may impact the quality of sources of drinking water for systems other than municipal residential systems.

- In order to determine if this project is occurring within a vulnerable area, proponents can use this mapping tool: http://www.applications.ene.gov.on.ca/swp/en/index.php.The mapping tool will also provide a link to the appropriate source protection plan in order to identify what policies may be applicable in the vulnerable area.

- For further information on the maps or source protection plan policies which may relate to their project, proponents must contact the appropriate source protection authority. **Please consult with the local source protection authority to discuss potential impacts on drinking water. The contact for this project is Diane Bloomfield at 905-854-9229 ext. 223 or dbloomfield@hrca.on.ca. Please document the results of that consultation within the Report and include all communication documents/correspondence.**

More Information
For more information on the Clean Water Act, source protection areas and plans, including specific information on the vulnerable areas and drinking water threats, please refer to Conservation Ontario's website where you will also find links to the local source protection plan/assessment report.

A list of the prescribed drinking water threats can be found in section 1.1 of Ontario Regulation 287/07 made under the Clean Water Act. In addition to prescribed drinking water threats, some source protection plans may include policies to address additional "local" threat activities, as approved by the MECP.

Climate Change

Ontario is leading the fight against climate change through the Climate Change Action Plan. Recently released, the plan lays out the specific actions Ontario will take in the next five years to meet its 2020 greenhouse gas reduction targets and establishes the framework necessary to meet its long-term targets. As a commitment of the action plan, **the province has now finalized a guide, "Considering Climate Change in the Environmental Assessment Process" (Guide), which is found online at: www.ontario.ca/page/considering-climate-change-environmental-assessment-process**

The Guide is now a part of the Environmental Assessment program's Guides and Codes of Practice. The Guide sets out the MECP's expectation for considering climate change in the preparation, execution and documentation of environmental assessment studies and processes. The guide provides examples, approaches, resources, and references to assist proponents with consideration of climate change in EA. **Proponents should review this Guide in detail.**

- The MECP expects proponents to:

1. Consider during the assessment of alternative solutions and alternative designs, the following:
    a. the project's expected production of greenhouse gas emissions and impacts on carbon sinks (climate change mitigation); and
    b. resilience or vulnerability of the undertaking to changing climatic conditions (climate change adaptation).
2. Include a discrete section in the PFR detailing how climate change was considered in the EA.

How climate change is considered can be qualitative or quantitative in nature and should be scaled to the project's level of environmental effect. In all instances, both a project's impacts on climate change (mitigation) and impacts of climate change on a project (adaptation) should be considered. **Please ensure climate change is considered in the report.**

- The MECP has also prepared another guide to support provincial land use planning direction related to the completion of energy and emission plans. The "Community Emissions Reduction Planning: A Guide for Municipalities" document is designed to educate stakeholders on the municipal opportunities to reduce energy and greenhouse gas emissions, and to provide guidance on methods and techniques to incorporate consideration of energy and greenhouse gas emissions into municipal activities of all types. We encourage you to review the Guide for information.

Air Quality, Dust and Noise

- If there are sensitive receptors in the surrounding area of this project, an air quality/odour impact assessment will be useful to evaluate alternatives, determine impacts and identify appropriate mitigation measures. The scope of the assessment can be determined based on the potential effects of the proposed alternatives, and typically includes source and receptor characterization and a quantification of local air quality impacts on the sensitive receptors and the environment in the study area. The assessment will compare to all applicable standards or guidelines for all contaminants of concern. **Please contact this office for further consultation on the level of Air Quality Impact Assessment required for this project if not already advised.**

- **If a full Air Quality Impact Assessment is not required for the project, the PFR should still contain:**
    - A discussion of local air quality including existing activities/sources that significantly impact local air quality and how the project may impact existing conditions;
    - A discussion of the nearby sensitive receptors and the project's potential air quality impacts on present and future sensitive receptors;
    - A discussion of local air quality impacts that could arise from this project during both construction and operation; and
    - A discussion of potential mitigation measures.

- As a common practice, "air quality" should be used an evaluation criterion for all road projects.

- Dust and noise control measures should be addressed and included in the construction plans to ensure that nearby residential and other sensitive land uses within the study area are not adversely affected during construction activities.

- The MECP recommends that non-chloride dust-suppressants be applied. For a comprehensive list of fugitive dust prevention and control measures that could be applied, refer to *Cheminfo Services Inc. Best Practices for the Reduction of Air Emissions from Construction and Demolition Activities.* Report prepared for Environment Canada. March 2005.http://www.bv.transports.gouv.qc.ca/mono/1173259.pdf

- The PFR should consider the potential impacts of increased noise levels during the operation of the completed project. The proponent should explore all potential measures to mitigate significant noise impacts during the assessment of alternatives.

Ecosystem Protection and Restoration

- Any impacts to ecosystem form and function must be avoided where possible. The PFR should describe any proposed mitigation measures and how project planning will protect and enhance the local ecosystem.

- All natural heritage features should be identified and described in detail to assess potential impacts and to develop appropriate mitigation measures. The following sensitive environmental features may be located within or adjacent to the study area:

    - Areas of Natural and Scientific Interest (ANSIs)
    - Rare Species of flora or fauna
    - Watercourses
    - Wetlands
    - Woodlots

We recommend consulting with the Ministry of Natural Resources and Forestry (MNRF), Fisheries and Oceans Canada (DFO) and your local conservation authority to determine if special measures or additional studies will be necessary to preserve and protect these sensitive features. In addition, you may consider the provisions of the Rouge Park Management Plan if applicable.

Surface Water

- The PFR must include a sufficient level of information to demonstrate that there will be no negative impacts on the natural features or ecological functions of any watercourses within the study area. Measures should be included in the planning and design process to ensure that any impacts to watercourses from construction or operational activities (e.g. spills, erosion, pollution) are mitigated as part of the proposed undertaking.

- Additional stormwater runoff from new pavement can impact receiving watercourses and flood conditions. Quality and quantity control measures to treat stormwater runoff should be considered for all new impervious areas and, where possible, existing surfaces. The ministry's Stormwater Management Planning and Design Manual (2003) should be referenced in the PFR and utilized when designing stormwater control methods. **A Stormwater Management Plan should be prepared as part of the Class EA process** that includes:

    - Strategies to address potential water quantity and erosion impacts related to stormwater draining into streams or other sensitive environmental features, and to ensure that adequate (enhanced) water quality is maintained
    - Watershed information, drainage conditions, and other relevant background information
    - Future drainage conditions, stormwater management options, information on erosion and sediment control during construction, and other details of the proposed works
    - Information on maintenance and monitoring commitments.

- Ontario Regulation 60/08 under the Ontario Water Resources Act (OWRA) applies to the Lake Simcoe Basin, which encompasses Lake Simcoe and the lands from which surface water drains into Lake Simcoe. If the proposed sewage treatment plant is listed in Table 1 of the regulation, the PFR should describe how the proposed project and its mitigation measures are consistent with the requirements of this regulation and the OWRA.

- Any potential approval requirements for surface water taking or discharge should be identified in the PFR. In particular, a Permit to Take Water (PTTW) under the OWRA will be required for any water takings that exceed 50,000 L/day, with the exception of certain water taking activities that have been prescribed by the Water Taking EASR Regulation – *O. Reg. 63/16*. These prescribed water-taking activities require registration in the EASR instead of a PTTW. Please review the Water Taking User Guide for EASR for more information. Additionally, an Environmental Compliance Approval under the OWRA is required for municipal stormwater management works.

Groundwater

- The status of, and potential impacts to any well water supplies should be addressed. If the project involves groundwater takings or changes to drainage patterns, the quantity and quality of groundwater may be affected due to drawdown effects or the redirection of existing contamination flows. In addition, project activities may infringe on existing wells such that they must be reconstructed or sealed and abandoned. Appropriate information to define existing groundwater conditions should be included in the PFR.

- If the potential construction or decommissioning of water wells is identified as an issue, the PFR should refer to Ontario Regulation 903, Wells, under the OWRA.

- Potential impacts to groundwater-dependent natural features should be addressed. Any changes to groundwater flow or quality from groundwater taking may interfere with the ecological processes of streams, wetlands or other surficial features. In addition, discharging contaminated or high volumes of groundwater to these features may have direct impacts on their function. Any potential effects should be identified, and appropriate mitigation measures should be recommended. The level of detail required will be dependent on the significance of the potential impacts.

- Any potential approval requirements for groundwater taking or discharge should be identified in the PFR. In particular, a Permit to Take Water (PTTW) under the OWRA will be required for any water takings that exceed 50,000 L/day, with the exception of certain water taking activities that have been prescribed by the Water Taking EASR Regulation – *O. Reg. 63/16*. These prescribed water-taking activities require registration in the EASR instead of a PTTW. Please review the Water Taking User Guide for EASR for more information.

Contaminated Soils

- Since the removal or movement of soils may be required, appropriate tests to determine contaminant levels from previous land uses or dumping should be undertaken. If the soils are contaminated, you must determine how and where they are to be disposed of, consistent with *Part XV.1 of the Environmental Protection Act* (EPA) and Ontario Regulation 153/04, Records of Site Condition, which details the new requirements related to site assessment and clean up. Please contact the ministry's District Offices for further consultation if contaminated sites are present.

- Any current or historical waste disposal sites should be identified in the PFR. The status of these sites should be determined to confirm whether approval pursuant to Section 46 of the EPA may be required for land uses on former disposal sites.

- The location of any underground storage tanks should be investigated in the PFR. Measures should be identified to ensure the integrity of these tanks and to ensure an appropriate response in the event of a spill. The ministry's Spills Action Centre must be contacted in such an event.

- The PFR should identify any underground transmission lines in the study area. The owners should be consulted to avoid impacts to this infrastructure, including potential spills.

Excess Materials Management

- Activities involving the management of excess soil should be completed in accordance with the MECP's current guidance document titled "Management of Excess Soil – A Guide for Best Management Practices" (2014) available online (http://www.ontario.ca/document/management-excess-soil-guide-best-management-practices).

- All waste generated during construction must be disposed of in accordance with ministry requirements.

Servicing and Facilities

- Any facility that releases emissions to the atmosphere, discharges contaminants to ground or surface water, provides potable water supplies, or stores, transports or disposes of waste must have an Environmental Compliance Approval (ECA) before it can operate lawfully. Please consult with the Environmental Approvals Access and Service Integration Branch (EAASIB) to determine whether a new or amended ECA will be required for any proposed infrastructure.

- We recommend referring to the ministry's "D-Series" guidelines – Land Use Compatibility to ensure that any potential land use conflicts are considered when planning for any infrastructure or facilities related to wastewater, pipelines, landfills or industrial uses.

Mitigation and Monitoring

Contractors must be made aware of all environmental considerations so that all environmental standards and commitments for both construction and operation are met. Mitigation measures should be clearly referenced in the PFR and regularly monitored during the construction stage of the project. In addition, we encourage proponents to conduct post-construction monitoring to ensure all mitigation measures have been effective and are functioning properly.

- Design and construction reports and plans should be based on a best management approach that centres on the prevention of impacts, protection of the existing environment, and opportunities for rehabilitation and enhancement of any impacted areas.

- The proponent's construction and post-construction monitoring plans must be documented in the PFR, as outlined in Section A.2.5 and A.4.1 of the MEA Class EA parent document.

Consultation

- The PFR must demonstrate how the consultation provisions of the Class EA have been fulfilled, including documentation of all stakeholder consultation efforts undertaken during the planning process. This includes a discussion in the PFR that identifies concerns that were raised and **describes how they have been addressed by the proponent** throughout the planning process. The Class EA also directs proponents to include copies of comments submitted on the project by interested stakeholders, and the proponent's responses to these comments.

Class EA Process

- The PFR should provide clear and complete documentation of the planning process in order to allow for transparency in decision-making.

- If this project is a Master Plan: there are several different approaches that can be used to conduct a Master Plan, examples of which are outlined in Appendix 4 of the Class EA. The Master Plan should clearly indicate the selected approach for conducting the plan, in particular by identifying whether the levels of assessment, consultation and documentation are sufficient to fulfill the requirements for Schedule B or C projects. Please note that any Schedule B or C projects identified in the plan would be subject to Part II Order Requests under the *Environmental Assessment Act* (EAA), although the plan itself would not be.

- The Class EA requires the consideration of the effects of each alternative on all aspects of the environment. The PFR should include a level of detail (e.g. hydrogeological investigations, terrestrial and aquatic assessments) such that all potential impacts can be identified and appropriate mitigation measures can be developed. Any supporting studies conducted during the Class EA process should be referenced and included as part of the PFR.

- Please include in the PFR a list of all subsequent permits or approvals that may be required for the

implementation of the preferred alternative, including but not limited to, MECP's PTTW, EASR Registrations and ECAs, conservation authority permits, species at risk permits, and approvals under the *Canadian Environmental Assessment Act* (CEAA).

- Ministry guidelines and other information related to the issues above are available at http://www.ontario.ca/environment-and-energy/environment-and-energy. We encourage you to review all the available guides and to reference any relevant information in the PFR.

DEFINITIONS

The following definitions are specific to this document and may not apply in other contexts:

Aboriginal communities – the First Nation or Métis communities identified by the Crown for the purpose of consultation.

Consultation – the Crown's legal obligation to consult when the Crown has knowledge of an established or asserted Aboriginal or treaty right and contemplates conduct that might adversely impact that right. This is the type of consultation required pursuant to s. 35 of the *Constitution Act, 1982*. Note that this definition does not include consultation with Aboriginal communities for other reasons, such as regulatory requirements.

Crown – the Ontario Crown, acting through a particular ministry or ministries.

Procedural aspects of consultation – those portions of consultation related to the process of consultation, such as notifying an Aboriginal community about a project, providing information about the potential impacts of a project, responding to concerns raised by an Aboriginal community and proposing changes to the project to avoid negative impacts.

Proponent – the person or entity that wants to undertake a project and requires an Ontario Crown decision or approval for the project.

I. PURPOSE

The Crown has a legal duty to consult Aboriginal communities when it has knowledge of an existing or asserted Aboriginal or treaty right and contemplates conduct that may adversely impact that right. In outlining a framework for the duty to consult, the Supreme Court of Canada has stated that the Crown may delegate procedural aspects of consultation to third parties. This document provides general information about the Ontario Crown's approach to delegation of the procedural aspects of consultation to proponents.

This document is not intended to instruct a proponent about an individual project, and it does not constitute legal advice.

II. WHY IS IT NECESSARY TO CONSULT WITH ABORIGINAL COMMUNITIES?

The objective of the modern law of Aboriginal and treaty rights is the *reconciliation* of Aboriginal peoples and non-Aboriginal peoples and their respective rights, claims and interests. Consultation is an important component of the reconciliation process.

The Crown has a legal duty to consult Aboriginal communities when it has knowledge of an existing or asserted Aboriginal or treaty right and contemplates conduct that might adversely impact that right. For example, the Crown's duty to consult is triggered when it considers issuing

a permit, authorization or approval for a project which has the potential to adversely impact an Aboriginal right, such as the right to hunt, fish, or trap in a particular area.

The scope of consultation required in particular circumstances ranges across a spectrum depending on both the nature of the asserted or established right and the seriousness of the potential adverse impacts on that right.

Depending on the particular circumstances, the Crown may also need to take steps to accommodate the potentially impacted Aboriginal or treaty right. For example, the Crown may be required to avoid or minimize the potential adverse impacts of the project.

III. THE CROWN'S ROLE AND RESPONSIBILITIES IN THE DELEGATED CONSULTATION PROCESS

The Crown has the responsibility for ensuring that the duty to consult, and accommodate where appropriate, is met. However, the Crown may delegate the procedural aspects of consultation to a proponent.

There are different ways in which the Crown may delegate the procedural aspects of consultation to a proponent, including through a letter, a memorandum of understanding, legislation, regulation, policy and codes of practice.

If the Crown decides to delegate procedural aspects of consultation, the Crown will generally:

- Ensure that the delegation of procedural aspects of consultation and the responsibilities of the proponent are clearly communicated to the proponent;
- Identify which Aboriginal communities must be consulted;
- Provide contact information for the Aboriginal communities;
- Revise, as necessary, the list of Aboriginal communities to be consulted as new information becomes available and is assessed by the Crown;
- Assess the scope of consultation owed to the Aboriginal communities;
- Maintain appropriate oversight of the actions taken by the proponent in fulfilling the procedural aspects of consultation;
- Assess the adequacy of consultation that is undertaken and any accommodation that may be required;
- Provide a contact within any responsible ministry in case issues arise that require direction from the Crown; and
- Participate in the consultation process as necessary and as determined by the Crown.

IV. THE PROPONENT'S ROLE AND RESPONSIBILITIES IN THE DELEGATED CONSULTATION PROCESS

Where aspects of the consultation process have been delegated to a proponent, the Crown, in meeting its duty to consult, will rely on the proponent's consultation activities and documentation of those activities. The consultation process informs the Crown's decision of whether or not to approve a proposed project or activity.

A proponent's role and responsibilities will vary depending on a variety of factors including the extent of consultation required in the circumstance and the procedural aspects of consultation the

Crown has delegated to it. Proponents are often in a better position than the Crown to discuss a project and its potential impacts with Aboriginal communities and to determine ways to avoid or minimize the adverse impacts of a project.

A proponent can raise issues or questions with the Crown at any time during the consultation process. If issues or concerns arise during the consultation that cannot be addressed by the proponent, the proponent should contact the Crown.

a) What might a proponent be required to do in carrying out the procedural aspects of consultation?

Where the Crown delegates procedural aspects of consultation, it is often the proponent's responsibility to provide notice of the proposed project to the identified Aboriginal communities. The notice should indicate that the Crown has delegated the procedural aspects of consultation to the proponent and should include the following information:

- a description of the proposed project or activity;
- mapping;
- proposed timelines;
- details regarding anticipated environmental and other impacts;
- details regarding opportunities to comment; and
- any changes to the proposed project that have been made for seasonal conditions or other factors, where relevant.

Proponents should provide enough information and time to allow Aboriginal communities to provide meaningful feedback regarding the potential impacts of the project. Depending on the nature of consultation required for a project, a proponent also may be required to:

- provide the Crown with copies of any consultation plans prepared and an opportunity to review and comment;
- ensure that any necessary follow-up discussions with Aboriginal communities take place in a timely manner, including to confirm receipt of information, share and update information and to address questions or concerns that may arise;
- as appropriate, discuss with Aboriginal communities potential mitigation measures and/or changes to the project in response to concerns raised by Aboriginal communities;
- use language that is accessible and not overly technical, and translate material into Aboriginal languages where requested or appropriate;
- bear the reasonable costs associated with the consultation process such as, but not limited to, meeting hall rental, meal costs, document translation(s), or to address technical & capacity issues;
- provide the Crown with all the details about potential impacts on established or asserted Aboriginal or treaty rights, how these concerns have been considered and addressed by the proponent and the Aboriginal communities and any steps taken to mitigate the potential impacts;
- provide the Crown with complete and accurate documentation from these meetings and communications; and
- notify the Crown immediately if an Aboriginal community not identified by the Crown approaches the proponent seeking consultation opportunities.

b) What documentation and reporting does the Crown need from the proponent?

Proponents should keep records of all communications with the Aboriginal communities involved in the consultation process and any information provided to these Aboriginal communities.

As the Crown is required to assess the adequacy of consultation, it needs documentation to satisfy itself that the proponent has fulfilled the procedural aspects of consultation delegated to it. The documentation required would typically include:

- the date of meetings, the agendas, any materials distributed, those in attendance and copies of any minutes prepared;
- the description of the proposed project that was shared at the meeting;
- any and all concerns or other feedback provided by the communities;
- any information that was shared by a community in relation to its asserted or established Aboriginal or treaty rights and any potential adverse impacts of the proposed activity, approval or disposition on such rights;
- any proposed project changes or mitigation measures that were discussed, and feedback from Aboriginal communities about the proposed changes and measures;
- any commitments made by the proponent in response to any concerns raised, and feedback from Aboriginal communities on those commitments;
- copies of correspondence to or from Aboriginal communities, and any materials distributed electronically or by mail;
- information regarding any financial assistance provided by the proponent to enable participation by Aboriginal communities in the consultation;
- periodic consultation progress reports or copies of meeting notes if requested by the Crown;
- a summary of how the delegated aspects of consultation were carried out and the results; and
- a summary of issues raised by the Aboriginal communities, how the issues were addressed and any outstanding issues.

In certain circumstances, the Crown may share and discuss the proponent's consultation record with an Aboriginal community to ensure that it is an accurate reflection of the consultation process.

c) Will the Crown require a proponent to provide information about its commercial arrangements with Aboriginal communities?

The Crown may require a proponent to share information about aspects of commercial arrangements between the proponent and Aboriginal communities where the arrangements:

- include elements that are directed at mitigating or otherwise addressing impacts of the project;
- include securing an Aboriginal community's support for the project; or
- may potentially affect the obligations of the Crown to the Aboriginal communities.

The proponent should make every reasonable effort to exempt the Crown from confidentiality provisions in commercial arrangements with Aboriginal communities to the extent necessary to allow this information to be shared with the Crown.

The Crown cannot guarantee that information shared with the Crown will remain confidential. Confidential commercial information should not be provided to the Crown as part of the consultation record if it is not relevant to the duty to consult or otherwise required to be submitted to the Crown as part of the regulatory process.

V. WHAT ARE THE ROLES AND RESPONSIBILITIES OF ABORIGINAL COMMUNITIES' IN THE CONSULTATION PROCESS?

Like the Crown, Aboriginal communities are expected to engage in consultation in good faith. This includes:

- responding to the consultation notice;
- engaging in the proposed consultation process;
- providing relevant documentation;
- clearly articulating the potential impacts of the proposed project on Aboriginal or treaty rights; and
- discussing ways to mitigates any adverse impacts.

Some Aboriginal communities have developed tools, such as consultation protocols, policies or processes that provide guidance on how they would prefer to be consulted. Although not legally binding, proponents are encouraged to respect these community processes where it is reasonable to do so. Please note that there is no obligation for a proponent to pay a fee to an Aboriginal community in order to enter into a consultation process.

To ensure that the Crown is aware of existing community consultation protocols, proponents should contact the relevant Crown ministry when presented with a consultation protocol by an Aboriginal community or anyone purporting to be a representative of an Aboriginal community.

VI. WHAT IF MORE THAN ONE PROVINCIAL CROWN MINISTRY IS INVOLVED IN APPROVING A PROPONENT'S PROJECT?

Depending on the project and the required permits or approvals, one or more ministries may delegate procedural aspects of the Crown's duty to consult to the proponent. The proponent may contact individual ministries for guidance related to the delegation of procedural aspects of consultation for ministry-specific permits/approvals required for the project in question. Proponents are encouraged to seek input from all involved Crown ministries sooner rather than later.



Tuck Creek Erosion Control Class Environmental Assessment

Harvester Road to Hydro Right of Way, Palmer Drive to CN Rail & Dundas Street to Headon Road

Notice of Public Information Centre

The Study

The City of Burlington has retained Aquafor Beech Limited to undertake a Municipal Class Environmental Assessment (EA) to study erosion related risks to three segments of Tuck Creek: i) from Dundas Street to Headon Road, ii) Palmer Drive to the CN Rail, and iii) Harvester Road to the Hydro Right of Way. The study areas are illustrated on the following page.

The objective of the study is to address creek erosion, protect infrastructure and private properties, and enhance the natural heritage of the Tuck Creek corridor. Alternative strategies will be investigated, including restoration and stabilization of Tuck Creek using natural and engineered approaches.

The Process

The Tuck Creek Erosion Control Municipal Class Environmental Assessment will be conducted as a Schedule B Project in accordance with the Municipal Class Environmental Assessment which is an approved process under the *Ontario Environmental Assessment Act*. The Class EA process includes public and review agency consultation, an evaluation of alternatives, an assessment of potential environmental effects of the proposed improvements, and identification of reasonable measures to mitigate any potential adverse impacts.

Online Public Information Centre

Due to the ongoing Public Health Emergency related to COVID-19, an Online Public Information Centre (PIC) will be available to the public to provide input on the Tuck Creek Erosion Control EA.

How to Participate:

Step 1: Visit https://www.burlington.ca/en/services-for-you/tuck-creek-erosion-control-ea-at-3-locations.asp by using your computer or mobile phone

Step 2: View the PIC boards provided on the website. PIC boards will be available for review from Thursday, December 10th, 2020.

Step 3: Attend the web presentation as per details below:

When: Tuesday, December 15th, 2020, 6:00pm to 7:30pm (1 hour presentation, 30 minute Q&A)

Where: WebEx - https://amosr.my.webex.com/join/Amos

The City is committed to informing and engaging the public on the Tuck Creek Erosion Control Class EA and will also be posting Public Information Centre content on the City's website starting December 10th, 2020 to January 11th, 2021.

We are interested in hearing any comments or concerns you may have with respect to this study. Comments received through the course of the study will be considered in selecting the preferred solution. Information will be collected in accordance with the Municipal Freedom of Information and Protection of Privacy Act. With the exception of personal information, all comments will be become part of the public record.

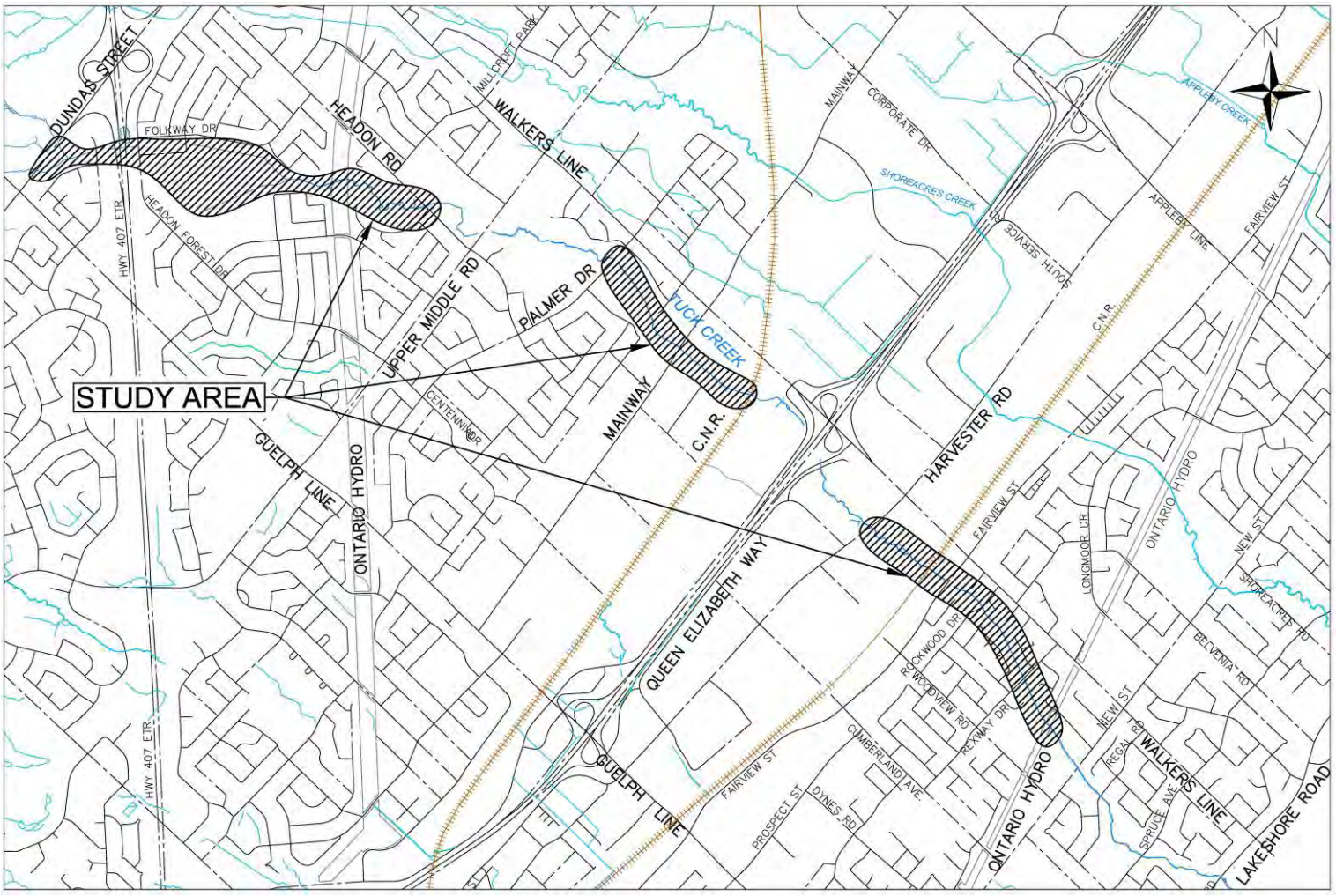
If you would like more information or would like to be placed on the Study mailing list, please contact:

Arif Shahzad, M. Eng., P. Eng.
City of Burlington, Senior Project Manager
426 Brant Street, P.O. Box 5013
Burlington, ON L7R 3Z6
905-335-7600 ext. 7486
Arif.Shahzad@burlington.ca

Robert Amos, MASc., P.Eng.
Aquafor Beech Ltd.
2600 Skymark Ave. Building 6, Unit 2
Mississauga, ON L4W 5B2
Ph 416-705-2367
Amos.R@Aquaforbeech.com

Please contact the Project Manager regarding disability accommodation requirements.

Study Area



List of Stakeholders
Tuck Creek Erosion Control Class EA

Ontario Ministry Contacts	Organization	Prefix/Suffix	First Name	Last Name	Position	Address	City	Province	Postal Code	Telephone	Fax	Email
	Ministry of Environment, Conservation and Parks	Ms.	Dorothy	Moszynski	Project Evaluator	135 St. Clair Avenue West, 1st Floor	Toronto	ON	M4V 1P5	416.326.3469	416.325.6345	Dorothy.Moszynski@ontario.ca
	Ministry of Environment, Conservation and Parks	Mr.	Daniel	Delaquis	Supervisor - Project Coordinator	8th Floor, 5575 Yonge Street	North York	ON	M2M 4J1	416.326.4839		Dan.Delaquis@ontario.ca
	Ministry of Environment, Conservation and Parks	Mr.	Trevor	Bell	Environmental Resource Planner / EA Coordinator- Air, Pesticides & Environmental Planning	5775 Yonge Street, 9th Floor	Toronto	ON	M2M 4J1	416.326.3577		Trevor.Bell@ontario.ca
	Ministry of Natural Resources and Forestry	Mr.	Steven	Strong	Aurora District Planner	50 Bloomington Road West	Aurora	ON	L4G 3G8	905.713.7366	905.713.7360	Steven.Strong@ontario.ca
	Ministry of Transportation Ontario		Rina	Kulathinal	Head, Transportation Highway Engineering	1201 Wilson Avenue, 2nd Floor, Building D	Downsview	ON	M3M 1J8	416.235.4562		Rina.Kulathinal@ontario.ca
	Ministry of Transportation Ontario	Mr.	John	Van Voorst		1201 Wilson Avenue, 5th Floor, Atrium Tower	Downsview	ON	M3M 1J8	416.235.5568		John.Vanvoorst@ontario.ca
	Ministry of Tourism and Culture	Ms.	Paula	Kupla	A/Heritage Planner, Central West, Culture Services Unit, Programs & Services Branch	400 University 4th Floor	Toronto	ON	M7A 2R9	416.341.7137	416.212.1802	Paula.Kulpa@ontario.ca
Federal Agencies	**Organization**	**Prefix/Suffix**	**First Name**	**Last Name**	**Position**	**Address**	**City**	**Province**	**Postal Code**	**Telephone**	**Fax**	**Email**
	Environment Canada	Mr.	Rob	Dobos	Manager, Environmental Assessment Section	Box 5050: 867 Lakeshore Road	Burlington	ON	L7R 4A6	905.336.4953	905.336.8901	Rob.Dobos@ec.gc.ca
	Transport Canada		Linda	Beaulieu		100 Front Street South	Sarina	ON	N7T 2M4	416.952.0470		Linda.Beaulieu@tc.gc.ca
	Fisheries and Oceans Canada				Fisheries Protection Program							FisheriesProtection@dfo-mpo.gc.ca
Conservation Halton	**Organization**	**Prefix/Suffix**	**First Name**	**Last Name**	**Position**	**Address**	**City**	**Province**	**Postal Code**	**Telephone**	**Fax**	**Email**
	Conservation Halton	Ms.	Cassandra	Connolly	Regulations Officer	2596 Britannia Road West	Burlington	ON	L7P 0G3	905.336.1158 x2301		cconnolly@hrca.on.ca
Region of Halton	**Organization**	**Prefix/Suffix**	**First Name**	**Last Name**	**Position**	**Address**	**City**	**Province**	**Postal Code**	**Telephone**	**Fax**	**Email**
	Halton Regional Municipality				Regional Clerk	1151 Bronte Rd.	Oakville	ON	L6M 3L1	905.825.6000		RegionalClerk@halton.ca
	Halton Regional Municipality		Richard	Clark	Senior Planner	1151 Bronte Rd.	Oakville	ON	L6M 3L1	905.825.6000 x7214		Richard.Clark@halton.ca
	Halton Regional Municipality		Ron	Reinholt	Regional Forester	1151 Bronte Rd.	Oakville	ON	L6M 3L1	905.825.6000		Ron.Reinholt@halton.ca
	Region of Halton	Mr.	Brian	Hudson	Senior Planner, Planning Services, Halton Region					905.825.6000 x7209	1.866.442.5866	Brian.Hudson@halton.ca
	Region of Halton	Mr.	James	Harnum	Commissioner, Public Works							Jim.Harnum@halton.ca
	Halton Regional Municipality		Adam	Huycke	Senior Planner	1151 Bronte Rd.	Oakville	ON	L6M 3L1	905.825.6000 x7604		Adam.Huycke@halton.ca
First Nations	**Organization**	**Suffix**	**First Name**	**Last Name**	**Position**	**Address**	**City**	**Province**	**Postal Code**	**Telephone**	**Fax**	**Email**
	Ontario Secretariat for Aboriginal Affairs		Gill	Surinder Singh	Policy Advisor - Policy and Relationships Branch	720 Bay St. 4th Floor	Toronto	ON	M5G 2K1	416.314.6781		Surinder.Singh.Gill@osaa.gov.on.ca
	Lands and ART Lands and Trust Services, Indian and Northern Affairs Canada	Ms.	Cheyenne	Loon	Senior Environmental Officer	25 St. Clair Avenue East, 8th Floor	Toronto	ON	M4T 1M2	416.973.6625		Cheyenne.Loon@aandc-aadnc.gc.ca
	De dwa da dehs nye>s Aboriginal Health Centre	Ms.	Constance	McKnight	Executive Director	678 Main Street East	Hamilton	ON	L8M 1K2	905.548.9593 (905.544.4320 x228)		Dedwada@cogeco.net
	Six Nations Lands and Resources	Ms.	Jo-Ann E.C.	Greene	Director	2498 Chiefswood Road, PO Box 5000	Oshweken	ON	N0A 1M0	519-753-0665	519.753.3449	
	The Chiefs of Ontario	Ms.	Margaret	Carpenter	Receptionist	111 Peter Street, Suite 804	Toronto	ON	M5V 2H1	416.597.1266	416.597.8365	Margaret1@coo.org
	Haudenosaunee Development Institute	Mr.	Wayne	Hill		16 Sunrise Court, Suite 600 P.O. Box 714	Ohsweken	ON	NOA 1M0			TworowArchaeology@gmail.com
	Mississaugas of the Credit First Nation	Ms.	Megon	DeVries	Department of Consultation & Accommodation	2789 Mississauga Road R.R. #6	Hagersville	ON	N0A 1H0			Megan.Devries@newcreditfirstnation.com
	Six Nations First Nation	Ms.	Joanne	Thomas	Land Use Unit	1695 Chiefswood Road P.O. Box 5000	Ohsweken	ON	NOA 1M0			JThomas@sixnations.ca

	The Metis Nation of Ontario	Ms.	Jane	Brennan	Administrator	500 Old St. Patric St. Unit D	Ottawa	ON	K1N 9G4	613.798.1488	613.722.4225	Janeb@metisnation.org
	The Métis Nation of Ontario	Ms.	Melanie	Paradis	Director	75 Sherbourne Street, Suite 311	Toronto	ON	M5A 2P9	416.977.9881 x114	416.977.9911	MelanieP@metisnation.org
	Ministry of Aboriginal Affairs	Ms.	Lorena	Weesit	Correspondence Coordinator, Communications Branch	160 Bloor Street East, 4th Floor	Toronto	ON	M7A 2E6			
	Ministry of Aboriginal Affairs	Mr.	David	Pickles	Team Lead for EAs	9th Floor, 160 Bloor Street East	Toronto	ON	7A 2E6	416.326.4757	416.326.1066	David.Pickles@ontario.ca
	Assessment and Historical Research Indian and Northern Affairs Canada	Mr.	Sean	Darcy	Manager	10 Wellington St.	Gatineau	QC	K1A 0H4	819.997.8155	819.997.1366	
	Department of Indian and Northern Affairs											CAU-UCA@aadnc-aandc.gc.ca
Utilities	**Organization**	**Prefix/Suffix**	**First Name**	**Last Name**	**Position**	**Address**	**City**	**Province**	**Postal Code**	**Telephone**	**Fax**	**Email**
	Hydro One Networks Inc	Ms.	Rossella	Fazio	Manager, Transmission Lines Sustainment Investment Planning	483 Bay Street, North Tower 12th Floor	Toronto	ON	M5G 2P5	416.345.6411	416.345.5443	Rossella.Fazio@HydroOne.com
	Hydro One Networks Inc	Ms.	Jenny	Seo	Network Management Officer, Secondary Land Use	483 Bay Street, North Tower 13th Floor	Toronto	ON	M5G 2P5	416.345.5676		Jenny.Seo@Hydroone.com
	Hydro One Networks Inc	Ms.	Enza	Cancilla	Hydro One Real Estate Management	185 Clegg Road	Markham	ON	L6G 1B7	416.345.5892		Enza.Cancilla@HydroOne.com
	Hydro One Networks Inc	Ms.	Susan	Sun	Secondary Land Use					416.345.6629		Susan.SUN@HydroOne.com
	Hydro One Networks Inc				Secondary Land Use							SecondaryLandUse@HydroOne.com
	Enbridge Pipelines Ltd.	Ms.	Ann	Newman	Crossings Coordinator, Enbridge Pipelines Inc.		Sarnia	ON	N7T 7H8			ann.newman@enbridge.com
Additional Stakeholders	**Organization**	**Prefix/Suffix**	**First Name**	**Last Name**	**Position**	**Address**	**City**	**Province**	**Postal Code**	**Telephone**	**Fax**	**Email**
		[redacted]										
	CN Rail	Mr.	Michael	Vallins	Manager, Public Works	1 Administration Road, P.O. Box 1000	Concord	ON	L4K 1B9	905-669-3264		Michael.Vallins@cn.ca
		[redacted]										
		Mr.	David	Espinosa	Project Coordinator	17250 Yonge Street	Newmarket	ON	L3Y 6Z1	1.877.464.9675 x75071		David.Espinosa@york.ca
		[redacted]										



WELCOME

Tuck Creek Erosion Control Environmental Assessment

PUBLIC INFORMATION CENTRE

December 15, 2020

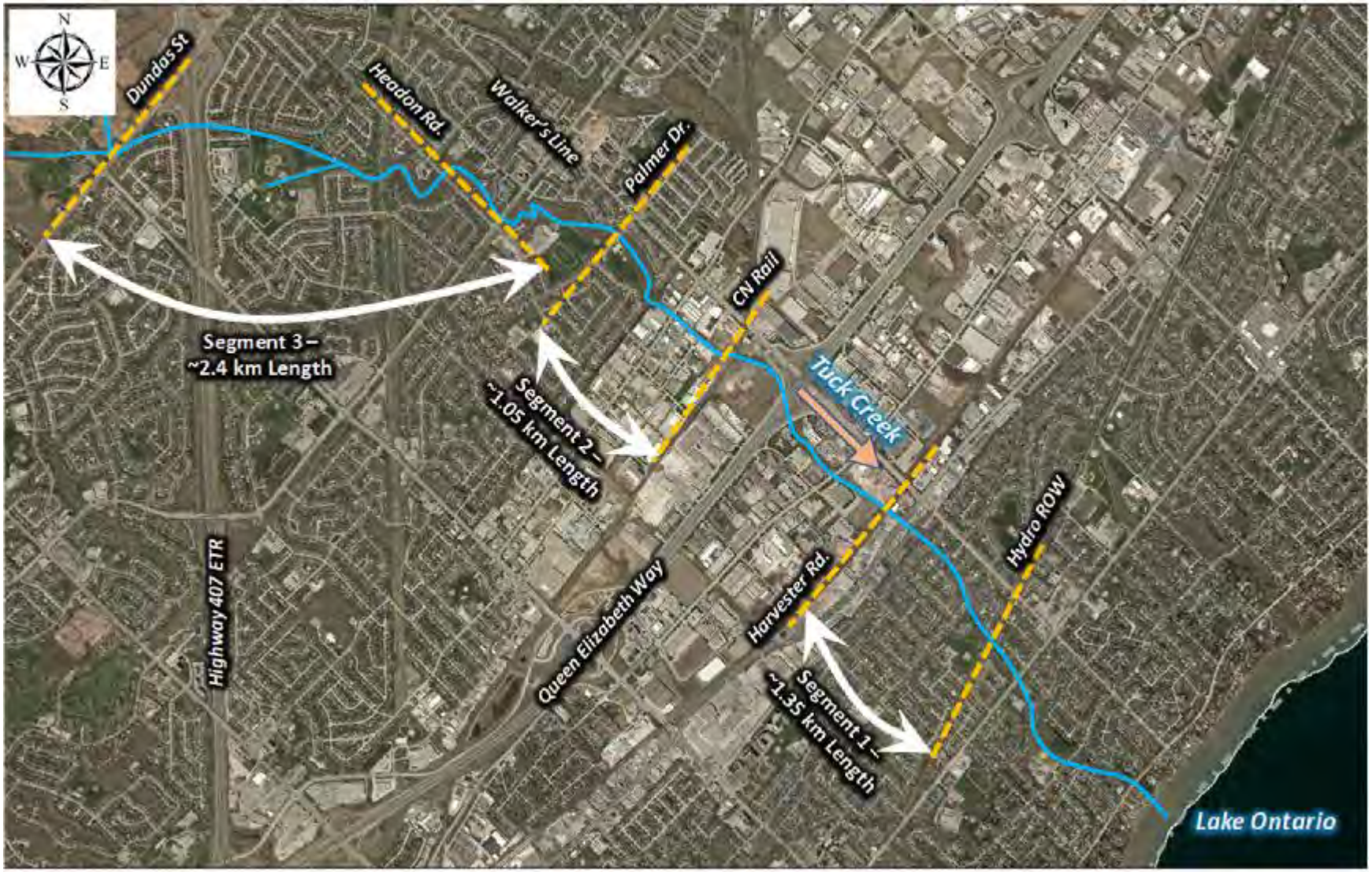
Your comments are encouraged and appreciated, as this will provide us an opportunity to address project issues and concerns.

Aquafor Beech Limited

City of Burlington

STUDY AREA

The study area along Tuck Creek is between Dundas St. to Headon Rd., Palmer Dr. to CN Rail & Harvester Rd. to Hydro ROW



STUDY PURPOSE / PROBLEM DEFINITION



The study is being carried out to study the risk of erosion related to Tuck Creek within the study area, and provide recommendations to reduce erosion and protect the natural heritage in the area.

PUBLIC INFORMATION CENTRE PURPOSE



This Public Information Centre (PIC) is Designed to:

- Present information on existing conditions
- Present alternative approaches to erosion protection
- Present study process and timelines



To gain community input on:

- Existing conditions information
- Identification of opportunities and mitigation preferences
- Prioritization of erosion sites
- Alternative evaluation criteria and scoring
- Selection of preferred solutions

MUNICIPAL CLASS ENVIRONMENTAL ASSESSMENT PROCESS

CLASS EA PROCESS - SCHEDULE B

Many projects related to municipal systems are similar in nature, are carried out routinely, and have predictable and mitigatable environmental effects which are investigated according to the Municipal Engineers Association "Municipal Class Environmental Assessment" (October 2000, as amended in 2007 & 2011).

This study is being undertaken as a Schedule B project under the Municipal Class Environmental Assessment process. The flow chart illustrates the key steps to be undertaken as part of the EA process.

Phase 1 – Identify Problems

- ✓ Identify Problem or Opportunity
- ✓ Public Consultation



We Are Here →

Phase 2 – Alternate Solutions

- ✓ Identify Alternative Solutions
- ✓ Inventory Natural, Social, Economic Environment
- ✓ Environmental Impacts and Mitigation
- ✓ Alternatives Evaluation
- Review Agency and Public Consultation
- Select Preferred Solution
- Review and Confirm Choice of Schedule
- Notice of Completion to Review Agency & Public
- Implementation

NATURAL HERITAGE ASSESSMENT

To assess the existing natural environment within the study area, the following studies were undertaken:

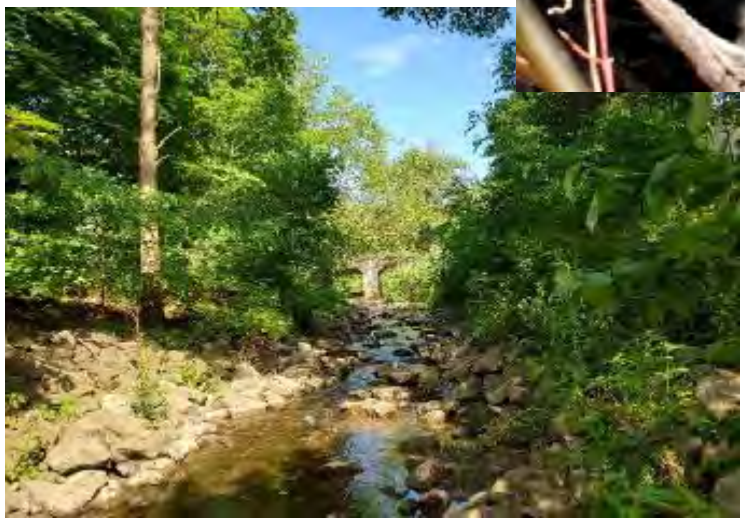
1. Tree inventory and assessment;
2. Vegetation community classification (Ecological Land Classification (ELC) protocol);
3. Vascular plant survey (includes vascular plant Species at Risk (SAR) survey);
4. Breeding Bird Surveys (BBS);
5. Candidate bat maternity roost surveys;
6. Snake surveys (no snakes recorded during surveys);
7. Frog and toad call surveys;
8. Fish community and aquatic habitat assessment;
9. SAR screening and habitat assessment; and,
10. Significant Wildlife Habitat (SWH) screening and assessment.



Eastern Cottontail (*Sylvilagus floridanus*) – a common urban resident



Fragile Forktail (*Ischnura posita*) – Rare in Halton Region



Forested Tuck Creek Corridor

VEGETATION COMMUNITY CLASSIFICATION

Vegetation communities within the study area were identified during field surveys completed in accordance with the *Ecological Land Classification (ELC) System for Southern Ontario: First Approximation and its Application* (Lee et al., 1998) protocol in 2020.

Determining the vegetation communities within the study area aids in identifying the presence of significant vegetation communities, Significant Wildlife Habitat (SWH), and the habitats of potential Species at Risk.

In total, 15 vegetation communities are within the study area (see Board 7). Community types ranged from disturbed woodlands and open meadows, to deciduous forest habitats containing mature species and moderate to high quality habitat. One community is considered provincially rare – FOD7-4 (S2S3), although found to be severely degraded by disturbance.



FOD7-4: Fresh – Moist Black Walnut Lowland Deciduous Forest Type (S2S3)



Mature Deciduous Forest adjacent to Tuck Creek

VEGETATION COMMUNITY CLASSIFICATION







Polygon	ELC Code	Community Name
01	MAS2-1	Cattail Mineral Shallow Marsh
02	FOD7-3	Fresh - Moist Willow Lowland Deciduous Forest
03	CUM1-1	Dry -Moist Old Field Meadow
04	FOD7-3	Fresh - Moist Willow Lowland Deciduous Forest
05	FOD7-4	Fresh - Moist Black Walnut Lowland Deciduous Forest
06	FOD6-5	Fresh - Moist Sugar Maple - Hardwood Deciduous Forest
07	CUM1-1	Dry -Moist Old Field Meadow
08	FOD7	Fresh - Moist Lowland Deciduous Forest
09	FOD5-3	Dry - Fresh Sugar Maple - Oak Deciduous Forest
10	CUT1/CUM1-1	Mineral Cultural Thicket / Dry - Moist Old Field Meadow Complex
11	FOD7	Fresh - Moist Lowland Deciduous Forest
12	CUW1	Mineral Cultural Woodland
13	CUT1	Mineral Cultural Thicket
14	FOD7	Fresh - Moist Lowland Deciduous Forest
15	CUM1-1	Dry -Moist Old Field Meadow
16	ANTH	Anthropogenic
17	ANTH	Anthropogenic
18	ANTH	Anthropogenic
19	ANTH	Anthropogenic
20	ANTH	Anthropogenic
21	ANTH	Anthropogenic
22	ANTH	Anthropogenic
23	ANTH	Anthropogenic

VASCULAR PLANTS

Vascular plants were identified in concert with vegetation community surveys in 2020. To date, 201 species have been identified.

Attributes of the vascular plant species recorded within the study area are as follows:

- Introduced Species: 78
- Native Species: 86
- Regionally Rare Species: 22
- Provincially Rare Species (S1-S3): 1 (Pignut Hickory, *Carya glabra*)
- Species at Risk: 0



Cut-leaved Toothwort (*Cardamine concatenata*) – Uncommon in Halton Region



Yellow Trout Lily (*Erythronium americanum*)



Pignut Hickory (*Carya glabra*) – S3; Rare in Halton Region

BREEDING BIRDS

Two Breeding Bird Surveys (BBS) were conducted in 2020 by a qualified avian biologist. A total of 32 species were recorded during surveys. BBS results are as follows:

- Confirmed breeding: 3
- Probable breeding: 9
- Possible breeding: 14
- No breeding evidence: 6

Significant Species are as follows:

- Provincially rare species: 1 (Black-crowned Night-heron (*Nycticorax nycticorax*))
- Species at Risk: 2 (Barn Swallow (*Hirundo rustica*), Eastern Wood-pewee (*Contopus virens*))
- Woodland Raptors: 1 (Cooper's Hawk (*Accipiter cooperii*))



Cooper's Hawk (*Accipiter cooperii*) – Uncommon in Halton Region

One breeding pair of Cooper's Hawk were observed in April by Aquafor staff. Nest location was confirmed by local residents.

Due to a lack of breeding evidence (i.e. no nests were observed in trees or on suitable structures), it is believed the Black-crowned Night-heron and Barn Swallow are using the Tuck Creek corridor for foraging.

OTHER WILDLIFE

Species specific surveys (Snake and calling Frogs and Toads) were conducted in 2020 by qualified terrestrial ecologists, along with incidental wildlife observations recorded throughout the duration of all site visits. A total of 17 additional wildlife species were recorded during surveys, as follows:

- Mammals: 5
- Amphibians: 2
- Insects: 11

Provincially rare species: 1 (River Bluet (*Enallagma anna*))

Regionally rare species: 1 (Fragile Forktail (*Ischnura posita*)



River Bluet (*Enallagma anna*) – S3, found along the grassy margins of Tuck Creek near Lansdown Park

Frog and Toad surveys only recorded two calling individuals throughout the study area (Green Frog and Spring Peeper). Their preferred habitat – wetland – was not abundantly present throughout the Tuck Creek corridor.

No snakes were observed directly by Aquafor staff, likely due to cool, overcast weather conditions and a tendency for these species to avoid detection.

SPECIES AT RISK

For the purpose of this study, Species At Risk (SAR) are defined as species listed as Endangered (END), Threatened (THR), or Special Concern (SC) under the provincial Endangered Species Act (ESA) and/or the federal Species at Risk Act (SARA). Other Species of Conservation Concern (SOCC) are those with Global ranks of G1-G3 and/or Subnational/Provincial ranks of S1-S3.

Species included in the screening assessment include those provided by secondary sources and those documented via direct observations by Aquafor Beech Limited. **A total of 18 SAR and SOCC are included in the screening assessment**. Of these, 10 are either confirmed present or have the potential to occur within the study area. These are as follows:

Species Name		Ranking					Assessment of Species Occurrence at or Near the Study Area
Scientific Name	Common Name	SARA*	ESA*	G-Rank	S-Rank	Halton Region	
Myotis leibii	Eastern Small-footed Myotis	END	END	G4	S2S3	-	Potentially Present
Myotis lucifugus	Little Brown Myotis	END	END	G3	S4	Common	Likely Present
Myotis septentrionalis	Northern Myotis	END	END	G1G2	S3	Common	Likely Present
Perimyotis subflavus	Tri-coloured Bat	END	END	G2G3	S3?	-	Likely Present
Nycticorax nycticorax	Black-crowned Night-heron	-	-	G5	S3B, SZN	Uncommon	Confirmed Present
Contopus virens	Eastern Wood-Pewee	SC	SC	G5	S4B	Common	Confirmed Present
Hirundo rustica	Barn Swallow	THR	THR	G5	S4B	Common	Confirmed Present
Carya glabra	Pignut Hickory	-	-	G5	S3	Rare	Confirmed Present
Enallagma anna	River Bluet	-	-	G5	S2	Rare	Confirmed Present
Danaus plexippus	Monarch	SC	SC	G4	S2N,S4B	Common	Confirmed Present

*Species ranking for SARA and ESA are as follows: EXT – Extinct, EXP – Extirpated, END – Endangered, THR – Threatened, SC – Special Concern, NAR – Not-at-Risk, and DD – Data Deficient

SIGNIFICANT WILDLIFE HABITAT

The province has provided guidance for the identification and assessment of Significant Wildlife Habitat (SWH). In Burlington, the primary document to use to identify SWH is the Technical Guide for Ecoregion 7E (Government of Ontario, 2015).

Candidate or Confirmed SWH types within the study area are as follows:

- **Bat Maternity Colonies – Candidate**
- **Landbird Migratory Stopover Areas – Candidate**
- **Woodland Raptor Nesting Habitat – Confirmed**
- **Seeps and Springs - Candidate**
- **Special Concern and Rare Wildlife Species – Confirmed**
  - ❖ Eastern Wood-pewee (SC, S4B), Confirmed
  - ❖ River Bluet (S2), Confirmed
  - ❖ Pignut Hickory (S3), Confirmed



Cooper's Hawk (*Accipiter cooperii*)

SWH is a *Key Feature* of Halton Region's Natural Heritage System (RNHS) and is protected under the Region's Official Plan.

FISHERIES & AQUATIC HABITAT

To assess the existing fisheries and aquatic habitat within the study the following studies were undertaken:

- Aquatic habitat assessments at six (6) locations throughout the study area, from Ryerson Park upstream to Ireland Park;
- Aquatic community assessments of historic data; and,
- SAR screening and potential habitat identification.

Summary of Fish Community Sampling

Scientific Name	Common Name
Rhinichthys atratulus	Blacknose dace
Culaea inconstans	Brook stickleback
Cyprinidae	Carps and minnows
Luxilus cornutus	Common shiner
Semotilus atromaculatus	Creek chub
Pimephales promelas	Fathead minnow
Rhinichthys cataractae	Longnose dace
Oncorhynchus mykiss	Rainbow trout
Gasterosteus aculeatus	Threespine stickleback
Catostomus commersoni	White sucker

Key Findings:

- No aquatic SAR were identified within the study area;
- The thermal classification of Tuck Creek within the study area is that of a Cool-Warm thermal regime and is dominated by warmwater and coolwater species, with the exception of Rainbow trout (coldwater);
- Coldwater species limited in distribution to downstream extent of the creek (migratory species);
- Very little evidence of groundwater (coldwater) contributions;
- Habitat quality and quantity varier throughout the study area and was largely dependent on surrounding landuse;
- A number of **fish barrier(s)** were observed throughout the study area, such as the perched culvert at Palmer Drive; and,
- There are opportunities to improve fish habitat.

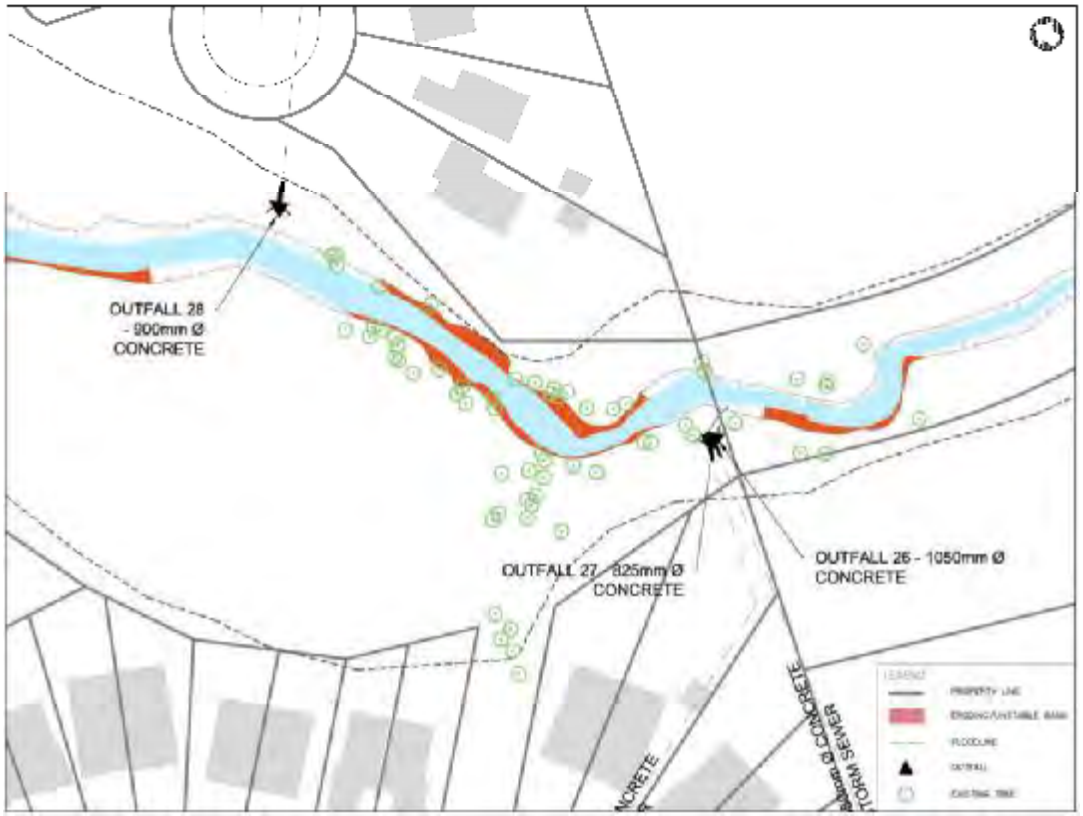


Fathead Minnow, *Pimephales promelas*
Photo Credit: Konrad P. Schmidt & Donals Biemborn

Next Steps:

- Data analysis and final reporting

TREE INVENTORY



Species Common Name	Species Botanical Name	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7
Apple	*Malus spp.*		1					
Balsam Poplar	*Populus balsamifera*							1
Basswood	*Tilia americana*		1		1			
Black Cherry	*Prunus serotina*			1	1			
Black Locust	*Robinia pseudoacacia*	1						
Black Walnut	*Juglans nigra*	1	4	19	5	5		2
Common Buckthorn	*Rhamnus cathartica*		1					
Eastern Cottonwood	*Populus deltoides*						2	1
Fireberry Hawthorn	*Crataegus chrysocarpa*					1		
Golden Willow	*Salix alba var. vitellina*	1	1		3	5		1
Honey Locust	*Gleditsia triacanthos var. inermis*	1						
Hybrid Crack Willow	*Salix x rubens*				6	4	1	3
Manitoba Maple	*Acer negundo*	1		3	33	10		17
Silver Maple	*Acer saccharinum*				1		1	
Small-leaved Linden	*Tilia cordata*		1					1
Sugar Maple	*Acer saccharum*				4			1
Trembling Aspen	*Populus tremuloides*				3			
White Ash	*Fraxinus americana*	1	6	6	7	6		1
White Elm	*Ulmus americana*							1
White Pine	*Pinus strobus*							1
White Spruce	*Picea glauca*						3	
Wild Cherry	*Prunus avium*		5	3				1

- Trees greater than 10cm diameter were inventoried in proximity to erosion sites within the study area, and a total of 22 species were identified.

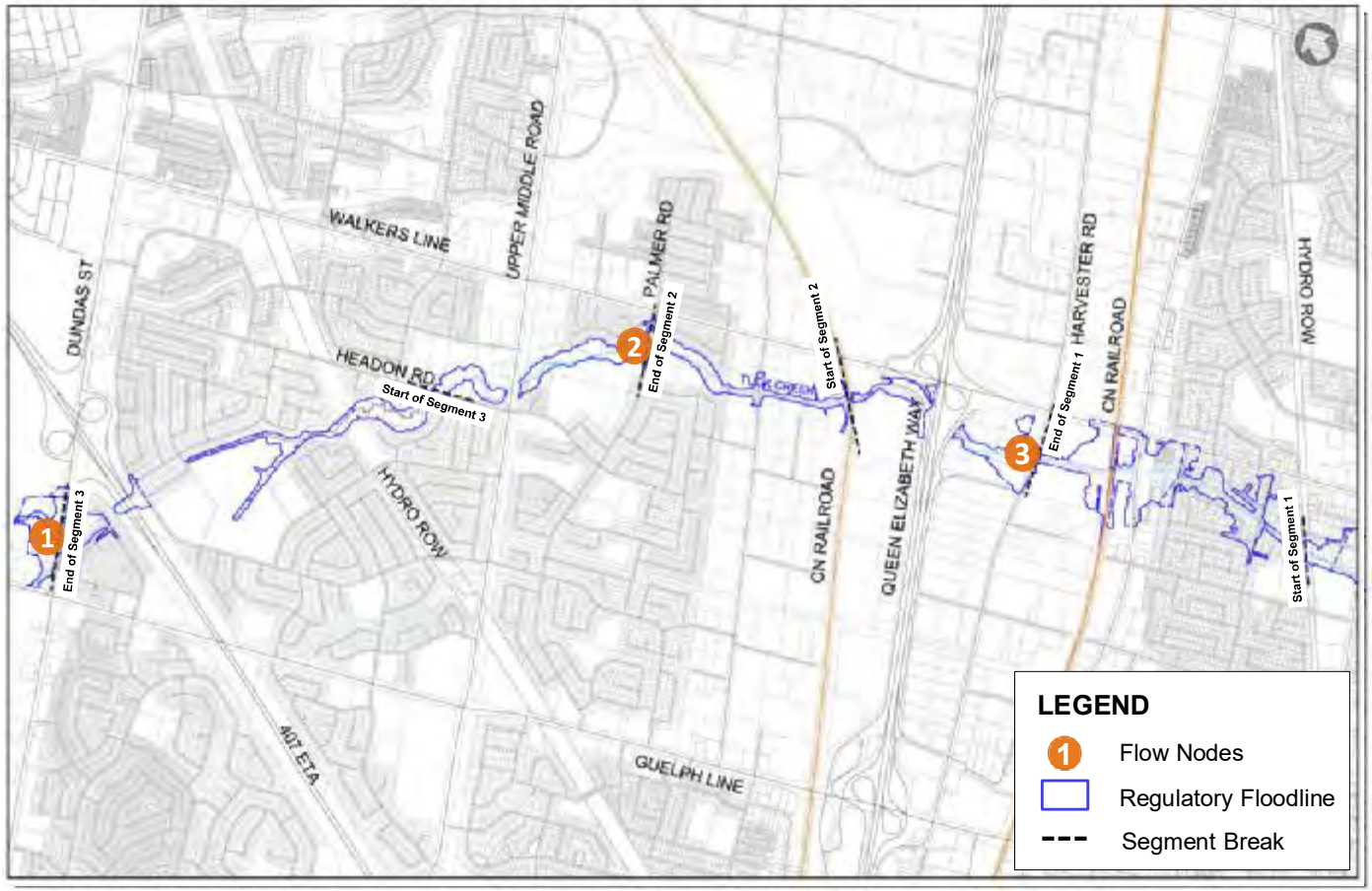
- Removal of trees may be required to accommodate channel works. However, the removed trees will be compensated with as per City of Burlington and Conversation Halton standards during restoration stage.



HYDROLOGY & EXISTING FLOODING PROFILE

Flows at different locations under various rainfall events are presented in the table, and the flooding profile under regional storm is shown in the figure.

Event	Flow (m^3/s)		
	Node 1	Node 2	Node 3
Regional	28.6	81	108.1
100 Year	13.8	38.9	51.2
50 Year	11.7	33.5	45.9
25 Year	9.7	29.2	40.1
10 Year	7.1	23.4	33.8
5 Year	5.3	19.9	28.1
2 Year	3.1	13.6	20.4

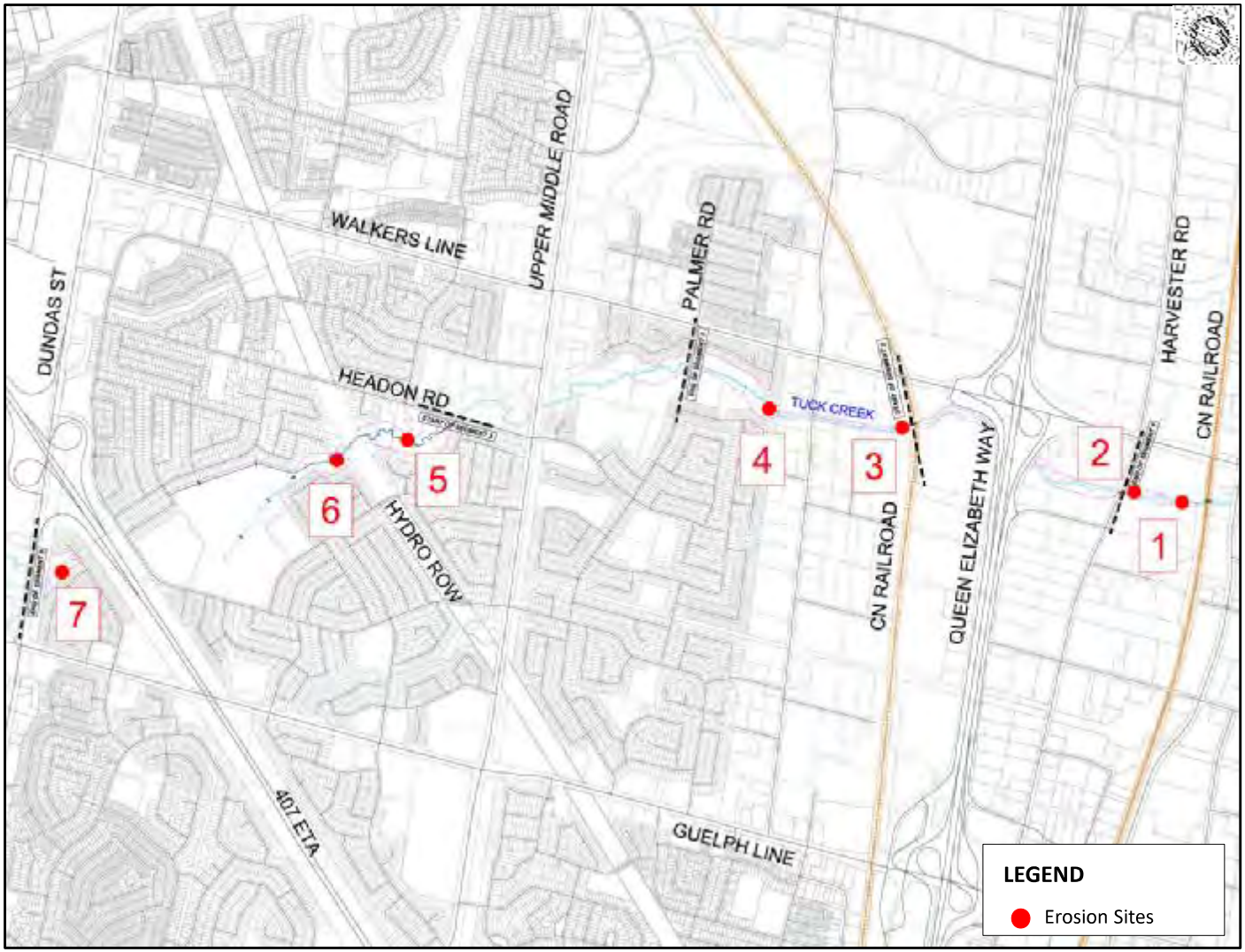


EROSION INVENTORY

Seven erosion sites were identified within the study area.

Risks observed at the erosion sites include:

- Risks to private properties;
- Risks to municipal infrastructure;
- Negative impacts on water quality;
- Fish barrier;
- Woody debris and fallen trees within the creek – negative impact on flow conveyance;
- Deteriorating engineered structures requires restoration / rehabilitation.



EVALUATION CRITERIA

The following criteria are used to evaluate each alternative. It will help determine which alternative should be selected as the preliminary preferred alternative.

Comment sheets are provided to collect public feedback on the evaluation criteria and preliminary evaluation.

Physical / Natural Environment

Potential to Reduce Stream Bank and Stream Bed Erosion	Greater reduction of erosion risks to public
Potential to Improve Aquatic Habitat	Greater improvements to fish and aquatic habitat scores higher, including substrate, overhanging vegetation, turbidity, and passage/connectivity
Potential Impacts to Aquatic Habitat During Construction	Less disruption to fish and aquatic habitat during construction scores higher
Potential to Improve Terrestrial Habitat	Greater improvements to terrestrial habitat scores higher, including loss and replacement of vegetation and natural corridor connectivity
Potential Impacts to Terrestrial Habitat During Construction	Less disruption to the terrestrial habitat during construction scores higher

Social / Cultural Environment

Aesthetics / Recreation	Greater improvements to the aesthetics of the creek corridor and how the alternative impacts recreational use of the corridor score higher
Compatibility with Adjacent Land Use	Greater compatibility with the land use of adjacent properties scores higher
Community Disruption	Less disruption the surrounding community and residents scores higher
Public Health and Safety	Greater protection of public health and safety for a longer time scores higher

Technical and Engineering Considerations

Ease of Implementation	Ease of Implementation Greater ease of implementing scores higher
Potential to Reduce Flooding Risks	Greater reduction of flooding risks to public and/or private lands for longer time scores higher
City Acceptance	City Acceptance Greater compliance with existing City plans, policies, and bylaw requirements scores higher
Technical Feasibility	Greater technical feasibility relative to other alternatives scores higher

Economic Environment

Construction Costs	Lower construction cost relative to other alternatives scores higher
Operation and Maintenance Costs	Lower operations and maintenance costs relative to other alternatives scores higher
Life Cycle Costs	Lower life cycle costs relative to the other alternatives scores higher
Infrastructure Protection	Greater protection of existing infrastructure for a longer time scores higher

EVALUATION APPROACH

Each erosion sites will be specifically evaluated to determine the preferred method for rehabilitation.

The evaluation uses a ranking scheme which accounts for Physical and Natural Environment, Technical Criteria, Social and Cultural Conditions, and Economics Considerations.

A preliminary ranking has been applied to each alternative for each reach. The alternative with the highest score will define which method of alternative is preferred for each erosion sites.

The ranking score has been normalized to provide equal weighting for each category of evaluation criteria.

Comment Sheets are provided to gain public input on the preliminary ranking. The ranking will be finalized once public input has been incorporated.

An Example is illustrated in the adjacent table:

EVALUATION CRITERIA		Alternative 1 - Do Nothing	Alternative 2 - Local Restoration Works	Alternative 3 - Reach Scale Works
		Score	Score	Score
Physical / Natural Environment Criteria				
Potential to Reduce Stream Bank and Stream Bed Erosion	Greater reduction of erosion risks, slope failures, and loss of public and private properties/parklands	0	4	5
Potential to Improve Aquatic Habitat	Greater improvements to fish and aquatic habitat scores higher, including substrate, overhanging vegetation, turbidity, and passage/connectivity	1	2	4
Potential Impacts to Aquatic Habitat During Construction	Less disruption to fish and aquatic habitat during construction scores higher	4	3	2
Potential to Improve Terrestrial Habitat	Greater improvements to the existing terrestrial condition score higher, including factors such as management/removal of invasive species, creation of new habitat types/features, or increasing the area/functionality of natural corridors	1	2	4
Potential Impacts to Terrestrial Habitat During Construction	Less disruption to the terrestrial habitat during construction scores higher	4	3	2
	Physical / Natural Environment Criteria Subtotal	10	14	17
	Weighted Score for Physical / Natural Environment Criteria (maximum of 25 pts)	8	11	14
Technical and Engineering Criteria				
Ease of Implementation	Less impact to the surrounding infrastructure (e.g., sewers, watermains, gas, roads) during and after constructions scores higher	4	3	3
Flooding Impacts	Greater reduction of flooding risks to public and/or private lands for longer time scores higher	2	2	4
City Acceptance	Greater compliance with existing City plans, policies, and bylaw requirements scores higher	2	3	4
Technical Feasibility	Greater technical feasibility relative to other alternatives scores higher	2	3	5
	Technical and Engineering Criteria Subtotal	10	11	16
	Weighted Score for Technical and Engineering Criteria (maximum of 25 pts)	15	17	24
Social / Cultural Environment Criteria				
Aesthetics / Recreation	Greater improvements to the aesthetics of the creek corridor and how the alternative impacts recreational use of the corridor score higher	2	3	4
Compatibility with Adjacent Land Use	Greater compatibility with the land use of adjacent properties (e.g. softer approach will be preferred in the residential and parklands compared to hard-engineered structure) scores higher	2	4	4
Community Disruption	Less disruption the surrounding community and residents scores higher	4	3	2
Archaeological Impacts	Less disturbance of areas with archaeological potential and cultural heritage resources scores higher	4	3	3
	Social / Cultural Environment Criteria Subtotal	12	13	13
	Weighted Score for Social / Cultural Environment Criteria (maximum of 25 pts)	12	13	13
Economic Environment Criteria				
Construction Costs	Lower construction cost relative to other alternatives scores higher	4	3	2
Operation and Maintenance Costs	Lower operations and maintenance costs relative to other alternatives scores higher	1	3	4
Life Cycle Costs	Lower life cycle costs relative to the other alternatives scores higher	1	3	4
Infrastructure Protection	Greater protection of existing infrastructure for a longer time scores higher	1	4	4
	Economic Criteria Subtotal	7	13	14
	Weighted Score for Economic Criteria (maximum of 25 pts)	11	20	21
Total		46	60	72

Highest Score = Preferred Alternative

Ranking Scale							
No / Negative Impact	0	1	2	3	4	5	**Ideal / Most Positive Impact**

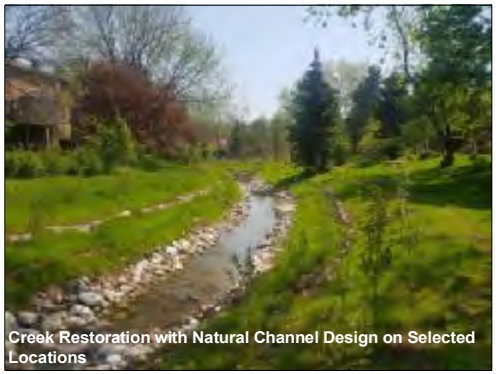
PRELIMINARY ALTERNATIVE SOLUTIONS

1. **Do Nothing**
   - Leave the site as it is and allow erosional processes to continue within the watercourse corridor;
   - Ongoing monitoring of erosion areas to address increased risks;
   - Maintenance or possible emergency works may be required in the future.



Active Bank Erosion along the outer bend of the channel, Risk to Private Property

2. **Local Restoration Works**
   - Localized channel bank and/or bed work to address erosion issues at the site;
   - May require ongoing maintenance, occasional repairs, or eventual replacement;
   - Often preferred to limit the economic cost and the environmental damage of large-scale channel engineering and stream restoration works.



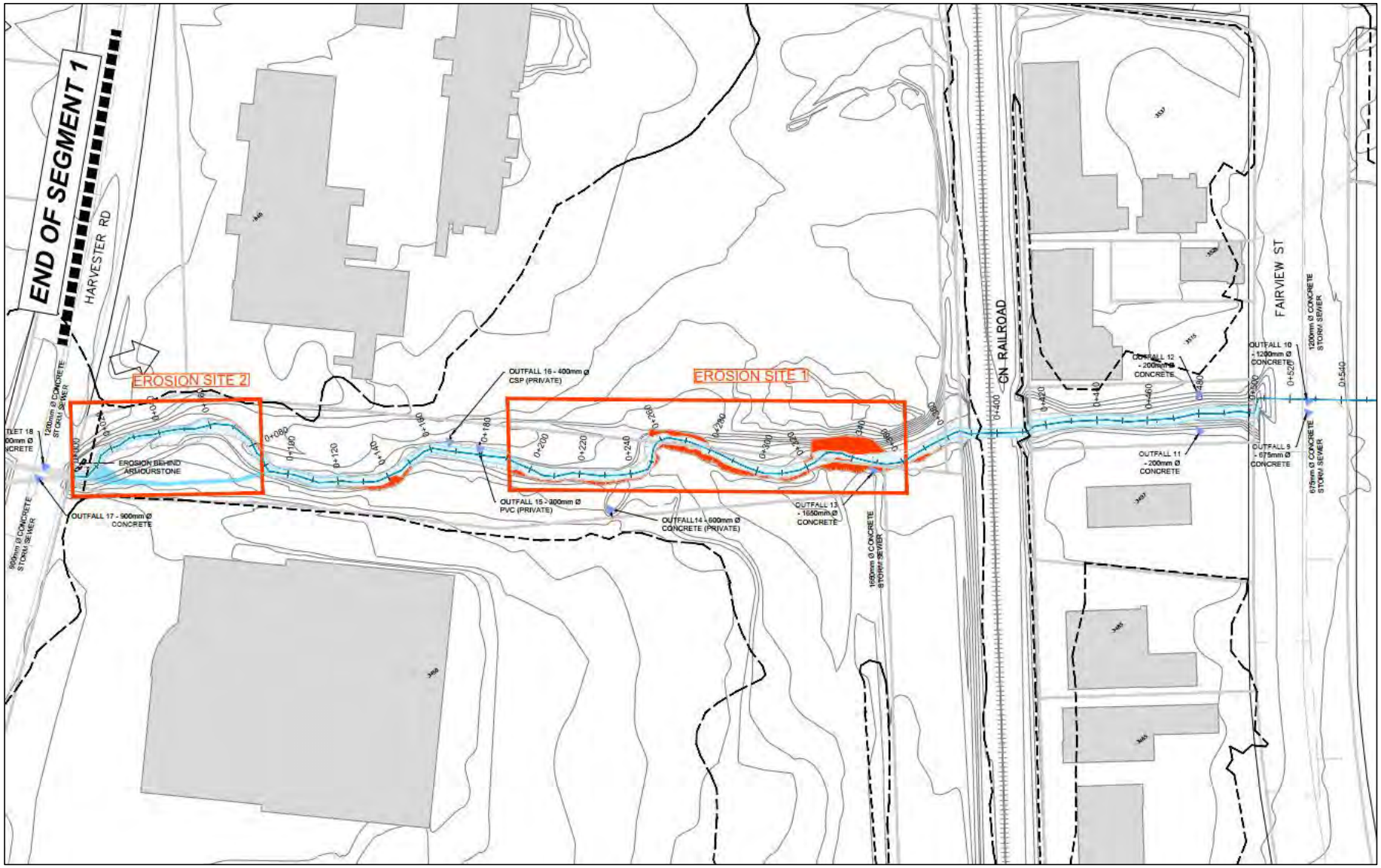
Creek Restoration with Natural Channel Design on Selected Locations

3. **Reach Scale Work**
   - A reach-based approach to address erosion issues at the site;
   - Typically applied in highly constrained urban watercourses;
   - Utilizes both “natural channel design” and “hard” channel engineering approaches;
   - Higher capital cost, but require minimal maintenance.



Armourstone Bank Treatment within Confined Channel

EROSION SITE 1 – UPSTREAM METROLINX / CN RAILWAY



EROSION SITE 1 – EXISTING CONDITIONS

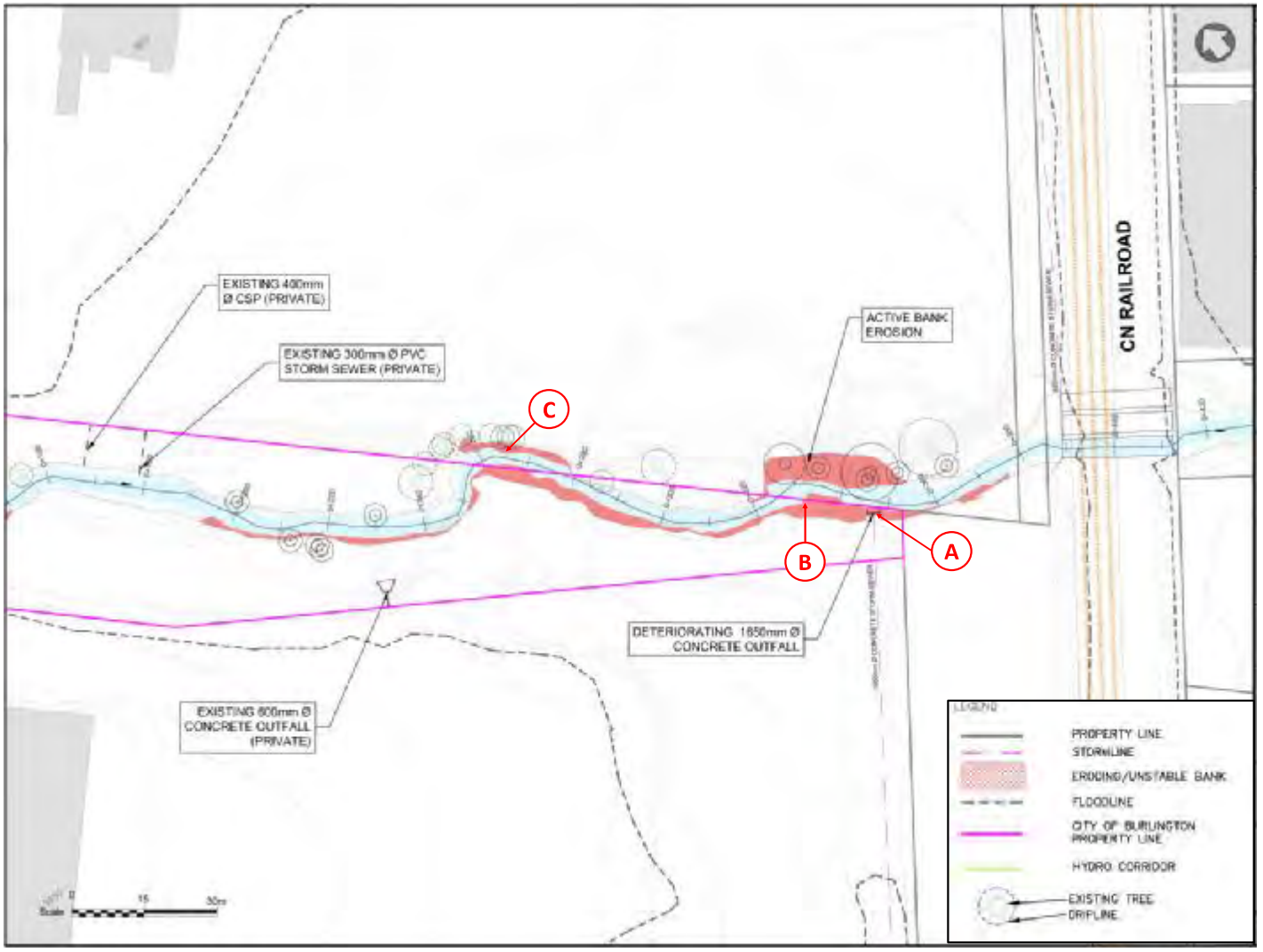



Photo A – Deteriorating Outfall Headwall due to Erosion

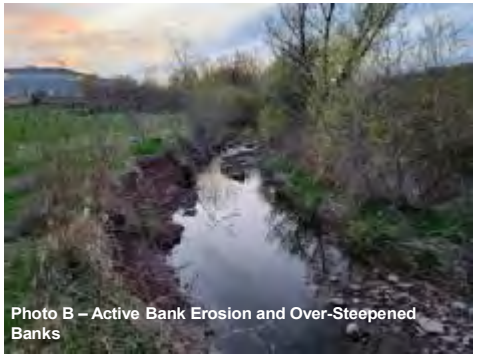

Photo B – Active Bank Erosion and Over-Steepened Banks

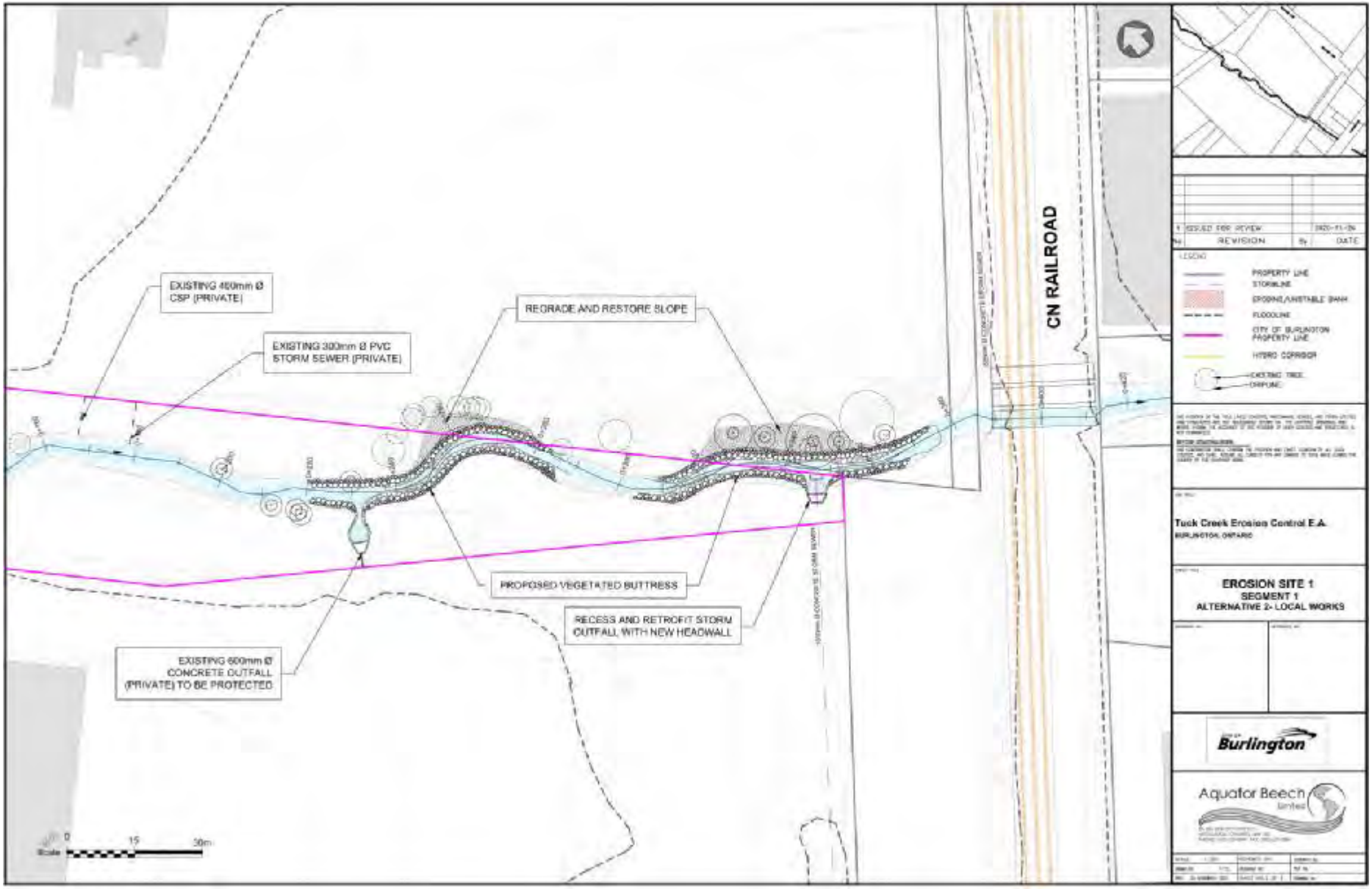

Photo C – Failed Bank Protection Using Concrete Debris placed by Local Landowners.

Risks to private property, municipal infrastructure and aquatic habitat due to:

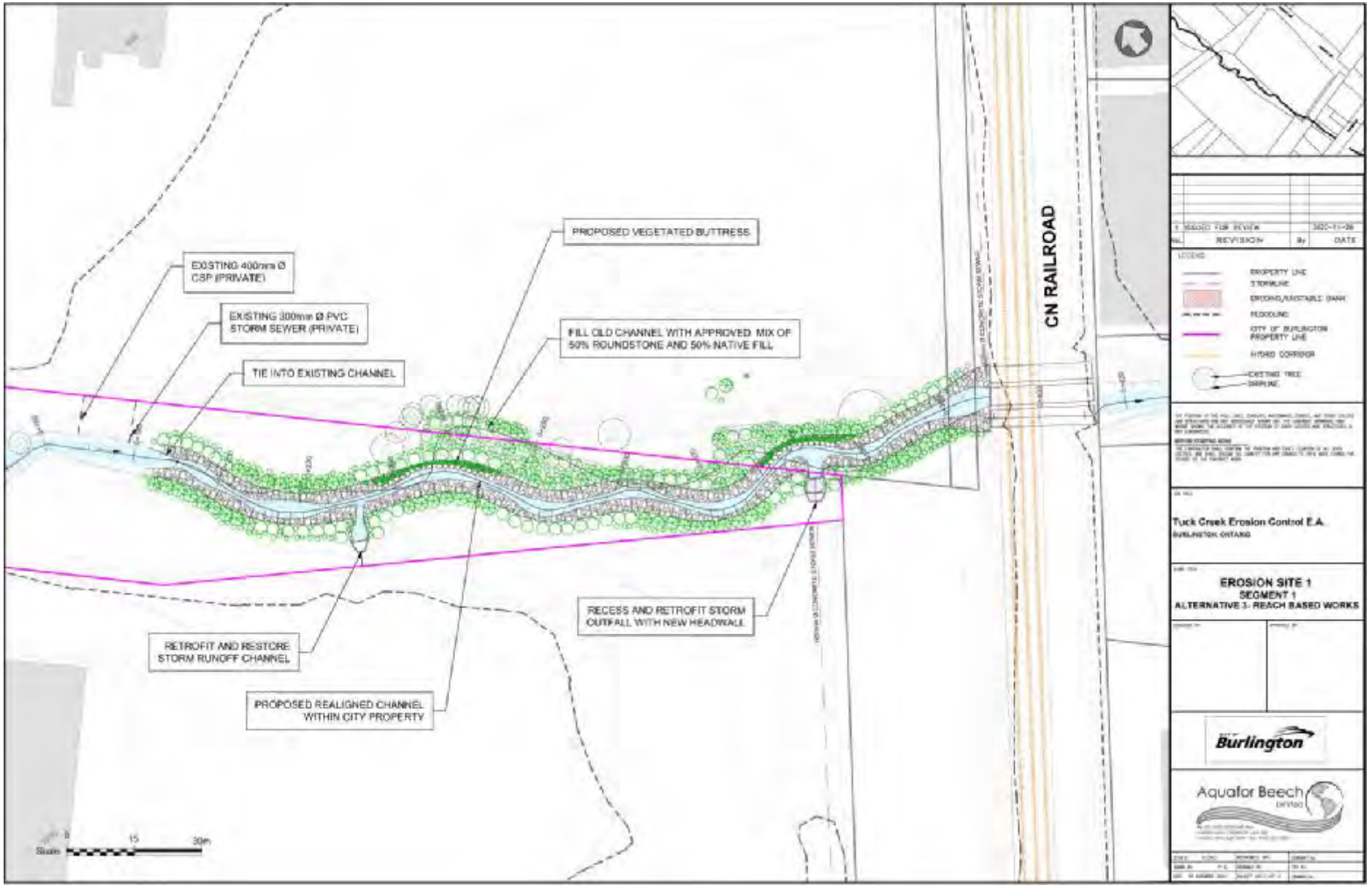
- Active bank erosion
- Deteriorating storm outfall headwall
- Creek encroaching private property

Level of Risk: High

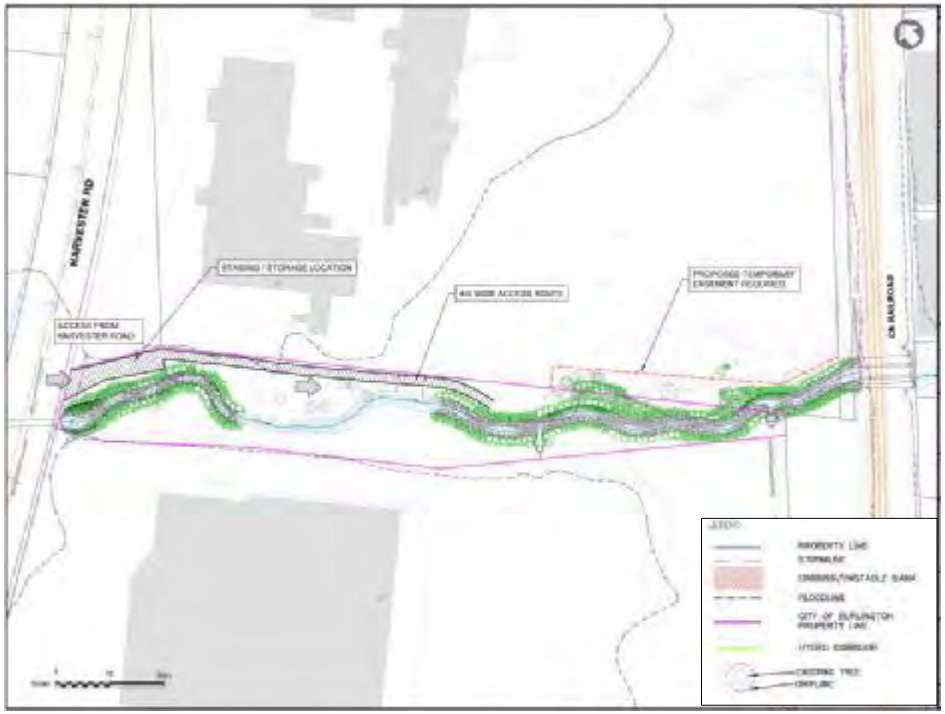
EROSION SITE 1 – LOCAL RESTORATION WORKS



EROSION SITE 1 – REACH SCALE WORKS



EROSION SITE 1 – POTENTIAL PREFERRED ALTERNATIVE





An Example of Natural Channel Design with Riffle-Pool



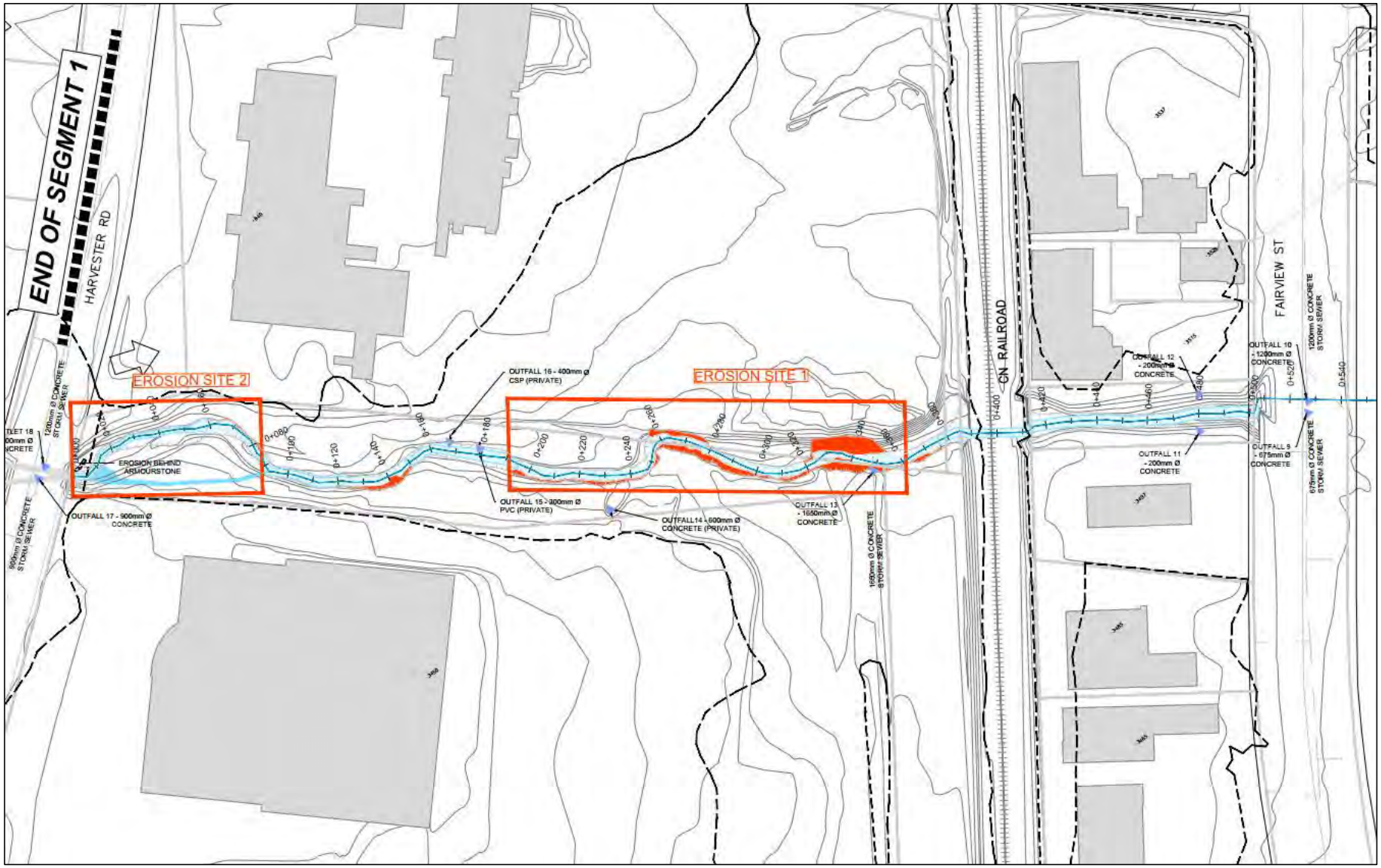
An Example of Natural Channel Design Enhanced with Vegetated Buttress

EVALUATION CRITERIA		Alternative 1 - Do Nothing	Alternative 2 - Local Restoration Works	Alternative 3 - Reach Scale Works
		Score	Score	Score
Physical / Natural Environment Criteria				
Potential to Reduce Stream Bank and Stream Bed Erosion	Greater reduction of erosion risks, slope failures, and loss of public and private properties/parklands	0	4	5
Potential to Improve Aquatic Habitat	Greater improvements to fish and aquatic habitat scores higher, including substrate, overhanging vegetation, turbidity, and passage/connectivity	1	2	4
Potential Impacts to Aquatic Habitat During Construction	Less disruption to fish and aquatic habitat during construction scores higher	4	3	2
Potential to Improve Terrestrial Habitat	Greater improvements to the existing terrestrial condition score higher, including factors such as management/removal of invasive species, creation of new habitat types/features, or increasing the area/functionality of natural corridors	1	2	4
Potential Impacts to Terrestrial Habitat During Construction	Less disruption to the terrestrial habitat during construction scores higher	4	3	2
	Physical / Natural Environment Criteria Subtotal	**10**	**14**	**17**
	Weighted Score for Physical / Natural Environment Criteria (maximum of 25 pts)	**8**	**11**	**14**
Technical and Engineering Criteria				
Ease of Implementation	Less impact to the surrounding infrastructure (e.g., sewers, watermains, gas, roads) during and after constructions scores higher	4	3	3
Flooding Impacts	Greater reduction of flooding risks to public and/or private lands for longer time scores higher	2	2	4
City Acceptance	Greater compliance with existing City plans, policies, and bylaw requirements scores higher	2	3	4
Technical Feasibility	Greater technical feasibility relative to other alternatives scores higher	2	3	5
	Technical and Engineering Criteria Subtotal	**10**	**11**	**16**
	Weighted Score for Technical and Engineering Criteria (maximum of 25 pts)	**15**	**17**	**24**
Social / Cultural Environment Criteria				
Aesthetics / Recreation	Greater improvements to the aesthetics of the creek corridor and how the alternative impacts recreational use of the corridor score higher	2	3	4
Compatibility with Adjacent Land Use	Greater compatibility with the land use of adjacent properties (e.g. softer approach will be preferred in the residential and parklands compared to hard-engineered structure) scores higher	2	4	4
Community Disruption	Less disruption the surrounding community and residents scores higher	4	3	2
Archaeological Impacts	Less disturbance of areas with archaeological potential and cultural heritage resources scores higher	4	3	3
	Social / Cultural Environment Criteria Subtotal	**12**	**13**	**13**
	Weighted Score for Social / Cultural Environment Criteria (maximum of 25 pts)	**12**	**13**	**13**
Economic Environment Criteria				
Construction Costs	Lower construction cost relative to other alternatives scores higher	4	3	2
Operation and Maintenance Costs	Lower operations and maintenance costs relative to other alternatives scores higher	1	3	4
Life Cycle Costs	Lower life cycle costs relative to the other alternatives scores higher	1	3	4
Infrastructure Protection	Greater protection of existing infrastructure for a longer time scores higher	1	4	4
	Economic Criteria Subtotal	**7**	**13**	**14**
	Weighted Score for Economic Criteria (maximum of 25 pts)	**11**	**20**	**21**
Total		46	60	72

Preliminary Preferred Alternative - Reach Scale Works

- Realign channel planform within City Property to protect private property
- Recess and Retrofit Storm Outfall with New Headwall
- Natural channel design to enhance creek riparian while providing protection to aquatic habitats
- Installation of a vegetated buttress to prevent lateral migration
- Preferred alternative requires temporary easement

EROSION SITE 2 – DOWNSTREAM HARVESTER ROAD



EROSION SITE 2 – EXISTING CONDITIONS

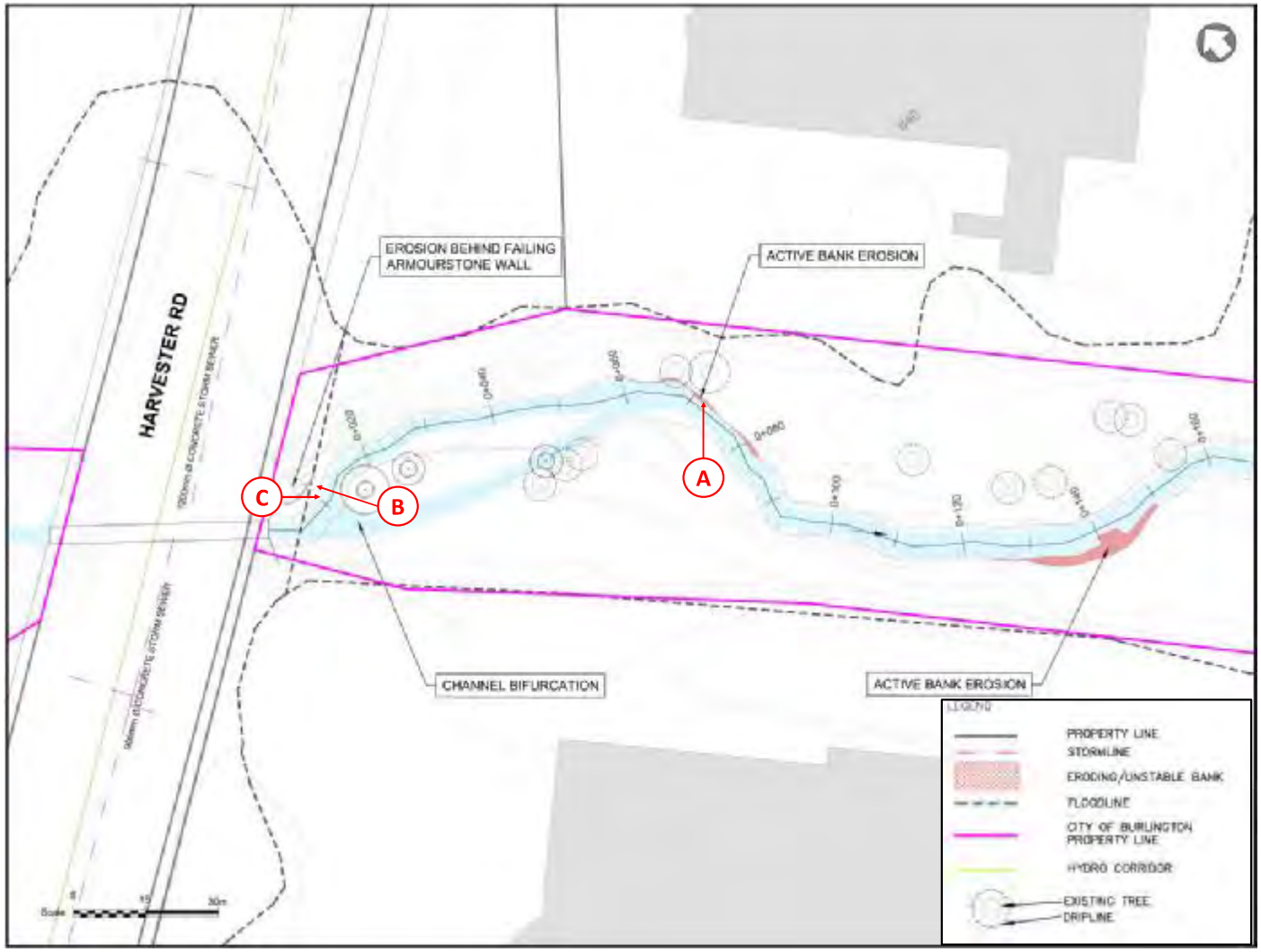



Photo A – Active Bank Erosion along the Eastern Bank


Photo B – Erosion Behind Failing Armourstone Wall

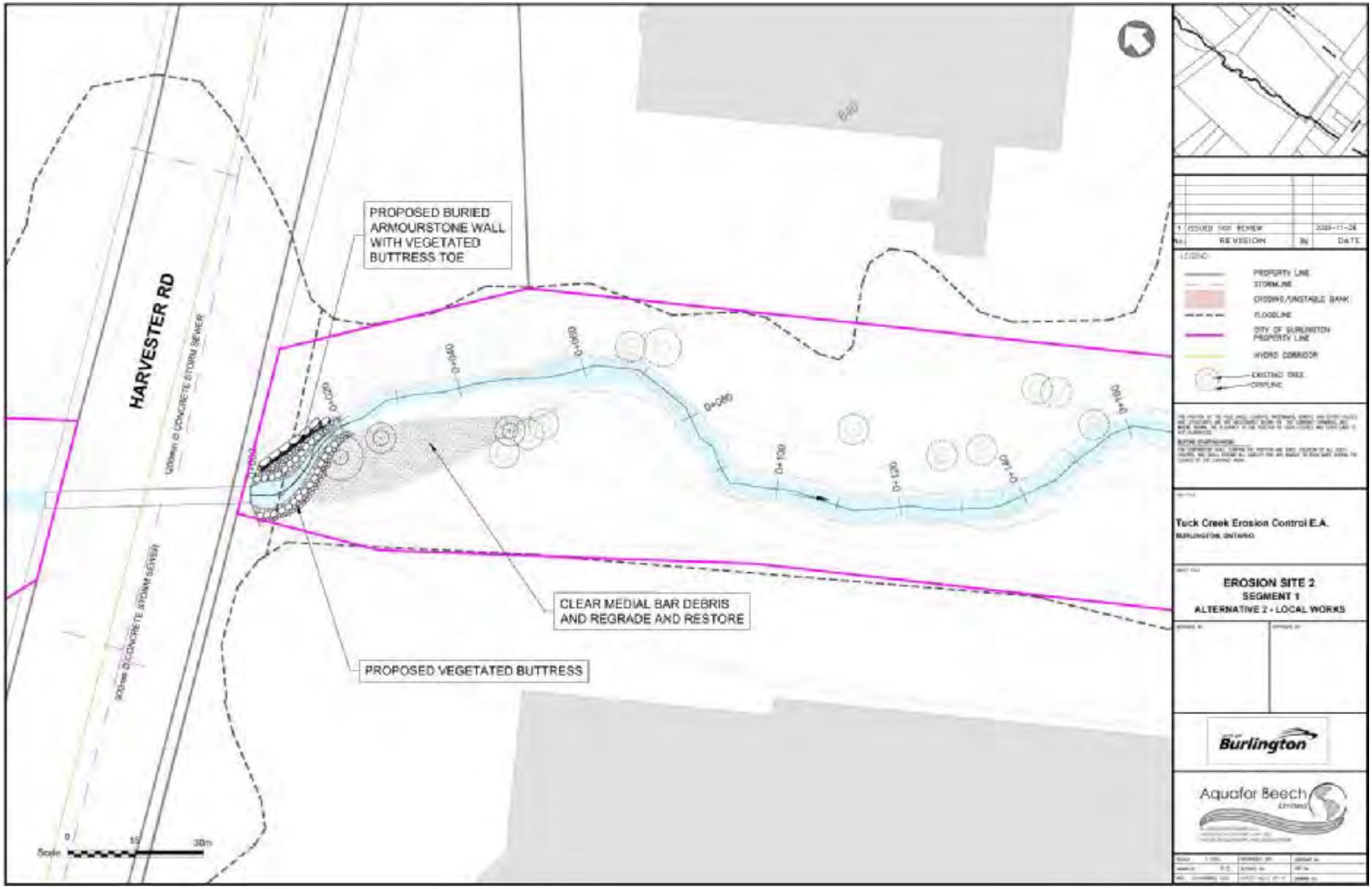

Photo C – Bifurcated Channel and Evidence of Channel Planform Adjustment

Risks to private property, municipal infrastructure and aquatic habitat due to:

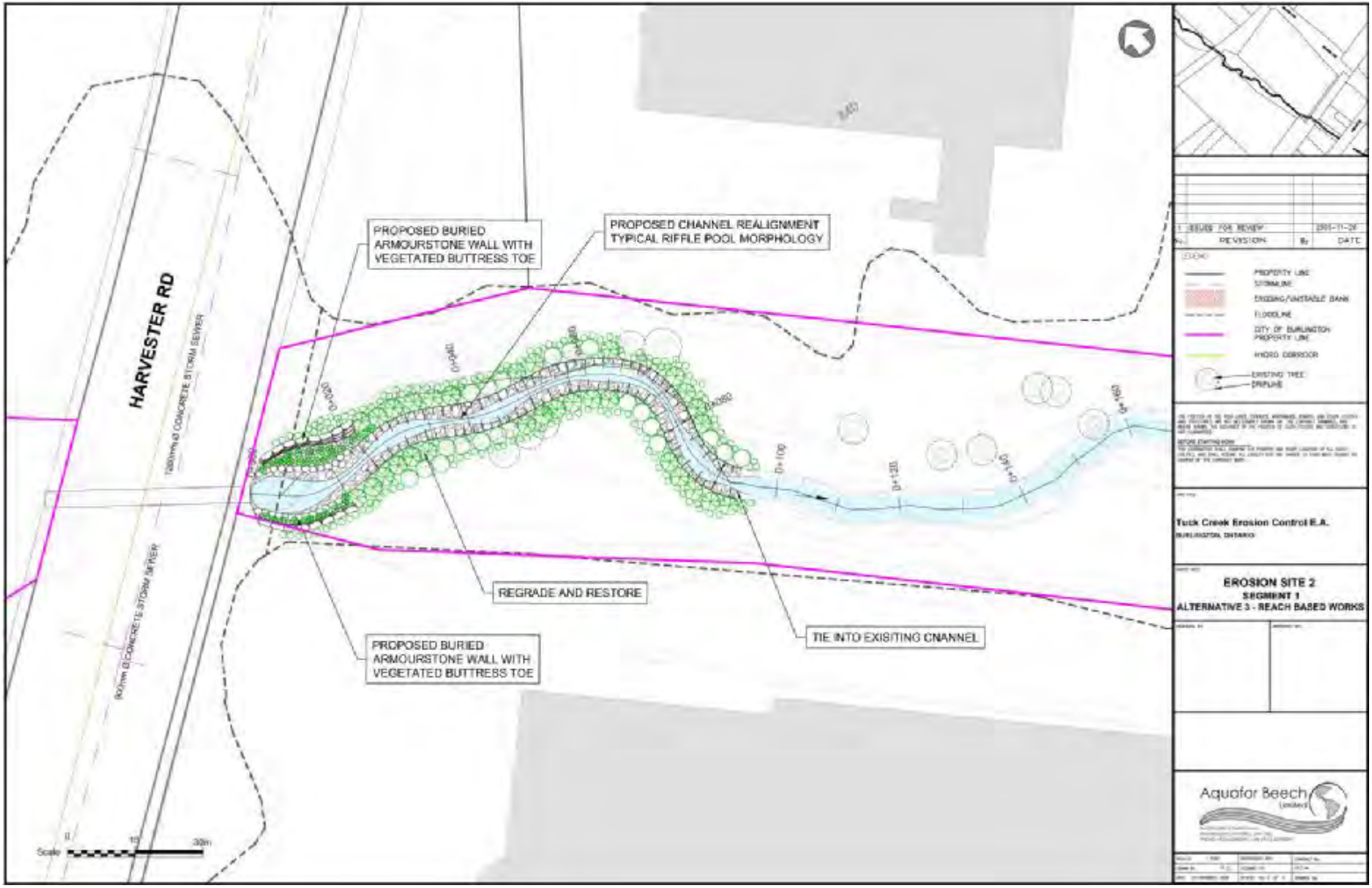
- Active bank erosion
- Erosion behind failing armourstone wall
- Channel bifurcation

Level of Risk: Low

EROSION SITE 2 – LOCAL RESTORATION WORKS



EROSION SITE 2 – REACH SCALE WORKS



EROSION SITE 2 – POTENTIAL PREFERRED ALTERNATIVE





An Example of Natural Channel Design with Riffle-Pool



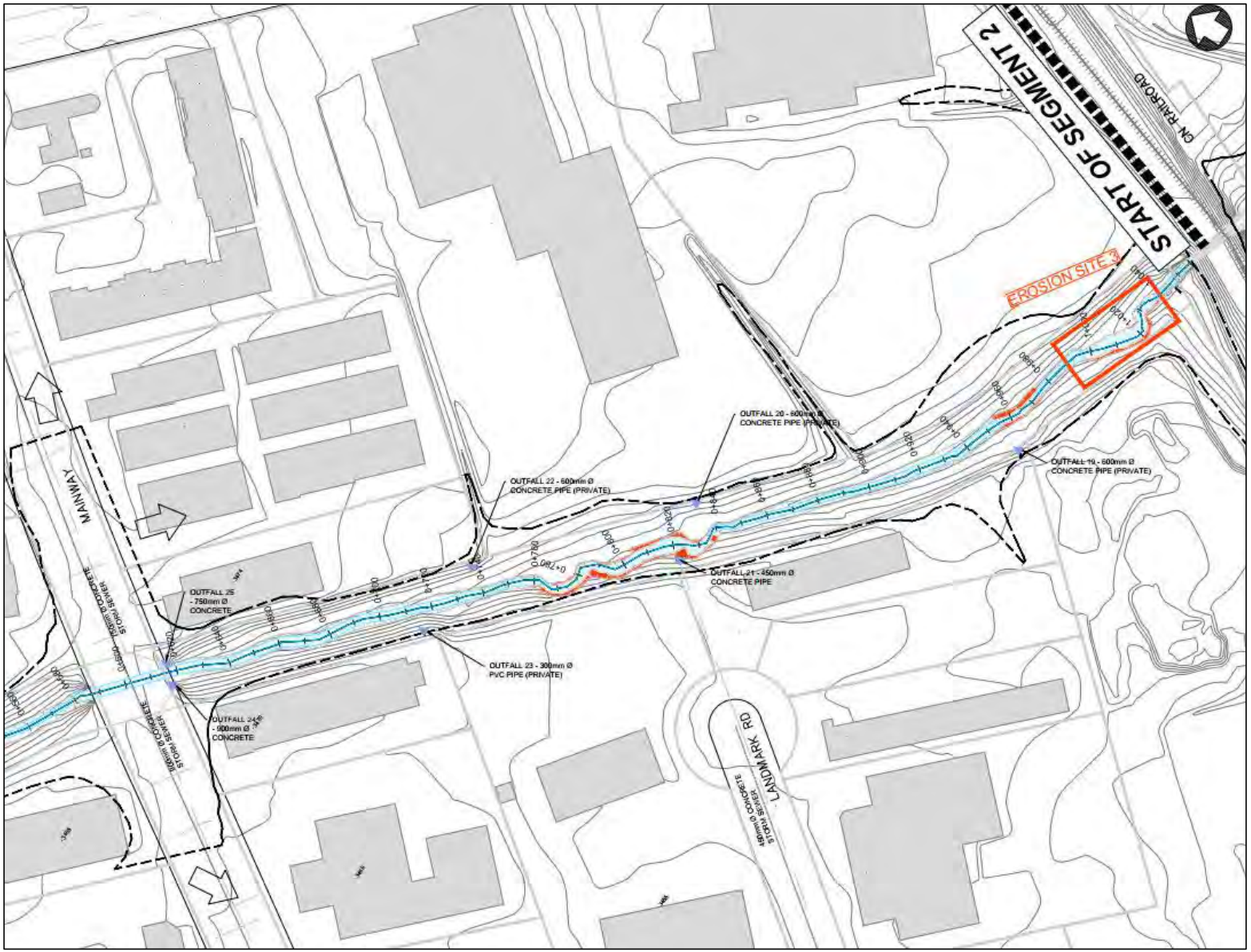
An Example of Natural Channel Design Enhanced with Vegetation Buffer

EVALUATION CRITERIA		Alternative 1 - Do Nothing	Alternative 2 - Local Restoration Works	Alternative 3 - Reach Scale Works
		Score	Score	Score
Physical / Natural Environment Criteria				
Potential to Reduce Stream Bank and Stream Bed Erosion	Greater reduction of erosion risks, slope failures, and loss of public and private properties/parklands	0	2	4
Potential to Improve Aquatic Habitat	Greater improvements to fish and aquatic habitat scores higher, including substrate, overhanging vegetation, turbidity, and passage/connectivity	1	2	4
Potential Impacts to Aquatic Habitat During Construction	Less disruption to fish and aquatic habitat during construction scores higher	5	3	2
Potential to Improve Terrestrial Habitat	Greater improvements to the existing terrestrial condition score higher, including factors such as management/removal of invasive species, creation of new habitat types/features, or increasing the area/functionality of natural corridors	1	3	4
Potential Impacts to Terrestrial Habitat During Construction	Less disruption to the terrestrial habitat during construction scores higher	5	3	3
	Physical / Natural Environment Criteria Subtotal	12	13	17
	Weighted Score for Physical / Natural Environment Criteria (maximum of 25 pts)	10	10	14
Technical and Engineering Criteria				
Ease of Implementation	Less impact to the surrounding infrastructure (e.g., sewers, watermains, gas, roads) during and after constructions scores higher	5	3	3
Flooding Impacts	Greater reduction of flooding risks to public and/or private lands for longer time scores higher	1	2	4
City Acceptance	Greater compliance with existing City plans, policies, and bylaw requirements scores higher	1	3	4
Technical Feasibility	Greater technical feasibility relative to other alternatives scores higher	5	4	3
	Technical and Engineering Criteria Subtotal	12	12	14
	Weighted Score for Technical and Engineering Criteria (maximum of 25 pts)	18	18	21
Social / Cultural Environment Criteria				
Aesthetics / Recreation	Greater improvements to the aesthetics of the creek corridor and how the alternative impacts recreational use of the corridor score higher	1	3	4
Compatibility with Adjacent Land Use	Greater compatibility with the land use of adjacent properties (e.g. softer approach will be preferred in the residential and parklands compared to hard-engineered structure) scores higher	1	3	4
Community Disruption	Less disruption the surrounding community and residents scores higher	5	3	3
Archaeological Impacts	Less disturbance of areas with archaeological potential and cultural heritage resources scores higher	5	3	2
	Social / Cultural Environment Criteria Subtotal	12	12	13
	Weighted Score for Social / Cultural Environment Criteria (maximum of 25 pts)	12	12	13
Economic Environment Criteria				
Construction Costs	Lower construction cost relative to other alternatives scores higher	5	2	1
Operation and Maintenance Costs	Lower operations and maintenance costs relative to other alternatives scores higher	1	3	4
Life Cycle Costs	Lower life cycle costs relative to the other alternatives scores higher	1	3	4
Infrastructure Protection	Greater protection of existing infrastructure for a longer time scores higher	1	3	4
	Economic Criteria Subtotal	8	11	13
	Weighted Score for Economic Criteria (maximum of 25 pts)	12	17	20
Total		52	57	67

Preliminary Preferred Alternative - Reach Scale Works

- Realign channel planform within City Property to protect private property
- Natural channel design with typical riffle-pool morphology to enhance creek riparian while providing protection to aquatic habitats
- Proposed buried armourstone wall with vegetated buttress to prevent toe erosion
- Regrade and restore banks

EROSION SITE 3 – UPSTREAM OF CN RAILROAD



EROSION SITE 3 – EXISTING CONDITIONS

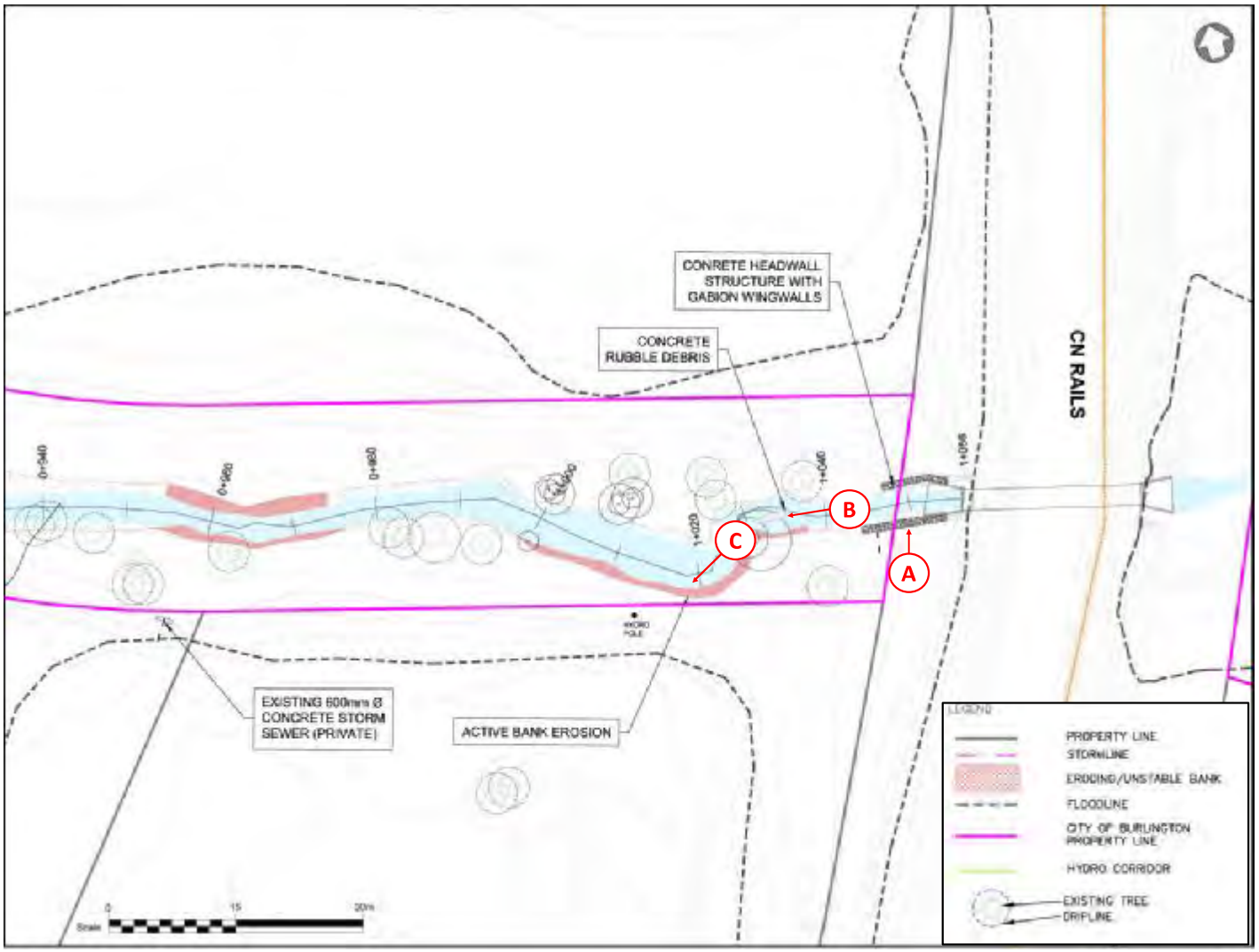



Photo A – Deteriorating Gabion Basket Wingwall and Emptying at Higher Level

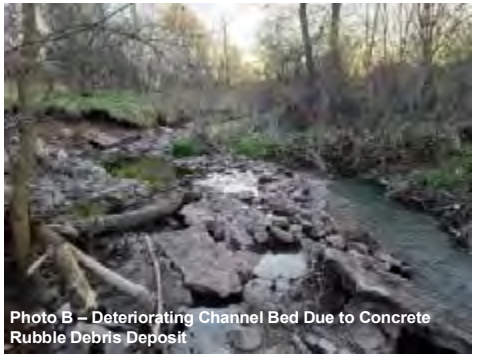

Photo B – Deteriorating Channel Bed Due to Concrete Rubble Debris Deposit

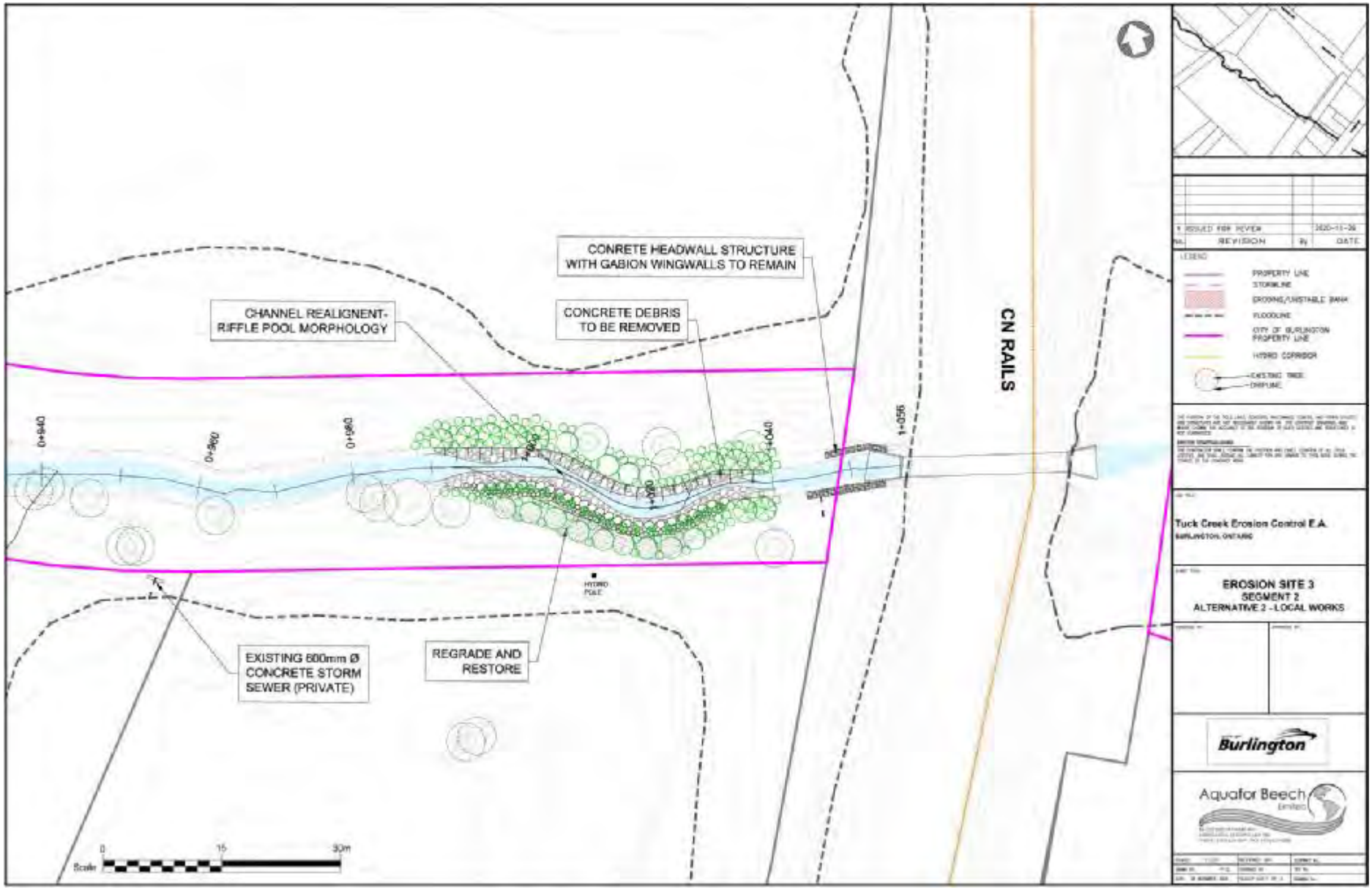

Photo C – Bank Erosion with Evidence of Planform Adjustment posing Hydro Pole at Risk

Risks to private property, municipal infrastructure and aquatic habitat due to:

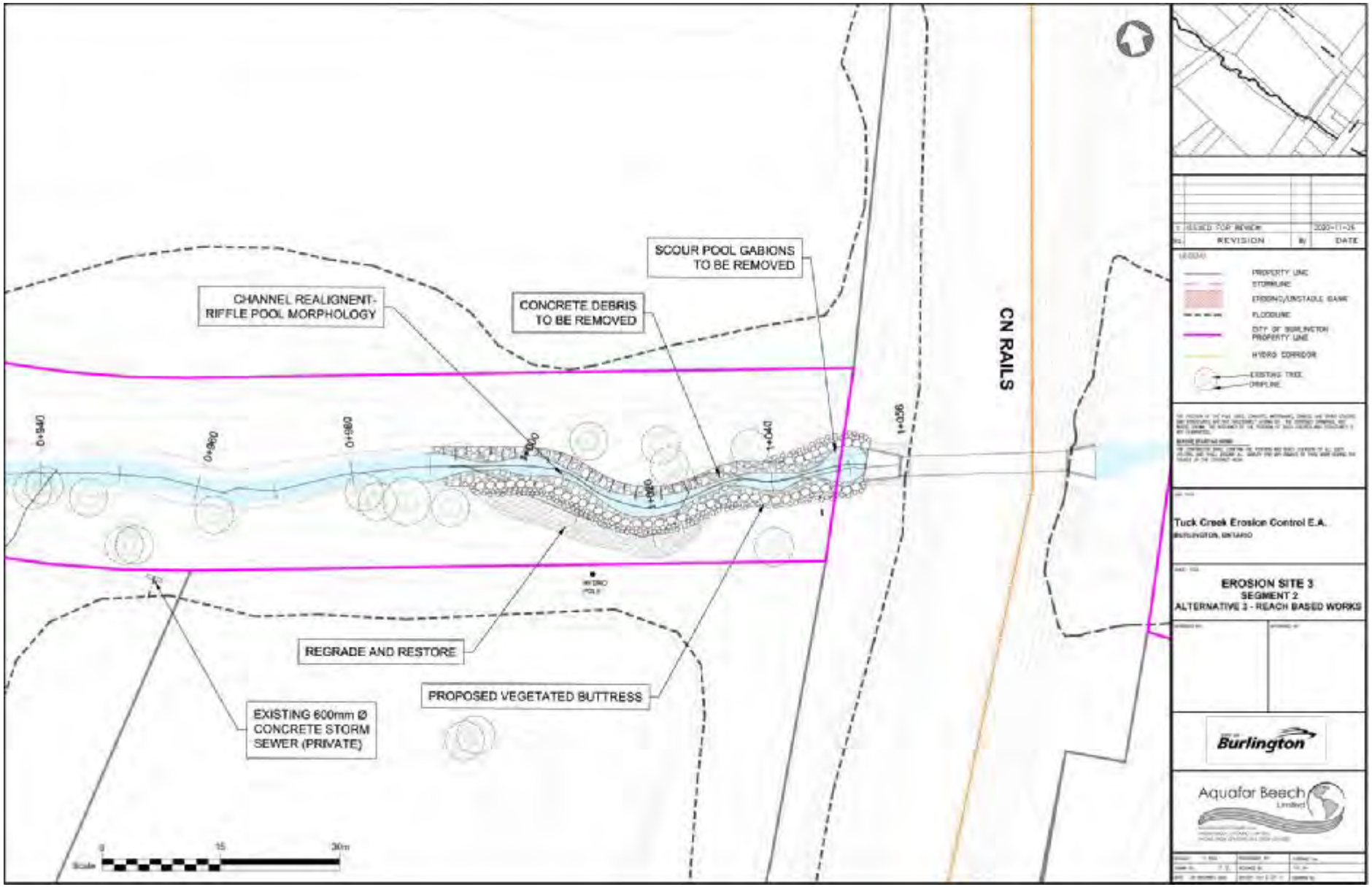
- Active bank erosion
- Deteriorating channel bed due to channel rubble debris deposit

Level of Risk: Medium

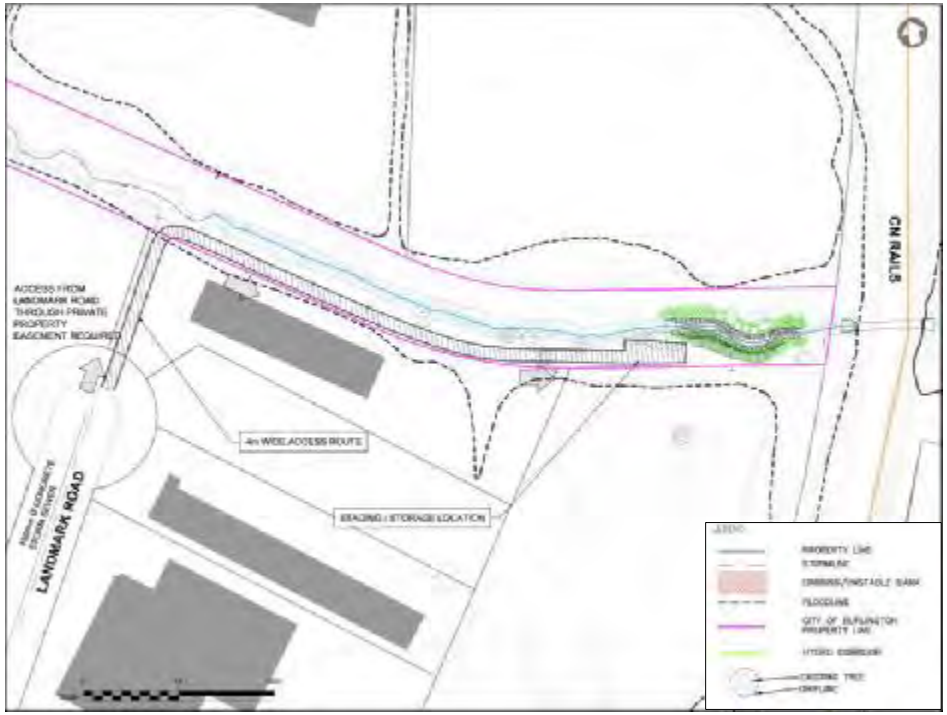
EROSION SITE 3 – LOCAL RESTORATION WORKS



EROSION SITE 3 – REACH SCALE WORKS

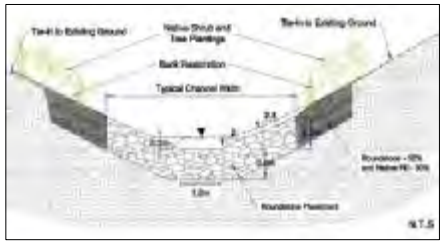


EROSION SITE 3 – POTENTIAL PREFERRED ALTERNATIVE





An Example of Natural Channel Design with Riffle-Pool



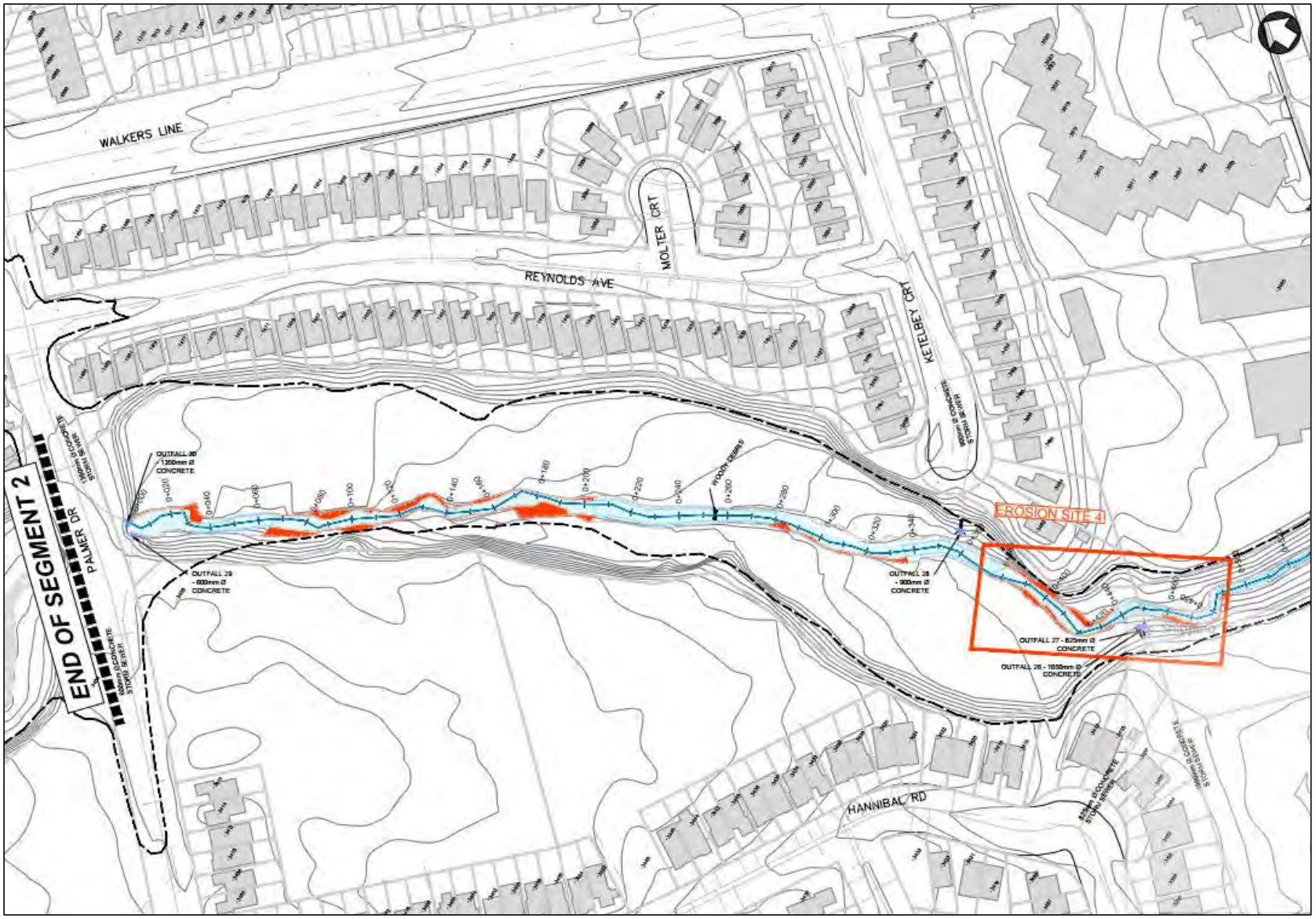
An Example of Typical Roundstone Riffle – Local Gravel Placement

EVALUATION CRITERIA		Alternative 1 - Do Nothing	Alternative 2 - Local Restoration Works	Alternative 3 - Reach Scale Works
		Score	Score	Score
Physical / Natural Environment Criteria				
Potential to Reduce Stream Bank and Stream Bed Erosion	Greater reduction of erosion risks, slope failures, and loss of public and private properties/parklands	1	3	4
Potential to Improve Aquatic Habitat	Greater improvements to fish and aquatic habitat scores higher, including substrate, overhanging vegetation, turbidity, and passage/connectivity	1	3	3
Potential Impacts to Aquatic Habitat During Construction	Less disruption to fish and aquatic habitat during construction scores higher	5	4	3
Potential to Improve Terrestrial Habitat	Greater improvements to the existing terrestrial condition score higher, including factors such as management/removal of invasive species, creation of new habitat types/features, or increasing the area/functionality of natural corridors	1	3	3
Potential Impacts to Terrestrial Habitat During Construction	Less disruption to the terrestrial habitat during construction scores higher	5	3	3
	Physical / Natural Environment Criteria Subtotal	13	16	16
	Weighted Score for Physical / Natural Environment Criteria (maximum of 25 pts)	10	13	13
Technical and Engineering Criteria				
Ease of Implementation	Less impact to the surrounding infrastructure (e.g., sewers, watermains, gas, roads) during and after constructions scores higher	5	3	3
Flooding Impacts	Greater reduction of flooding risks to public and/or private lands for longer time scores higher	2	3	4
City Acceptance	Greater compliance with existing City plans, policies, and bylaw requirements scores higher	1	4	3
Technical Feasibility	Greater technical feasibility relative to other alternatives scores higher	1	4	3
	Technical and Engineering Criteria Subtotal	9	14	13
	Weighted Score for Technical and Engineering Criteria (maximum of 25 pts)	14	21	20
Social / Cultural Environment Criteria				
Aesthetics / Recreation	Greater improvements to the aesthetics of the creek corridor and how the alternative impacts recreational use of the corridor score higher	1	3	3
Compatibility with Adjacent Land Use	Greater compatibility with the land use of adjacent properties (e.g. softer approach will be preferred in the residential and parklands compared to hard-engineered structure) scores higher	2	3	3
Community Disruption	Less disruption the surrounding community and residents scores higher	2	4	3
Archaeological Impacts	Less disturbance of areas with archaeological potential and cultural heritage resources scores higher	4	4	4
	Social / Cultural Environment Criteria Subtotal	9	14	13
	Weighted Score for Social / Cultural Environment Criteria (maximum of 25 pts)	9	14	13
Economic Environment Criteria				
Construction Costs	Lower construction cost relative to other alternatives scores higher	5	4	3
Operation and Maintenance Costs	Lower operations and maintenance costs relative to other alternatives scores higher	1	3	3
Life Cycle Costs	Lower life cycle costs relative to the other alternatives scores higher	1	5	3
Infrastructure Protection	Greater protection of existing infrastructure for a longer time scores higher	1	4	4
	Economic Criteria Subtotal	8	16	13
	Weighted Score for Economic Criteria (maximum of 25 pts)	12	24	20
Total		45	72	65

Preliminary Preferred Alternative - Local Restoration Works

- Minor channel realignment with riffle-pool morphology to enhance creek riparian while providing protection to aquatic habitats
- Removal of concrete debris from channel bed
- Regrade and restore banks

EROSION SITE 4 – LANSDOWN PARK & KETTLEBY ROAD



EROSION SITE 4 – EXISTING CONDITIONS

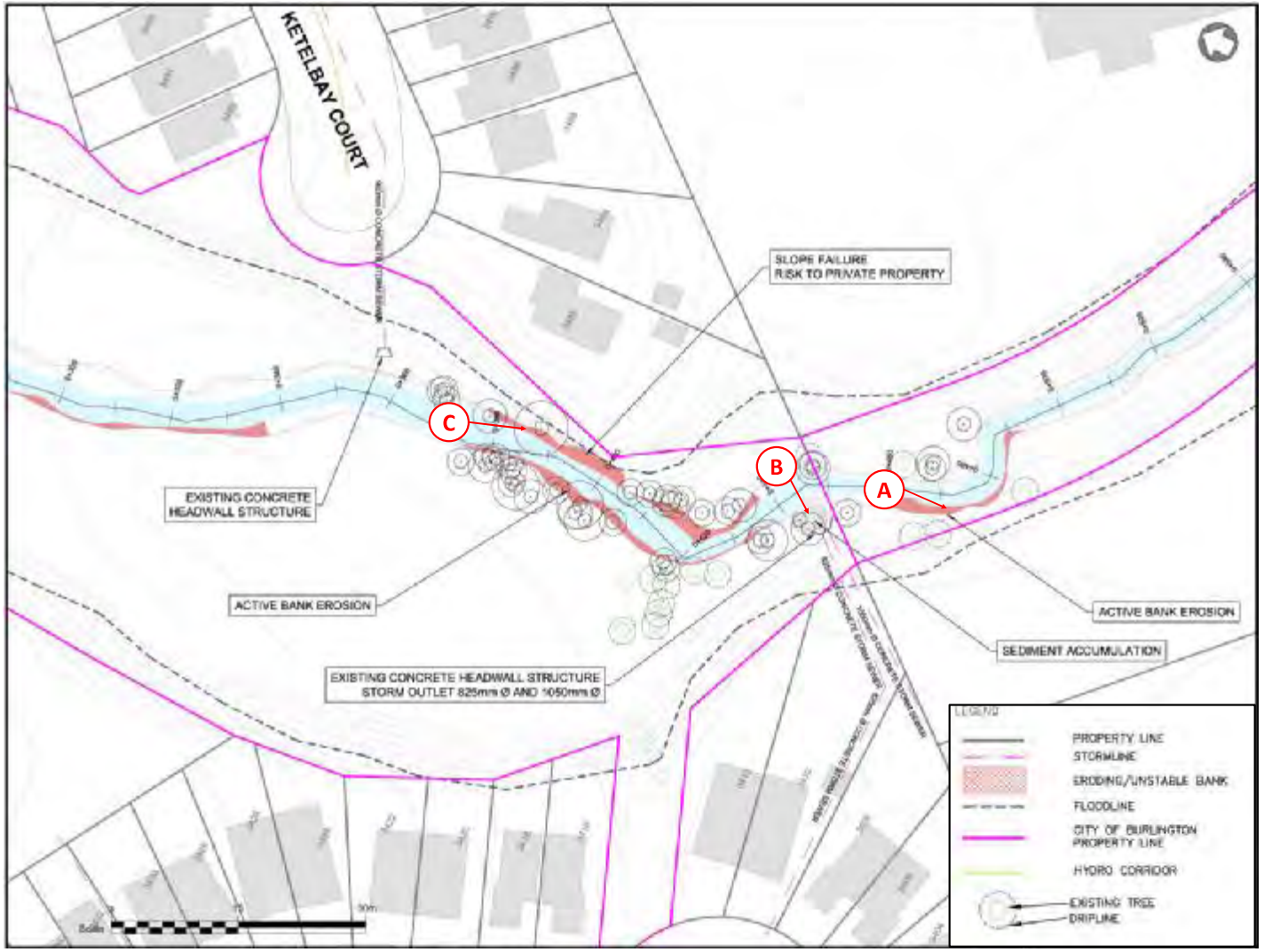



Photo A – Eroded Outer Bank with Near Vertical Slope


Photo B – Accumulated Sediment Infront of Twin Storm Outfall

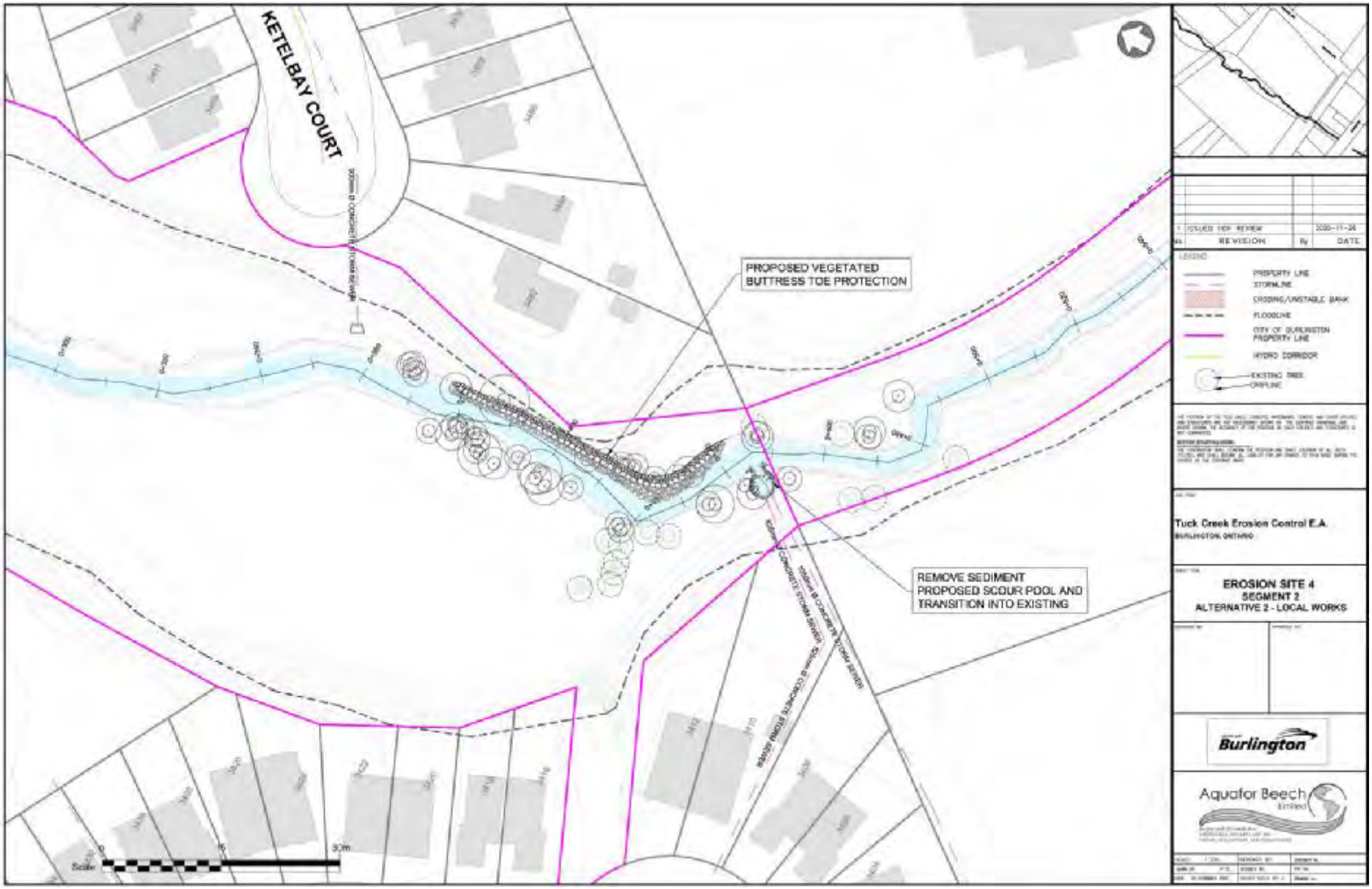

Photo C – Over-steepened Slope Due to Erosion, Adjacent to Private Property, Undermined Trees

Risks to private property, municipal infrastructure and aquatic habitat due to:

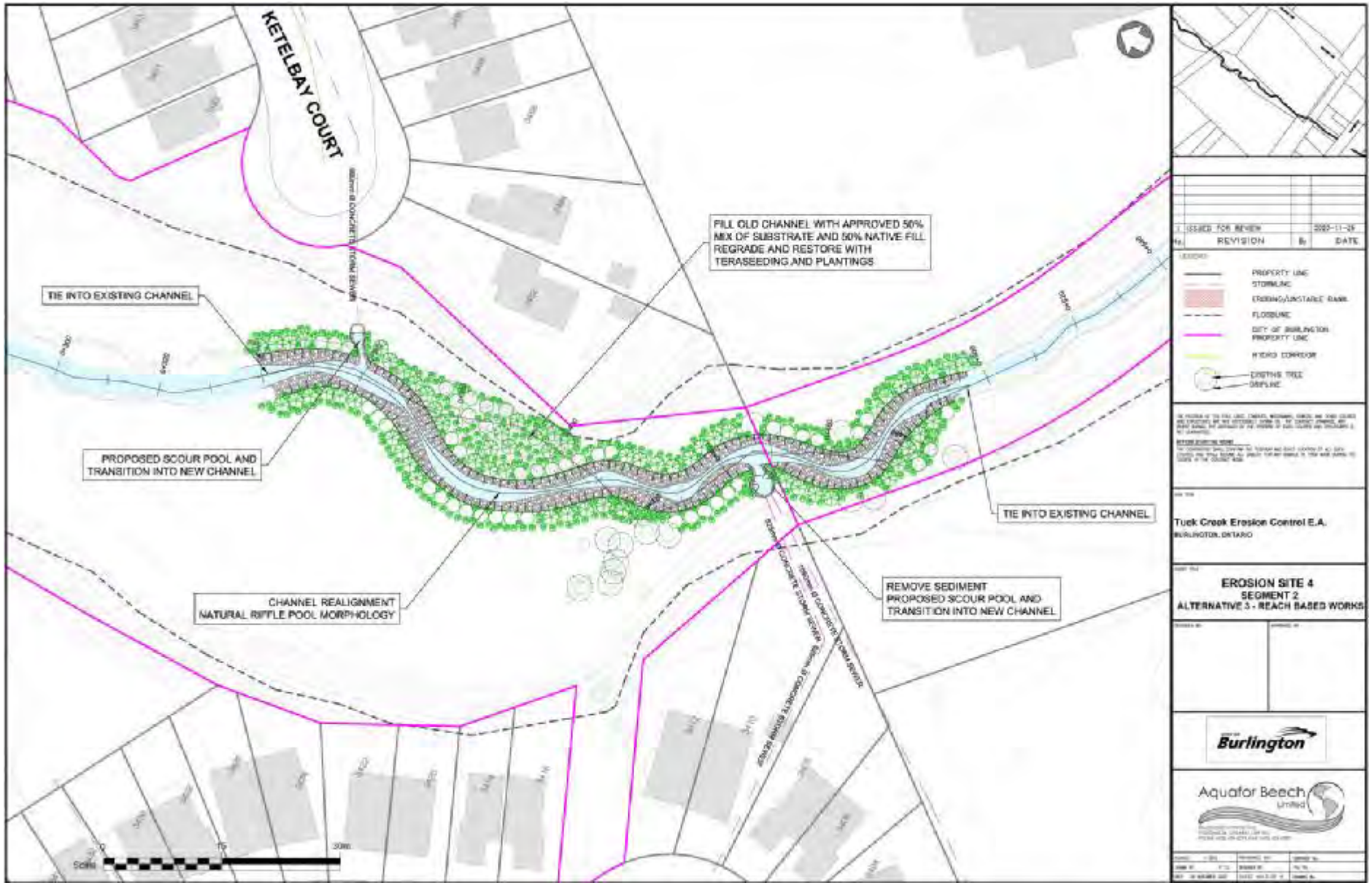
- Active bank erosion, undermined trees, slope failure posing risk to private property adjacent to Kettleby Court properties
- Sediment accumulated in front of storm sewer

Level of Risk: High

EROSION SITE 4 – LOCAL RESTORATION WORKS



EROSION SITE 4 – REACH SCALE WORKS

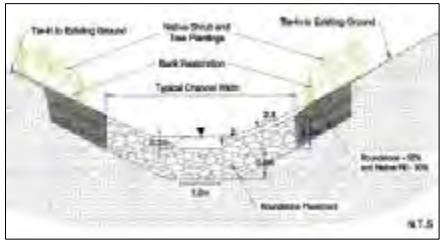


EROSION SITE 4 – POTENTIAL PREFERRED ALTERNATIVE





An Example of Natural Channel Design with Riffle-Pool



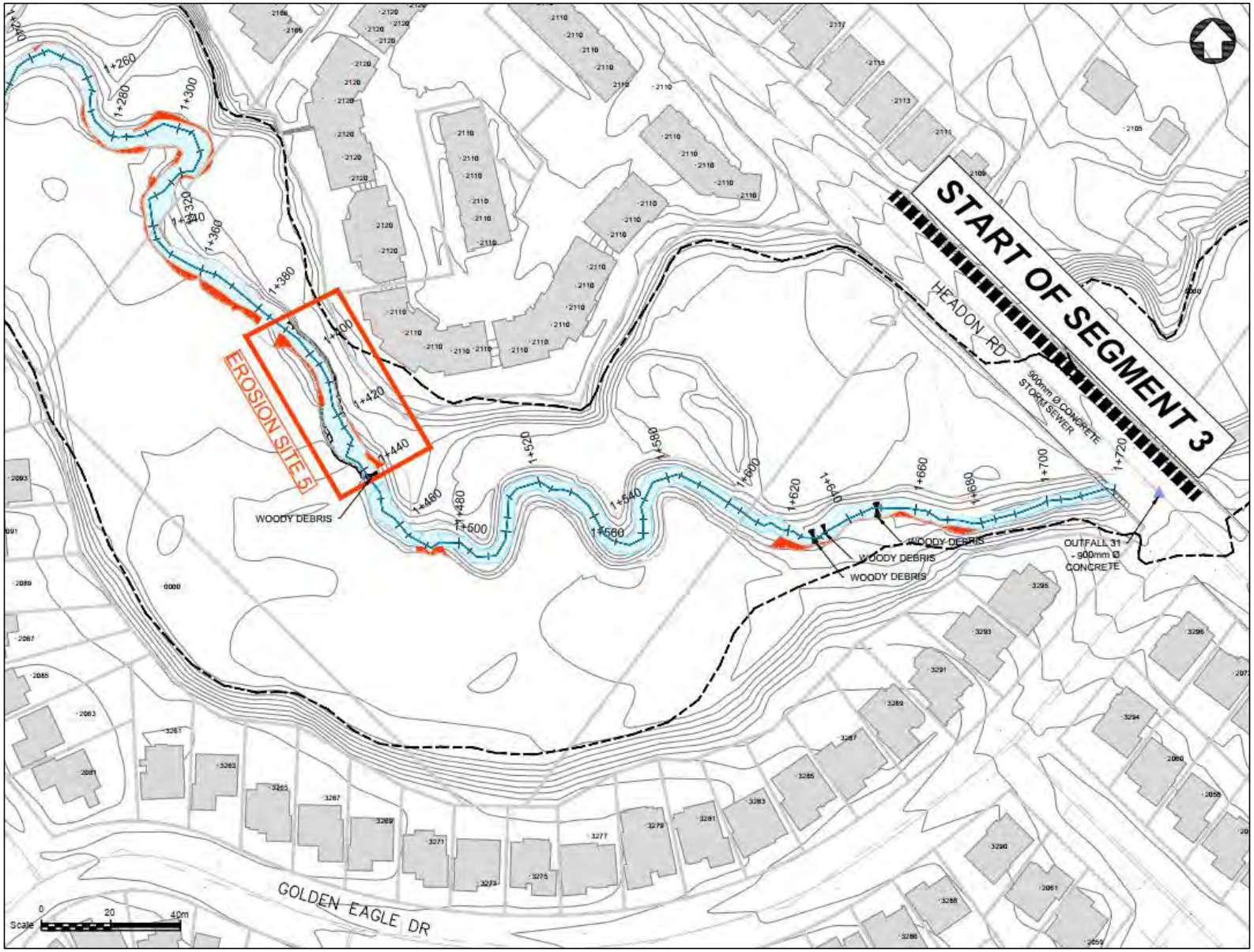
An Example of Typical Roundstone Riffle – Local Gravel Placement

EVALUATION CRITERIA		Alternative 1 - Do Nothing	Alternative 2 - Local Restoration Works	Alternative 3 - Reach Scale Works
		Score	Score	Score
Physical / Natural Environment Criteria				
Potential to Reduce Stream Bank and Stream Bed Erosion	Greater reduction of erosion risks, slope failures, and loss of public and private properties/parklands	1	3	5
Potential to Improve Aquatic Habitat	Greater improvements to fish and aquatic habitat scores higher, including substrate, overhanging vegetation, turbidity, and passage/connectivity	1	3	4
Potential Impacts to Aquatic Habitat During Construction	Less disruption to fish and aquatic habitat during construction scores higher	5	4	2
Potential to Improve Terrestrial Habitat	Greater improvements to the existing terrestrial condition score higher, including factors such as management/removal of invasive species, creation of new habitat types/features, or increasing the area/functionality of natural corridors	1	3	4
Potential Impacts to Terrestrial Habitat During Construction	Less disruption to the terrestrial habitat during construction scores higher	5	3	1
	Physical / Natural Environment Criteria Subtotal	**13**	**16**	**16**
	Weighted Score for Physical / Natural Environment Criteria (maximum of 25 pts)	**10**	**13**	**13**
Technical and Engineering Criteria				
Ease of Implementation	Less impact to the surrounding infrastructure (e.g., sewers, watermains, gas, roads) during and after constructions scores higher	5	4	4
Flooding Impacts	Greater reduction of flooding risks to public and/or private lands for longer time scores higher	2	3	3
City Acceptance	Greater compliance with existing City plans, policies, and bylaw requirements scores higher	1	2	4
Technical Feasibility	Greater technical feasibility relative to other alternatives scores higher	1	3	4
	Technical and Engineering Criteria Subtotal	**9**	**12**	**15**
	Weighted Score for Technical and Engineering Criteria (maximum of 25 pts)	**14**	**18**	**23**
Social / Cultural Environment Criteria				
Aesthetics / Recreation	Greater improvements to the aesthetics of the creek corridor and how the alternative impacts recreational use of the corridor score higher	1	3	4
Compatibility with Adjacent Land Use	Greater compatibility with the land use of adjacent properties (e.g. softer approach will be preferred in the residential and parklands compared to hard-engineered structure) scores higher	1	4	5
Community Disruption	Less disruption the surrounding community and residents scores higher	5	3	2
Archaeological Impacts	Less disturbance of areas with archaeological potential and cultural heritage resources scores higher	5	3	2
	Social / Cultural Environment Criteria Subtotal	**12**	**13**	**13**
	Weighted Score for Social / Cultural Environment Criteria (maximum of 25 pts)	**12**	**13**	**13**
Economic Environment Criteria				
Construction Costs	Lower construction cost relative to other alternatives scores higher	5	3	2
Operation and Maintenance Costs	Lower operations and maintenance costs relative to other alternatives scores higher	1	3	4
Life Cycle Costs	Lower life cycle costs relative to the other alternatives scores higher	2	3	4
Infrastructure Protection	Greater protection of existing infrastructure for a longer time scores higher	1	4	4
	Economic Criteria Subtotal	**9**	**13**	**14**
	Weighted Score for Economic Criteria (maximum of 25 pts)	**14**	**20**	**21**
Total		49	63	69

Preliminary Preferred Alternative – Reach Scale Works

- Realign channel planform with riffle-pool morphology to enhance creek riparian and protect private properties while providing protection to aquatic habitats
- Recess and Retrofit Storm Outfall with New Headwall
- Scour pool for storm sewer outlet and transition into new channel

EROSION SITE 5 – UPSTREAM HEADON ROAD



EROSION SITE 5 – EXISTING CONDITIONS

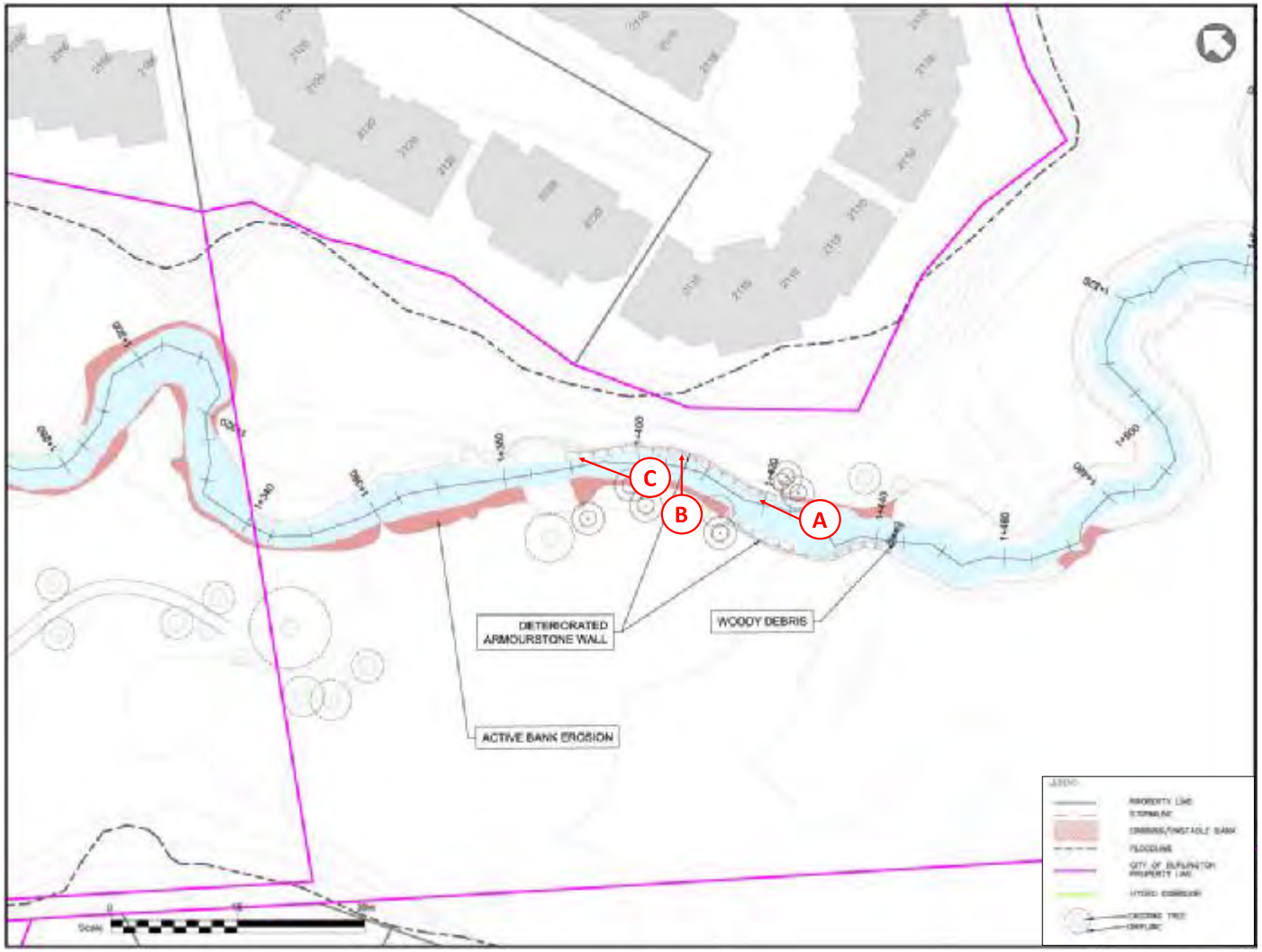



Photo A – Deteriorating Armourstone Wall


Photo B – Installation of Armourstone without Proper Drainage

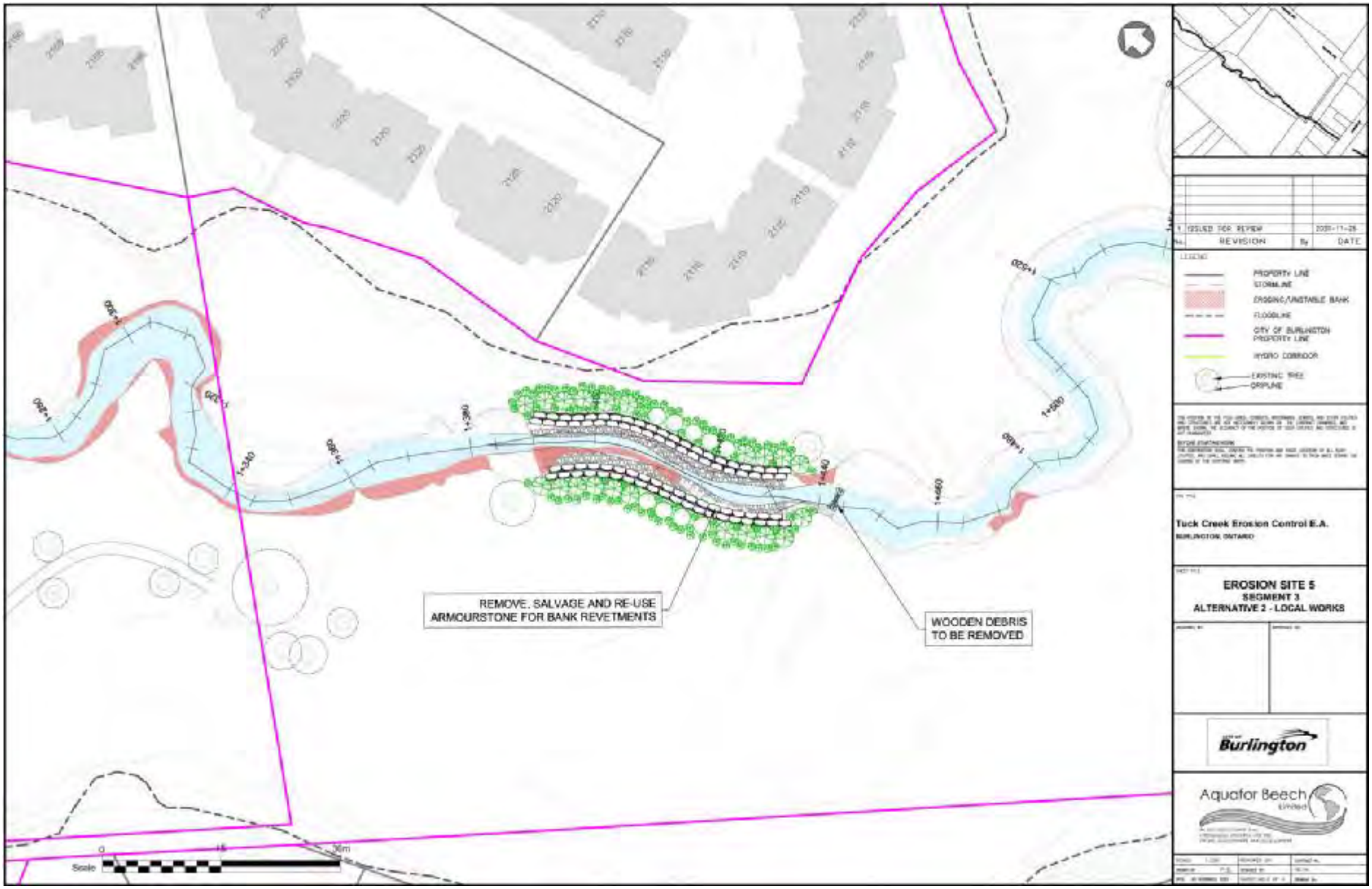

Photo C – Failing Armourstone falling towards the Creek

Risks to private property, municipal infrastructure and aquatic habitat due to:

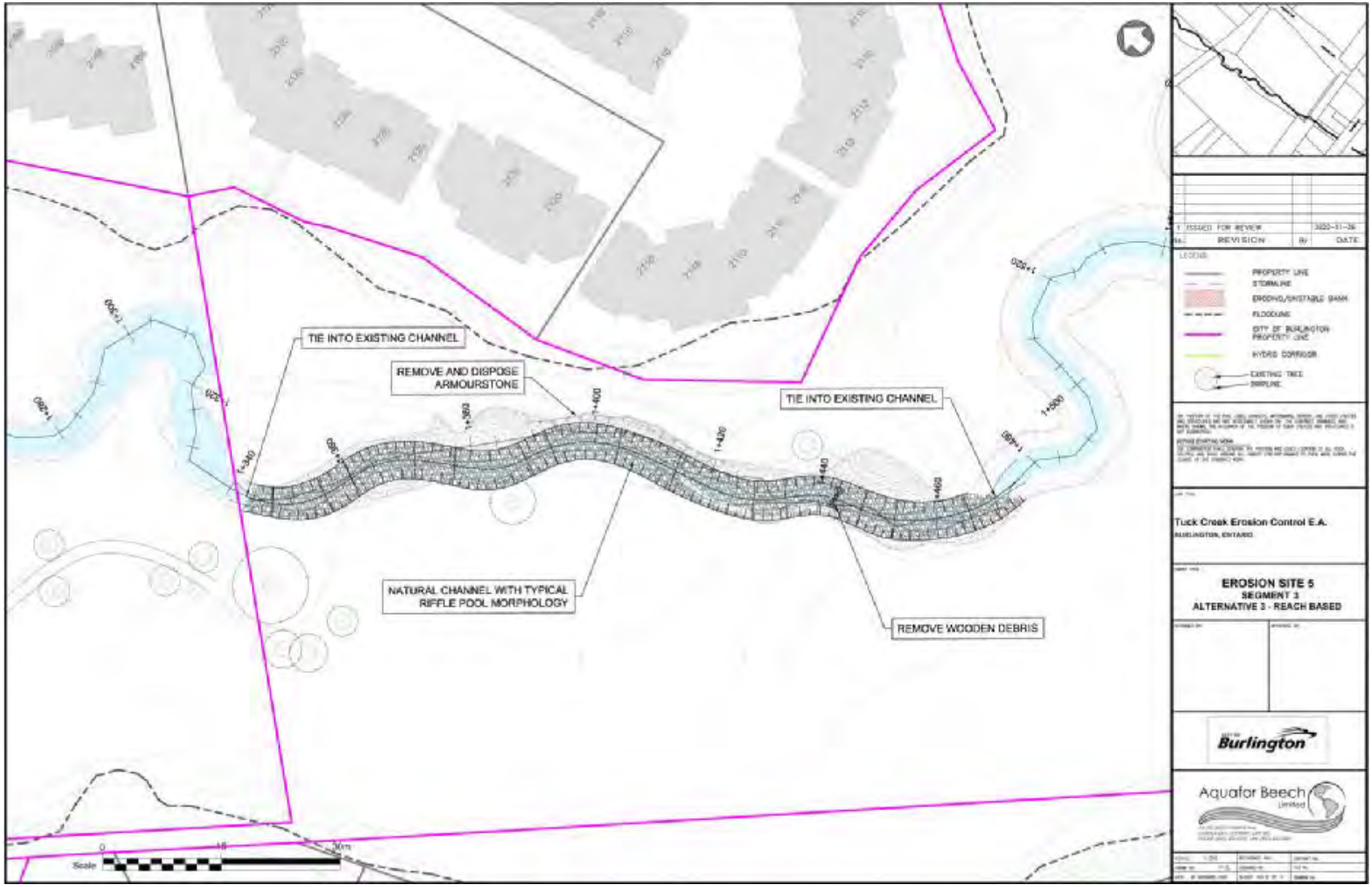
- Active bank erosion
- Woody debris jam in the channel
- Deteriorated armourstone wall

Level of Risk: Low

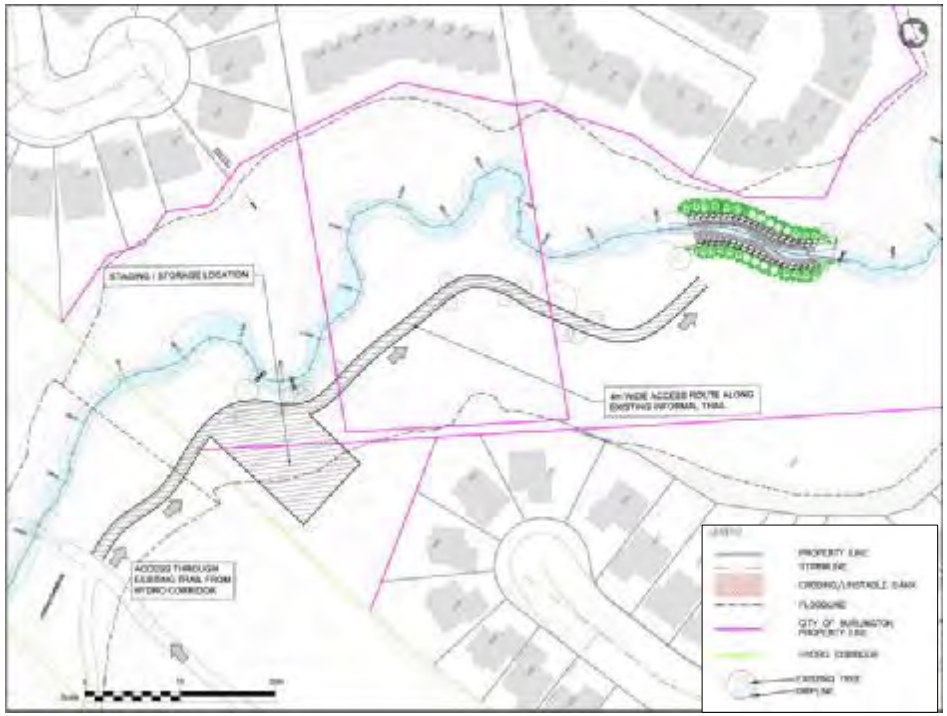
EROSION SITE 5 – LOCAL RESTORATION WORKS



EROSION SITE 5 – REACH SCALE WORKS

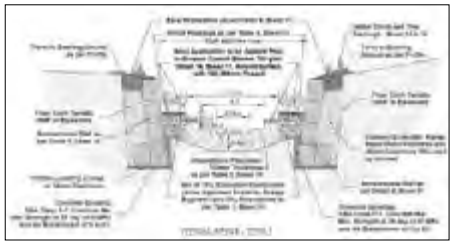


EROSION SITE 5 – POTENTIAL PREFERRED ALTERNATIVE





An Example of Armourstone for Bank Revetments



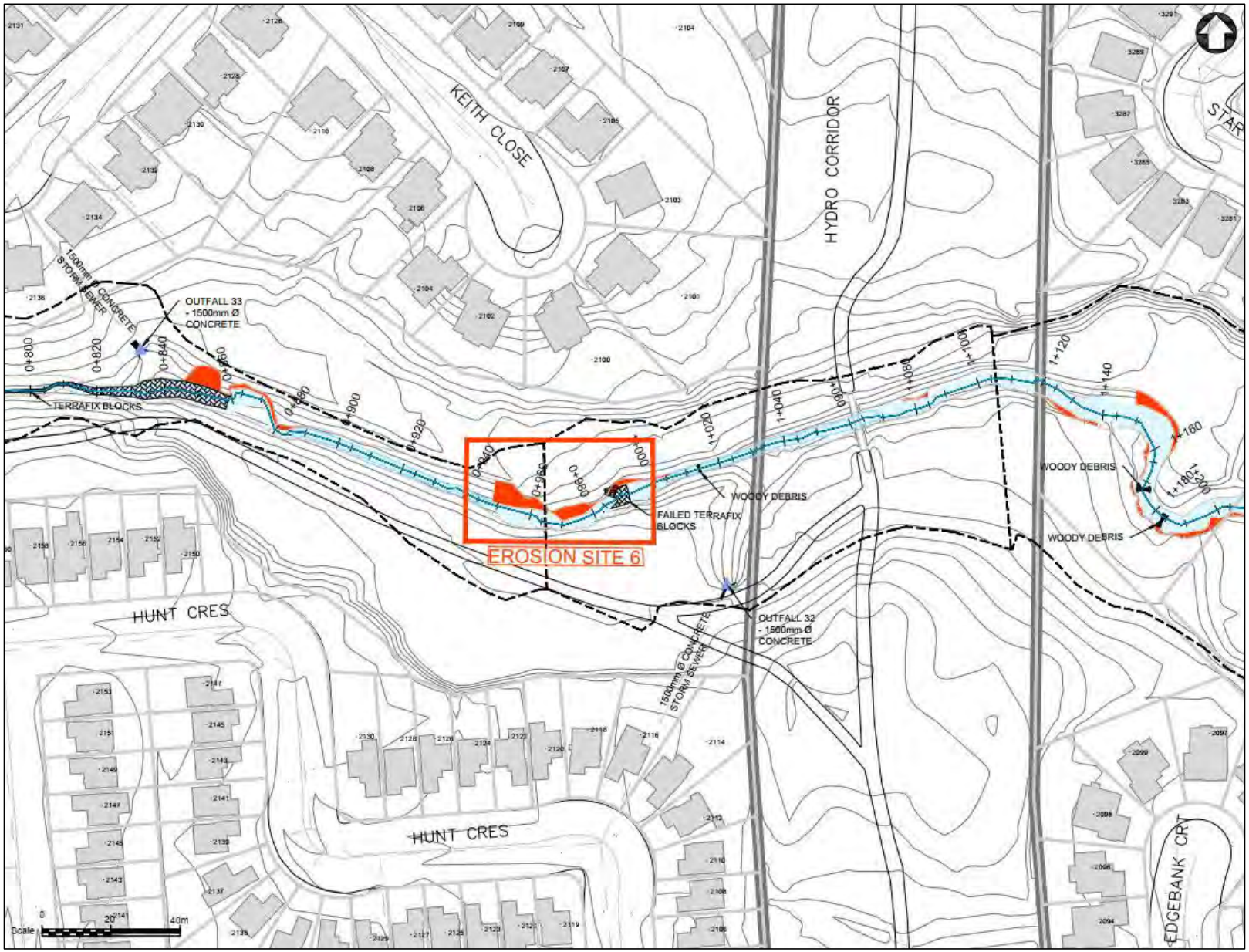
An Example of Armourstone Wall Detail for Bank Revetment

EVALUATION CRITERIA		Alternative 1 - Do Nothing	Alternative 2 - Local Restoration Works	Alternative 3 - Reach Scale Works
		Score	Score	Score
Physical / Natural Environment Criteria				
Potential to Reduce Stream Bank and Stream Bed Erosion	Greater reduction of erosion risks, slope failures, and loss of public and private properties/parklands	1	2	4
Potential to Improve Aquatic Habitat	Greater improvements to fish and aquatic habitat scores higher, including substrate, overhanging vegetation, turbidity, and passage/connectivity	1	4	3
Potential Impacts to Aquatic Habitat During Construction	Less disruption to fish and aquatic habitat during construction scores higher	5	3	1
Potential to Improve Terrestrial Habitat	Greater improvements to the existing terrestrial condition score higher, including factors such as management/removal of invasive species, creation of new habitat types/features, or increasing the area/functionality of natural corridors	1	3	4
Potential Impacts to Terrestrial Habitat During Construction	Less disruption to the terrestrial habitat during construction scores higher	5	2	1
	Physical / Natural Environment Criteria Subtotal	13	14	13
	Weighted Score for Physical / Natural Environment Criteria (maximum of 25 pts)	10	11	10
Technical and Engineering Criteria				
Ease of Implementation	Less impact to the surrounding infrastructure (e.g., sewers, watermains, gas, roads) during and after constructions scores higher	5	4	2
Flooding Impacts	Greater reduction of flooding risks to public and/or private lands for longer time scores higher	2	3	3
City Acceptance	Greater compliance with existing City plans, policies, and bylaw requirements scores higher	1	4	3
Technical Feasibility	Greater technical feasibility relative to other alternatives scores higher	2	4	4
	Technical and Engineering Criteria Subtotal	10	15	12
	Weighted Score for Technical and Engineering Criteria (maximum of 25 pts)	15	23	18
Social / Cultural Environment Criteria				
Aesthetics / Recreation	Greater improvements to the aesthetics of the creek corridor and how the alternative impacts recreational use of the corridor score higher	1	3	5
Compatibility with Adjacent Land Use	Greater compatibility with the land use of adjacent properties (e.g. softer approach will be preferred in the residential and parklands compared to hard-engineered structure) scores higher	1	3	5
Community Disruption	Less disruption the surrounding community and residents scores higher	3	3	1
Archaeological Impacts	Less disturbance of areas with archaeological potential and cultural heritage resources scores higher	5	3	1
	Social / Cultural Environment Criteria Subtotal	10	12	12
	Weighted Score for Social / Cultural Environment Criteria (maximum of 25 pts)	10	12	12
Economic Environment Criteria				
Construction Costs	Lower construction cost relative to other alternatives scores higher	5	3	1
Operation and Maintenance Costs	Lower operations and maintenance costs relative to other alternatives scores higher	1	3	4
Life Cycle Costs	Lower life cycle costs relative to the other alternatives scores higher	1	4	4
Infrastructure Protection	Greater protection of existing infrastructure for a longer time scores higher	1	4	4
	Economic Criteria Subtotal	8	14	13
	Weighted Score for Economic Criteria (maximum of 25 pts)	12	21	20
Total		47	67	60

Preliminary Preferred Alternative – Local Restoration Works

- Remove, salvage, and re-use armourstone for bank revetments
- Removal of woody debris

EROSION SITE 6 – DOWNSTREAM IRELAND PARK



EROSION SITE 6 – EXISTING CONDITIONS

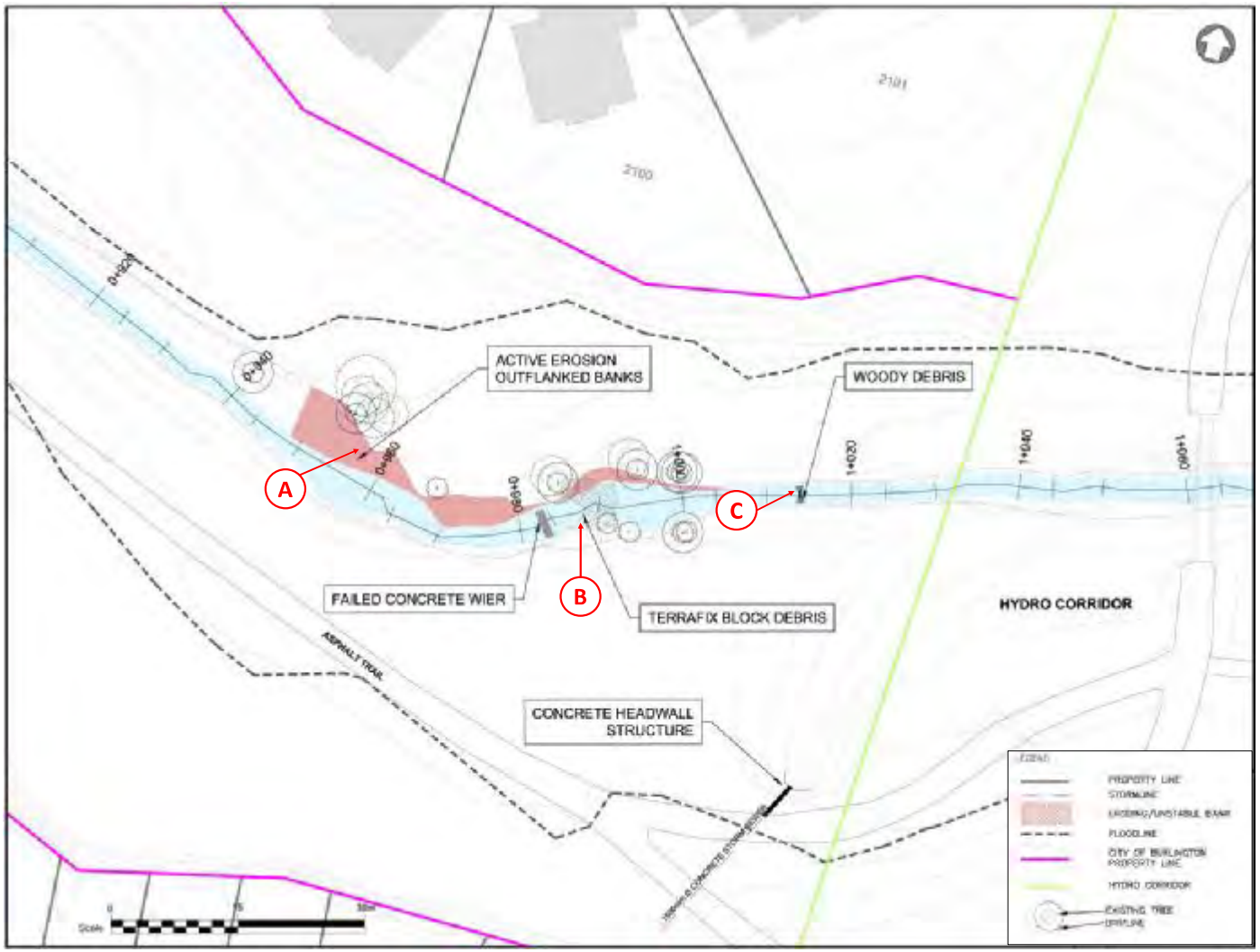



Photo A – Active Erosion and Outflanked Banks with Evidence of Planform Adjustment


Photo B – Failed Terrafix Block & Concrete Weir

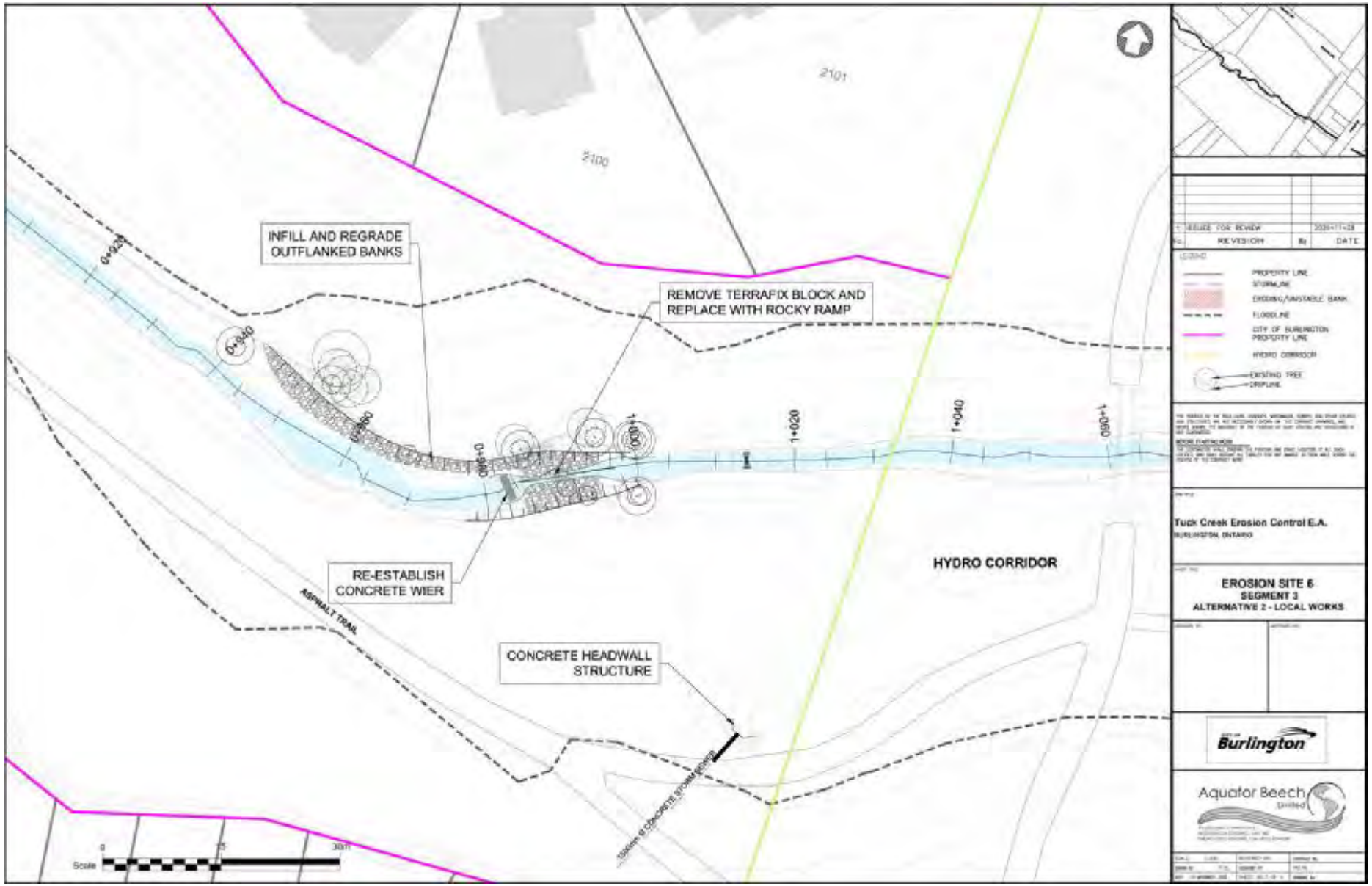

Photo C – Woody Debris Jam in the Channel

Risks to private property, municipal infrastructure and aquatic habitat due to:

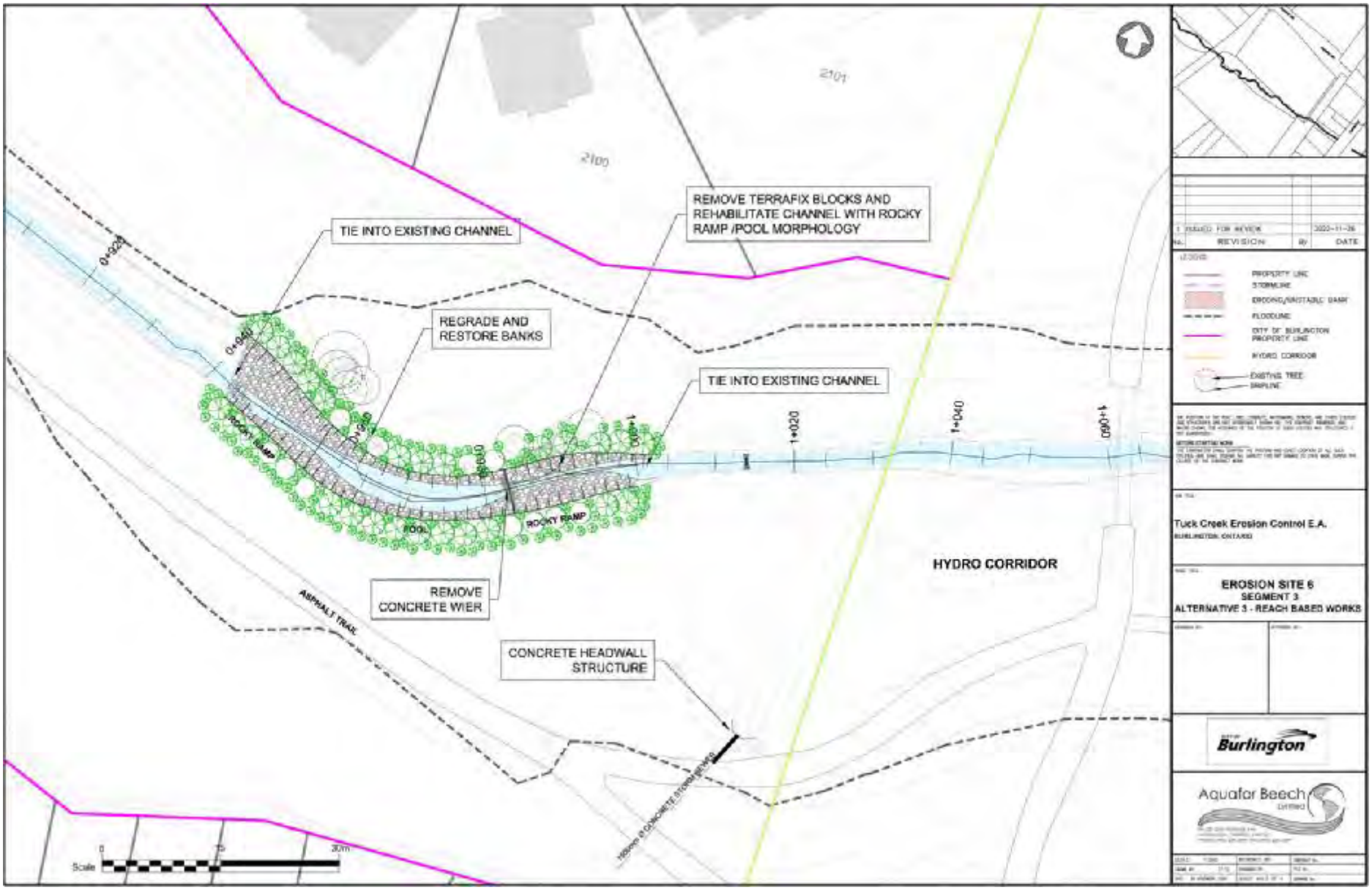
- Active bank erosion and outflanked banks
- Failed concrete weir and terrafix block debris
- Woody debris jam in the channel

Level of Risk: High

EROSION SITE 6 – LOCAL RESTORATION WORKS



EROSION SITE 6 – REACH SCALE WORKS

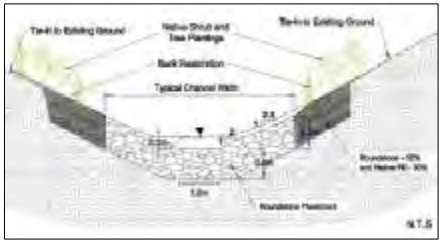


EROSION SITE 6 – POTENTIAL PREFERRED ALTERNATIVE





An Example of Rocky Ramp / Pool Morphology



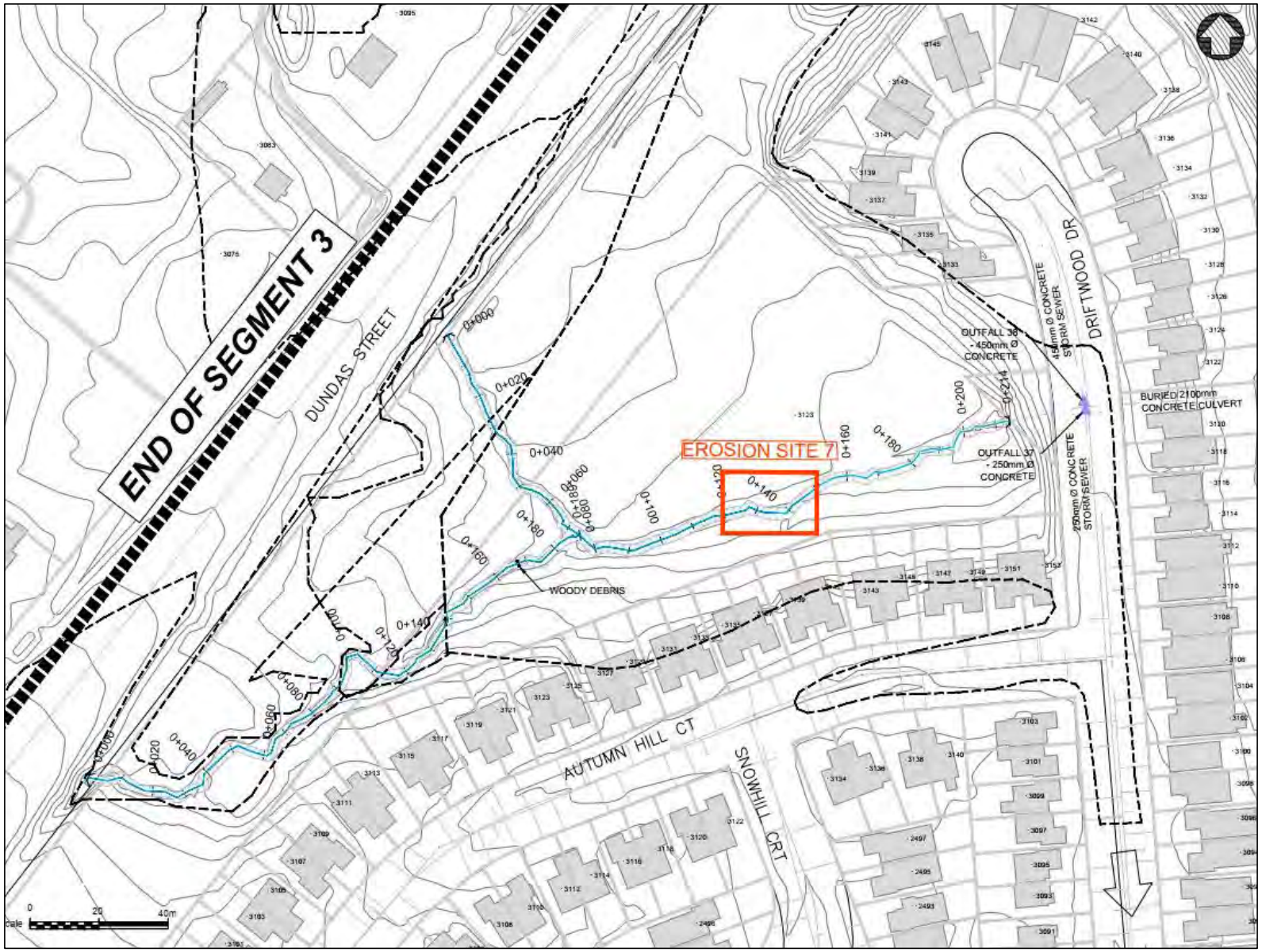
An Example of Typical Roundstone Riffle – Local Gravel Placement

EVALUATION CRITERIA		Alternative 1 - Do Nothing	Alternative 2 - Local Restoration Works	Alternative 3 - Reach Scale Works
		Score	Score	Score
Physical / Natural Environment Criteria				
Potential to Reduce Stream Bank and Stream Bed Erosion	Greater reduction of erosion risks, slope failures, and loss of public and private properties/parklands	1	2	4
Potential to Improve Aquatic Habitat	Greater improvements to fish and aquatic habitat scores higher, including substrate, overhanging vegetation, turbidity, and passage/connectivity	1	2	4
Potential Impacts to Aquatic Habitat During Construction	Less disruption to fish and aquatic habitat during construction scores higher	5	3	1
Potential to Improve Terrestrial Habitat	Greater improvements to the existing terrestrial condition score higher, including factors such as management/removal of invasive species, creation of new habitat types/features, or increasing the area/functionality of natural corridors	1	3	4
Potential Impacts to Terrestrial Habitat During Construction	Less disruption to the terrestrial habitat during construction scores higher	5	3	2
	Physical / Natural Environment Criteria Subtotal	13	13	15
	Weighted Score for Physical / Natural Environment Criteria (maximum of 25 pts)	10	10	12
Technical and Engineering Criteria				
Ease of Implementation	Less impact to the surrounding infrastructure (e.g., sewers, watermains, gas, roads) during and after constructions scores higher	5	3	3
Flooding Impacts	Greater reduction of flooding risks to public and/or private lands for longer time scores higher	2	3	3
City Acceptance	Greater compliance with existing City plans, policies, and bylaw requirements scores higher	1	3	4
Technical Feasibility	Greater technical feasibility relative to other alternatives scores higher	2	3	4
	Technical and Engineering Criteria Subtotal	10	12	14
	Weighted Score for Technical and Engineering Criteria (maximum of 25 pts)	15	18	21
Social / Cultural Environment Criteria				
Aesthetics / Recreation	Greater improvements to the aesthetics of the creek corridor and how the alternative impacts recreational use of the corridor score higher	1	3	5
Compatibility with Adjacent Land Use	Greater compatibility with the land use of adjacent properties (e.g. softer approach will be preferred in the residential and parklands compared to hard-engineered structure) scores higher	0	2	5
Community Disruption	Less disruption the surrounding community and residents scores higher	2	3	2
Archaeological Impacts	Less disturbance of areas with archaeological potential and cultural heritage resources scores higher	5	3	2
	Social / Cultural Environment Criteria Subtotal	8	11	14
	Weighted Score for Social / Cultural Environment Criteria (maximum of 25 pts)	8	11	14
Economic Environment Criteria				
Construction Costs	Lower construction cost relative to other alternatives scores higher	5	3	2
Operation and Maintenance Costs	Lower operations and maintenance costs relative to other alternatives scores higher	1	4	5
Life Cycle Costs	Lower life cycle costs relative to the other alternatives scores higher	1	3	4
Infrastructure Protection	Greater protection of existing infrastructure for a longer time scores higher	1	4	5
	Economic Criteria Subtotal	8	14	16
	Weighted Score for Economic Criteria (maximum of 25 pts)	12	21	24
Total		45	60	71

Preliminary Preferred Alternative – Reach Scale Works

- Removal of concrete weir and terrafix blocks
- Rehabilitate channel bed with rocky ramp / pool morphology
- Regrade and restore banks

EROSION SITE 7 – DRIFTWOOD PARK



EROSION SITE 7 – EXISTING CONDITIONS

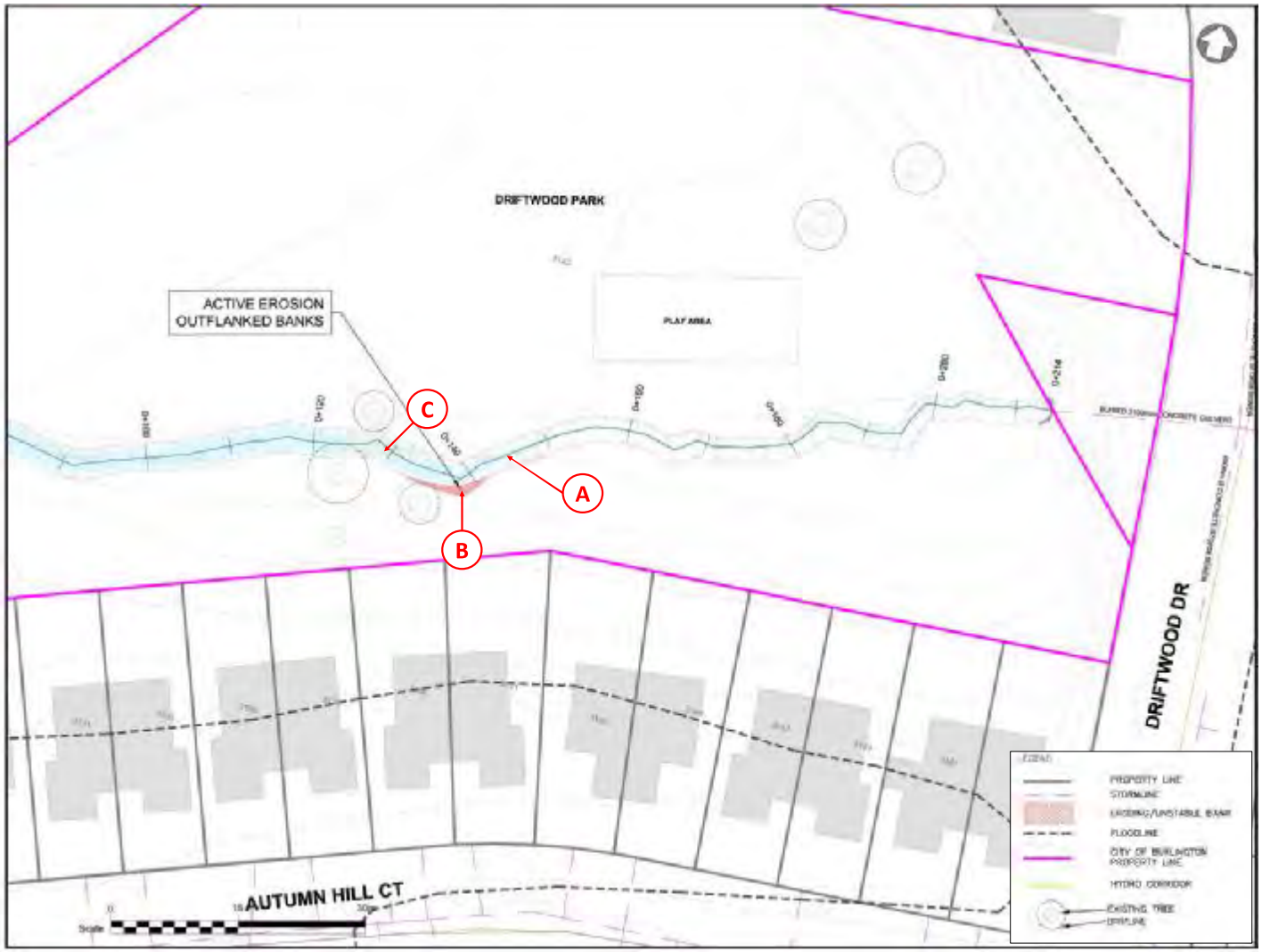



Photo A – Downstream of the Erosion Site


Photo B – Active Bank Erosion and Outflanked Banks with Evidence of Planform Adjustment

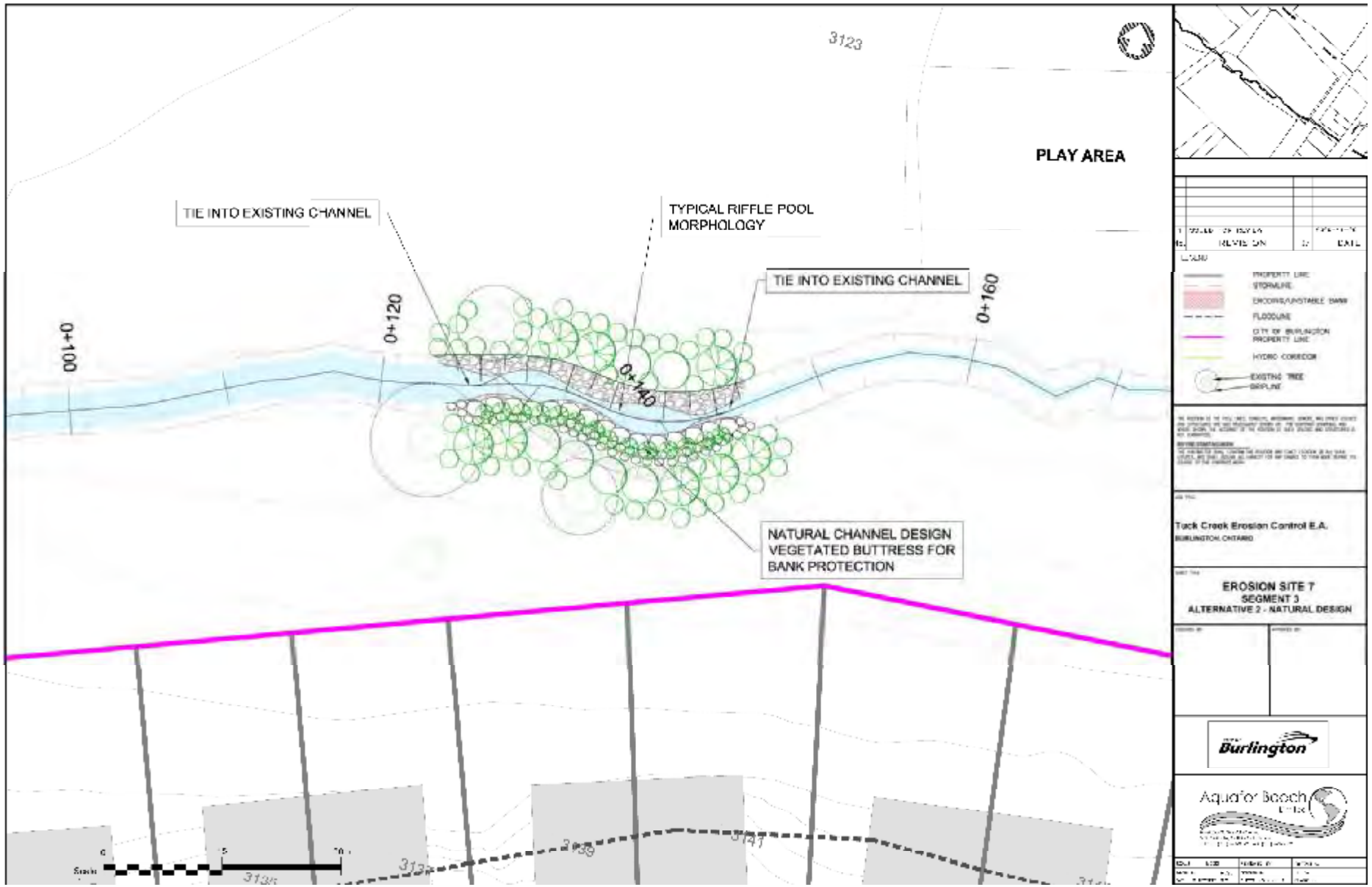

Photo C – Upstream of the Erosion Site

Risks to private property, municipal infrastructure and aquatic habitat due to:

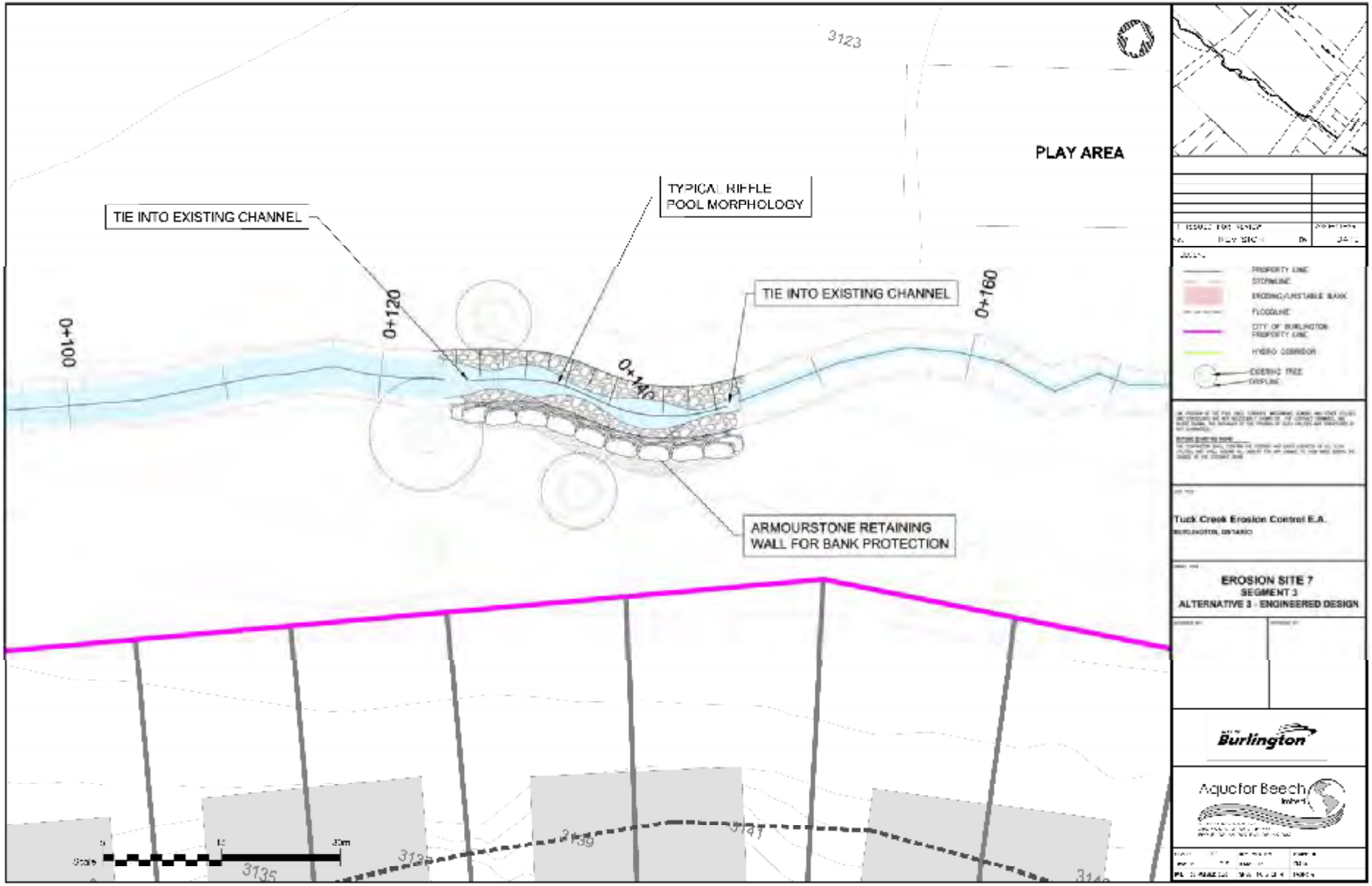
- Active bank erosion and outflanked banks
- Creek encroaching private property

Level of Risk: Medium

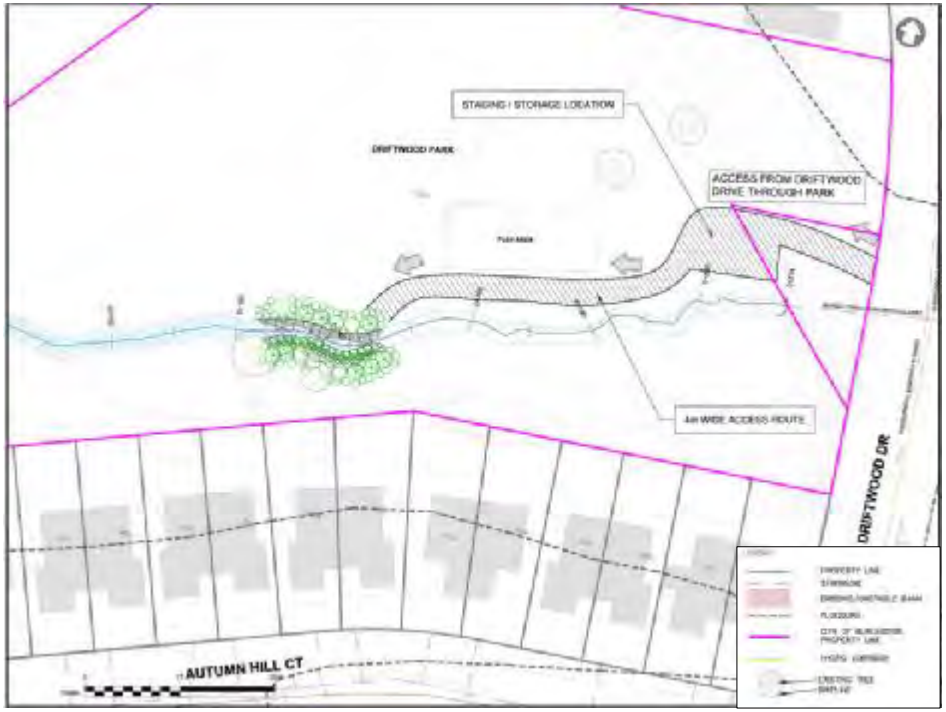
EROSION SITE 7 – NATURAL DESIGN



EROSION SITE 7 – ENGINEERED DESIGN

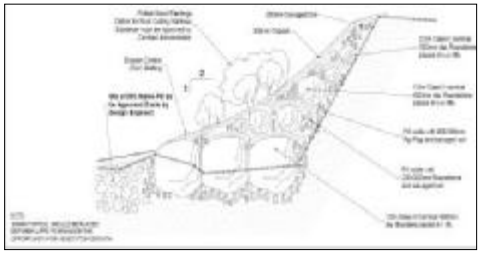


EROSION SITE 7 – POTENTIAL PREFERRED ALTERNATIVE





An Example of Natural Channel Design Enhanced with Vegetated Buttress



An Example of Vegetated Buttress Detail

EVALUATION CRITERIA		Alternative 1 - Do Nothing	Alternative 2 - Natural Design	Alternative 3 - Engineered Works
		Score	Score	Score
Physical / Natural Environment Criteria				
Potential to Reduce Stream Bank and Stream Bed Erosion	Greater reduction of erosion risks, slope failures, and loss of public and private properties/parklands	1	4	4
Potential to Improve Aquatic Habitat	Greater improvements to fish and aquatic habitat scores higher, including substrate, overhanging vegetation, turbidity, and passage/connectivity	1	4	3
Potential Impacts to Aquatic Habitat During Construction	Less disruption to fish and aquatic habitat during construction scores higher	5	3	3
Potential to Improve Terrestrial Habitat	Greater improvements to the existing terrestrial condition score higher, including factors such as management/removal of invasive species, creation of new habitat types/features, or increasing the area/functionality of natural corridors	1	3	4
Potential Impacts to Terrestrial Habitat During Construction	Less disruption to the terrestrial habitat during construction scores higher	5	3	3
	Physical / Natural Environment Criteria Subtotal	**13**	**17**	**17**
	Weighted Score for Physical / Natural Environment Criteria (maximum of 25 pts)	**10**	**14**	**14**
Technical and Engineering Criteria				
Ease of Implementation	Less impact to the surrounding infrastructure (e.g., sewers, watermains, gas, roads) during and after constructions scores higher	5	3	3
Flooding Impacts	Greater reduction of flooding risks to public and/or private lands for longer time scores higher	2	3	3
City Acceptance	Greater compliance with existing City plans, policies, and bylaw requirements scores higher	1	4	3
Technical Feasibility	Greater technical feasibility relative to other alternatives scores higher	2	4	4
	Technical and Engineering Criteria Subtotal	**10**	**14**	**13**
	Weighted Score for Technical and Engineering Criteria (maximum of 25 pts)	**15**	**21**	**20**
Social / Cultural Environment Criteria				
Aesthetics / Recreation	Greater improvements to the aesthetics of the creek corridor and how the alternative impacts recreational use of the corridor score higher	1	4	2
Compatibility with Adjacent Land Use	Greater compatibility with the land use of adjacent properties (e.g. softer approach will be preferred in the residential and parklands compared to hard-engineered structure) scores higher	3	5	2
Community Disruption	Less disruption the surrounding community and residents scores higher	2	3	3
Archaeological Impacts	Less disturbance of areas with archaeological potential and cultural heritage resources scores higher	5	5	5
	Social / Cultural Environment Criteria Subtotal	**11**	**17**	**12**
	Weighted Score for Social / Cultural Environment Criteria (maximum of 25 pts)	**11**	**17**	**12**
Economic Environment Criteria				
Construction Costs	Lower construction cost relative to other alternatives scores higher	5	3	2
Operation and Maintenance Costs	Lower operations and maintenance costs relative to other alternatives scores higher	1	4	3
Life Cycle Costs	Lower life cycle costs relative to the other alternatives scores higher	1	4	3
Infrastructure Protection	Greater protection of existing infrastructure for a longer time scores higher	1	4	4
	Economic Criteria Subtotal	**8**	**15**	**12**
	Weighted Score for Economic Criteria (maximum of 25 pts)	**12**	**23**	**18**
Total		48	74	63

Preliminary Preferred Alternative – Natural Design

- Natural design to enhance creek riparian while providing protection to aquatic habitats
- Installation of a vegetated buttress to prevent lateral migration
- Restore channel with typical riffle-pool morphology

NEXT STEPS

PUBLIC CONSULTATION – DECEMBER, 2020

- Receive PIC feedback, incorporate input and update results
- Compile and review feedback. Confirm or adapt preliminary preferred alternatives.

SUBMIT EA PROJECT FILE AND OBTAIN AGENCY APPROVALS – SUMMER 2021

- EA Project file posted for 30 day review period.

DETAILED DESIGN & IMPLEMENTATION

- Construction timing dependant on City of Burlington Capital Planning.

TO PROVIDE COMMENT, OR TO BE ADDED TO THE STUDY STAKEHOLDER LIST, PLEASE CONTACT:

Mr. Arif Shahzad, P. Eng.
Senior Project Manager
City of Burlington
426 Brant Street, PO Box 5013
Burlington, L7R 3Z6
Phone: 905-335-7600
E-mail: arif.shahzad@burlington.ca

Mr. Rob Amos, P. Eng.
Project Manager
Aquafor Beech Limited
2600 Skymark Ave., Suite 202,
Building 6, Mississauga, L4W 5B2
Phone: 905-629-0099 x 284
E-mail: amos.r@aquaforbeech.com

THANK YOU

FOR PARTICIPATING IN THE TUCK CREEK EROSION CONTROL ENVIRONMENTAL ASSESSMENT STUDY

City of Burlington's

Tuck Creek Erosion Control EA - Harvester Road to Hydro Right of Way, Palmer Drive to CN Rail & Dundas Street to Headon Road

Date/Time: December 15th, 2020 6:00 pm – 7:30 pm
Location: WebEx - https://amosr.my.webex.com/join/Amos
Aquafor Ref: 66632
Consultant: Aquafor Beech Ltd
Prepared by: Sachet Siwakoti

PIC Attendees

Name	Company	Telephone	Email
Bailey			
Glenn			
Glenn Warnica			
Rob Parry			
Shawna Solte			
J Reid			
Steve Chipps			
Arif Shahzad (AS)	City of Burlington	905.335.7600 x 7486	Arif.Shahzad@burlington.ca
Rob Amos (RA)	Aquafor Beech (ABL)	416.705.2367	Amos.R@aquaforbeech.com
Sachet Siwakoti (SS)	Aquafor Beech	226.791.3333	Siwakoti.S@aquaforbeech.com

siwakoti.s@aquaforbeech.com

From: Rob Amos <amos.r@aquaforbeech.com>
Sent: December 22, 2020 8:50 AM
To: [redacted]
Cc: 'Shahzad, Arif'; siwakoti.s@aquaforbeech.com
Subject: RE: Tuck Creek Erosion Control

Hi[redacted]

Thank again for the call last week.

Arif and I just wanted to confirm we've received your input, and if you have any further questions or comments, please feel free to call or email anytime.

Otherwise, we'll look forward to sharing the Project File report when complete, which will include your comments as follows:

> Robert, thankyou for taking my call and the time to really listen to my concerns today in regards to the area between Rockwood south to the hydro corridor. I was very worried as well as all the neighbours that back onto the creek in this area that unnecessary destruction and reworking of the natural environment and natural habitat was going to take place. We have never had any concerns about erosion and have never been impacted in any way, even after the August 2014 flood. It was good to hear that you agree that in the study there was no need for any adjustments to be made in this area. Please let me know if for some reason this opinion changes.
>
> Thanks again,
>
> [redacted]

Thanks,

Rob

Robert Amos MASc. P.Eng.
Fluvial Geomorphologist
905.629.0099 x 284
amos.r@aquaforbeech.com

From: [redacted]
Sent: Tuesday, December 15, 2020 8:17 PM
To: Amos.R@Aquaforbeech.com
Subject: Tuck Creek Erosion Control

Robert, I tried to get into the Webex presentation but my old laptop didn't want to download the app. I hope all went well and that you had a good response from the people of the community being affected. Please let

me know if something came up that was not in line with what we had discussed in our phone conversation today. Thanks



siwakoti.s@aquaforbeech.com

From: Rob Amos <amos.r@aquaforbeech.com>
Sent: December 22, 2020 8:46 AM
To: 'Shahzad, Arif'; [redacted]
Cc: 'Bentivegna, Angelo'; siwakoti.s@aquaforbeech.com
Subject: RE: Tuck Creek Erosion Control

Hi [redacted]

Thanks very much for your input regarding the existing conditions and risks of Tuck Creek adjacent to Hunt Crescent.

As a followup to Arif's response, Aquafor will give consideration and ensure the conditions of the terrafix erosion control measures you noted are accounted for.

At present, the Erosion Site 6 area has completely failed and requires intervention. Although the area of concern you noted has not yet failed, there may be benefit in addressing these lesser risks before they continue to increase and follow the same trajectory observed downstream.

Thanks again for your input. We'll look forward to sharing the Project File when complete which will include your comment and how we have accounted for it.

Rob

Robert Amos MASc. P.Eng.
Fluvial Geomorphologist
416.705.2367
amos.r@aquaforbeech.com

From: Shahzad, Arif [mailto:Arif.Shahzad@burlington.ca]
Sent: Monday, December 21, 2020 4:04 PM
To: [redacted]; amos.r@aquaforbeech.com; Ellis, Becky
Cc: Bentivegna, Angelo
Subject: RE: Tuck Creek Erosion Control

Hello [redacted] Thank you for your email and interest in the project. You raised some good points.

As you said, the woody debris generated in the natural channels/areas is considered part of the habitat. This debris is not supposed to be disturbed unless it becomes a potential flood risk. Any fallen tree in woodland is to be left to decompose. This is the standard policy/direction from Conservation Halton.

As I understand at the erosion site 6, the creek is actively eroding and moving closer to the pathway. Therefore, the creek bank needs to be reinforced to stop the movement of the channel. Having said that, I will let Rob Amos explain the difference between this site and the locations you have pointed out.

For your inquiry regarding the paving of the pathway, I copied staff from Parks Design & Construction to update us about future improvement in the Ireland park.

Regards,

Arif Shahzad, M.Eng., P.Eng.
Senior Project Manager - Stormwater Engineering
Capital Works

(905) 335-7600 ext.7486
arif.shahzad@burlington.ca



From: [redacted]
Sent: Thursday, December 17, 2020 3:45 PM
To: Shahzad, Arif <Arif.Shahzad@burlington.ca>; amos.r@aquaforbeech.com
Cc: Bentivegna, Angelo <Angelo.Bentivegna@burlington.ca>
Subject: Tuck Creek Erosion Control

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

RE: Tuck Creek Erosion Control

Thank you for publishing the pdf, most informative. However I feel you have missed a couple of points in Ireland Park and its environs.
Much of the woody debris in the creek could have been resolved with a more proactive maintenance program instead of the “natural degeneration” that has been adopted over the last 20-25 years. I understand the natural breakdown provides habit and food, but as the farmers of old knew, the hedges and ditches are as important as the roof on his barn, and the city has seemed to ignore this aspect. All distances are estimated from your charts or from Google Earth.

Erosion area 6:
The integrity of theTerrafix in this area was destroyed several years before the Great Flood of ’14 (GF14). From scaling your maps I estimate the closest property boundary (left bank) is about 15m from the creek bank. Hardly an imminent threat to property compared to the threatened Terrafix feature adjacent to Hunt Crescent, circled below.

This is Google Earth from 2004, at this point the creek is about 6m from the property line. Closer, than the 7.5m I estimate, for the Autumn Hill properties in Area7. The GF14 submerged the gravel path and topped the bridge on the right. Much of that gravel was washed down into the creek, which has added to the encroachment of the left bank. (Although it has created a beach area which little ones enjoy in the summer a little further downstream, and maybe 90m upstream from area 6.)

Similarly, further upstream beneath the next footbridge we have more Terrafix under threat of failure due the creek realigning itself. No property impact apart from the integrity of the bridge abutments. This bridge was installed with the lighting adjacent to the path to the NNE towards Folkway, so the school wouldn't have to bus kids from the Folkway side of the park.

Has the city considered paving this section of path, from the Baseball diamonds to the bridge at the right of the first picture.

Thank you

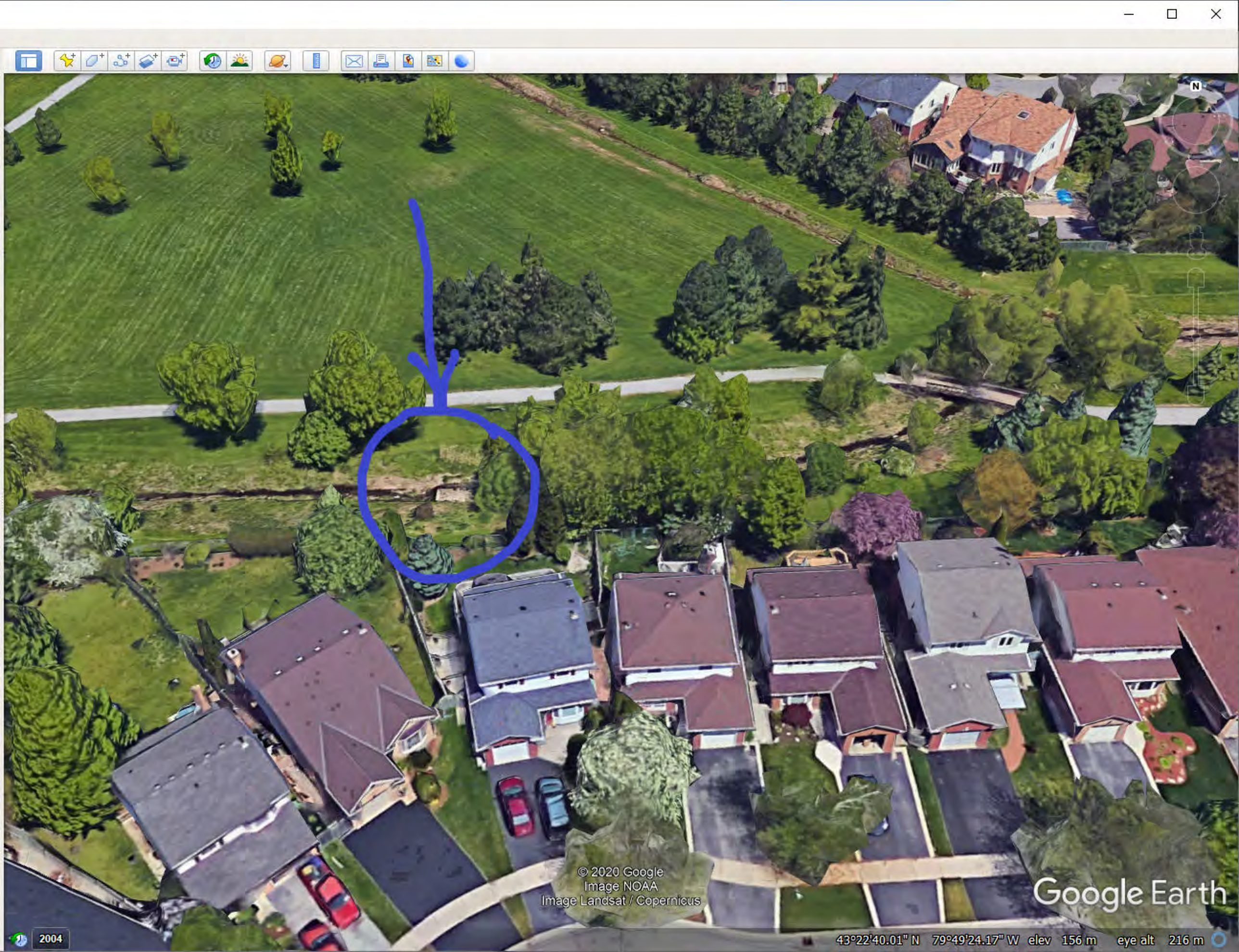
[redacted]


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The foot bridge to St Timothy School, the upstream creekbed has been encroached by runoff from the park and is threatening the integrity of the Terrafix, as has happened at site 6 of this study,

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Image Landsat / Copernicus
Google Earth


N
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Image NOAA
Image Landsat / Copernicus
Google Earth
2004
43°22'40.01" N 79°49'24.17" W elev 156 m eye alt 216 m

January 5, 2022

Attn: **Ms. Cassandra Connolly**
Regulation Officer
Conservation Halton
2596 Britannia Road West
Burlington, Ontario, L7P 0G3
Phone: 905-336-1158 ext. 2301 | Email: cconnolly@hrca.on.ca

Cc: **Mr. Arif Shahzad,**
Senior Environmental Engineer
City of Burlington
426 Brant Street P.O. Box 5013
Burlington, Ontario, L7R 3Z6
Phone: 905-335-7600 ext. 7486 Email: Arif.Shahzad@burlington.ca

Re: **Tuck Creek Erosion Control Environmental Assessment Project File Report – Draft Report**
City of Burlington
CH File – MPR 742

Dear Cassandra,

Please find below the responses to the Conservation Halton's comments regarding the first submission of City of Burlington's *Tuck Creek Erosion Control Environmental Assessment Project File Report - Draft*. Comment numbering follows the same order as the ones in CH's comment letter dated September 20, 2021.

Accompanying this letter is the project file, conceptual drawings and supporting documents as appendices for your review.

Should you require any further information or discussion regarding this response letter, please do not hesitate to contact the undersigned.

Sachet Siwakoti, MASc., P.Eng.
Aquafor Beech Limited
Siwakoti.s@aquaforbeech.com

Rob Amos, MASc, P.Eng.
Aquafor Beech Limited | Project Manager
Amos.r@aquaforbeech.com

Section 2.1, General Comment – Pages 8-23:

1. Identify whether the City of Burlington has easements on any of the lands shown on Figures 2-2 through 2-8; Specifically, where the watercourse is not confined to lands owned by the City of Burlington. Please adjust the drawing scale to match what is stated.
   Aquafor's response:
   The City of Burlington do not have any easements on any of the lands shown on Figure 2-2 through 2-8. The scale is adjusted to match as per the comment.

Section 2.1.5 Erosion Site 5 – Photo 2-14, Page 18:

2. Please clarify what is confirmed/concluded that the armourstone wall was constructed without proper drainage.
   Aquafor's response:
   The armourstone wall is assumed to be constructed without proper drainage. Without intervention, the armourstone retaining wall will eventually fail putting the road crossing at risk.

Section 2.1.6 Erosion Site 6 – Photo 2-17, Page 20:

3. Confirm if utility locates were completed in vicinity of the concrete weir and portion of the block lined channel.
   Aquafor's response:
   The utility locates confirms that no utility is present in the vicinity of the concrete weir and portion of block lined channel.

Section 2.2 Opportunities, Page 24:

4. Discussion on the feasibility of installing softer soil bioengineering approaches and creek bed restoration options are to be included; ultimately, the extent/amount of armourstone, stone bank and rock protection works should be minimized to the extent possible at each of the erosion sites.
   Aquafor's response:
   The discussion of the feasibility of installing softer soil bioengineering approaches to the creek bed and banks is added.

Section 3.3.1 Erosion Site Inventory, Table 3-1: Summary of Erosion Sites by Reach, Page 33:

5. Further discussion/clarification is required as to how aquatic habitat is being put at risk by erosion risks identified. Staff understand that habitat is degraded in various location due to concrete debris, etc. However, it's not always clear how erosion is negatively affecting aquatic habitat and/or resulting in further degradation.
   Aquafor's response:
   The aquatic habitat is being put at risk in various located due to concrete debris and reduced fish passage, however, erosion itself is not negatively affecting the aquatic habitat.

6. It is recommended that the table be updated to include a level of risk to terrestrial habitat, as the erosion sites include Species At Risk (SAR), Significant Wildlife Habitat (SWH) and provincially rare Erosion Land Classification (ELC) communities.
   Aquafor's response:
   The level of risk to terrestrial habitat is added to the table.

The following comments are applicable to each Erosion Site, as described in Table 3-1, Page 33:
Erosion Site 1:

7. Clarify/specify the municipal infrastructure that is at risk.
   Aquafor's response:
   City owned 1650mm ø concrete storm outfall is at risk.

8. Considering the watercourse is situated on privately owned lands for much of this erosion site, it is unclear whether the watercourse is truthfully encroaching into private property – or if the watercourse has always been in that location. It does appear as though 852 Walkers Line has encroached into the watercourse between 2013 and 2015 based on aerial imagery. Prior to any CH permits being issued, encroachment of 852 Walkers Line must be first be addressed. Modification to the watercourse to protect said encroachment will not be supported.
   Aquafor's response:
   There has been actively used land within the private property. The owner has used the erosion control measures such as use of large concrete debris. The stream is in a deteriorated condition within the reach of erosion site 1 and resulted in risk to aquatic habitat due to effectively deteriorated condition of the watercourse. The creek is not encroaching the private property but the adjacent land owner has encroached in the watercourse.

Erosion Site 2:

9. Clarify/specify the municipal infrastructure is at risk of stream bed/bank erosion.
   Aquafor's response:
   The armourstone retaining wall is at risk.

10. In staff's opinion, the existing armourstone wall appears to be functional (not failing) and is not seen as a significant concern/risk. Further investigation should be undertaken to better consider whether the loss of materials from behind this wall is a result of overland flows (from Harvester), freeze thaw cycles, typical wall rotation, etc.; i.e., is the cause undoubtedly/mainly riverine flow?
    Aquafor's response:
    As a follow-up to our recent discussion with this comment, the existing armourstone wall is seen as risk.

11. Although risk to private property is listed as a risk, the watercourse appears to be contained within the corridor in this area. Please provide further information to support this indication as private property does not appear to be at risk of erosion as of current.
    Aquafor's response:
    The private property is not at risk and the Table 3-1 is revised accordingly.

12. There appears to be an accumulation of materials downstream of the culvert which likely caused the channel bifurcation. This accumulation appears to have formed after the August 2014 storm; it is thought that the accumulated materials were transferred from upstream erosion control works (riprap, etc. placed in 2013) which failed during the August 2014 storm. Staff request that the report speak to the accumulated materials in the site conditions description, etc.
    Aquafor's response:
    The site condition description is updated as per the comment.

Erosion Site 3:

13. Include gabion basket failure within description. Considering the infill natural channel bed and failed infrastructure, the level of risk should be high for both infrastructure and aquatic habitat.
    Aquafor's response:
    The site condition description is updated as per the comment. The level of risk is revised to high for both infrastructure and aquatic habitat.

14. It is understood that a hydro pole is at risk due to erosion, consider speaking to this in the site conditions description, etc.
    Aquafor's response:
    The risk to hydro pole is added to the site condition description and Table 3-1.

15. Clarification is required as to whether the channel bed itself is deteriorating as result of the rubble, or rather aquatic habitat is degraded.
    Aquafor's response:
    The aquatic habitat is degraded due to channel rubble debris deposit. Table 3-1 is revised.

16. Consider identifying the failing gabion wingwalls in the site conditions description.
    Aquafor's response:
    The site description is updated identifying the failing gabion wingwalls.

Erosion Site 4:

17. Staff question if only one property (3482 Ketelbey Court) is potentially at risk due to erosion. Consideration should be made regarding whether encroachments by 3482 Ketelbey Court toward the top of bank may have contributed to destabilization of the embankment. It appears vegetation is being mowed up to and including the top of bank. Establishment of deeper rooting vegetation in this area may aid with stabilization of this embankment.
    Aquafor's response:
    Only one property (3482 Ketelbey Court's fence line) is potentially at risk due to erosion. Table 3-1 is updated. Establishment of deeper rooting vegetation in this area is discussed within the preferred alternative.

Erosion Site 4:

18. The level of risk to aquatic habitat should be increased to medium, as failure of existing armourstone and wall may contribute to further degradation of habitat and fish passage.
    Aquafor's response:
    The level of risk to aquatic habitat is updated.

19. Clarification is required as to which property is at risk due to stream bed/bank erosion.
    Aquafor's response:
    The fence line of 3482 Ketelbey Court private property is at risk due to bank erosion. Table 3-1 is updated.

Erosion Site 6:

20. Clarify what private property is at risk due to stream bed/bank erosion.
    Aquafor's response:
    No private property is at risk due to stream bed/bank erosion. Table 3-1 is updated.

21. Clarify what municipal infrastructure is at risk due to stream bed/bank erosion. In staff's opinion the grade control structure would not be considered municipal infrastructure at risk as it was purposefully situated in the watercourse.
    Aquafor's response:
    The concrete weir and Terrafix block are at risk due to stream bed/bank erosion.

22. Recommend updating the level of risk to aquatic habitat to medium, as existing grade control structures, erosion and Terrafix block all contribute to degradation of habitat and reduce fish passage.
    Aquafor's response:
    The level of risk to aquatic habitat is updated.

Erosion Site 7:

23. Clarify what private property is at risk due to stream bed/bank erosion and why the erosion is public safety concern at this location.
    Aquafor's response:

3139, 3141 and 3143 Autumn Hill Court private properties are risk due to stream bank erosion. The erosion is public safety concern at this erosion site because Driftwood Park is located adjacent to the erosion site.

Section 3.3.3 Erosion Sites Field Scoring Results, (Page 35-36):

24. Table 3-3, Page 36: Update the report to include the evaluation scoring sheets for each of the erosion sites. From staff's understanding the type of risk for many of these erosion sites should be tied to open space; review types of risks assigned at each erosion site and adjust as necessary. Similarly, review distance assignment in the erosion index category; staff suggest clarifying that this distance is measured from the erosion area to the potential at risk infrastructure/asset of concern and may not be applicable where open space exists.
    Aquafor's response:
    The report is updated with the evaluation scoring for each erosion sites. The distance component in the erosion index category is measured from the erosion area to the potential at risk infrastructure/asset of concern.

25. Terrestrial habitat is needed as part of the evaluation to address and evaluate the sensitive habitats and vegetation communities present within the erosion sites.
    Aquafor's response:
    The terrestrial habitat is included as part of the evaluation.

Section 3.5,1, Hydrology, Page 36

26. Clarify that this Erosion EA did not assess watershed hydrology and the hydrology remains consistent with the modelling provided by CH.
    Aquafor's response:
    The Erosion EA did not assess watershed hydrology and the hydrology remains consistent with the modelling provided by CH.

Section 3.8.4 Significant Wildlife Habitat, Page 55-5; and Appendix C, Table C-16 Significant Wildlife Habitat Screening:

27. A map which shows all Candidate and Confirmed SWH is to be included to help identify appropriate mitigation measures (preferred access routes and staging areas) and minimize negative impact on habitat form and function.
    a. Bat Maternity Colonies – Habitat is present. Revise the text to indicate Confirmed SWH. Revise the report to discuss this separately form SAR bat habitat. The SWH Criteria Schedules for Ecoregion 7E identifies different bats species from the species listed under ESA, 2007. Appropriate mitigation measures are required to help minimize negative impact on SWH.
    b. Raptor Wintering Area – As potential habitat is present, it should be classified as Candidate.
    c. Other Rare Vegetation Communities – As the rare ELC community FOD7-4 is present, the wording should indicate Confirmed SWH. Understanding the habitat may be changing with introduced and invasive species, the rarity of the habitat on the landscape maintains, as well as function it provided within the urban setting the restoration plan and planting should mimic the habitat and function to help improve and maintain species to create sustainability long term.
    d. Special Concern and Rare Wildlife Species – As Provincially Rare and Special Concern species are present, revise wording to indicate Confirmed SWH.

    Aquafor's response:

    The requested SWH map will be prepared.
    a. Habitat with suitable characteristics to support bat maternity colonies is present in the study area, but without targeted surveying to confirm presence/absence we do not feel comfortable in stating the SWH is Confirmed. Unless CH has data which confirm the presence of maternity colonies in these areas, this SWH category will continue to be described as Candidate. The report will be revised such that SWH bat habitat is discussed alongside SAR bat habitat.

b. Our report states that the study area was not observed to contain the specified habitat characteristics that would qualify for this SWH type. The provincial candidacy criteria are: "raptor wintering sites (hawk/owl) need to be >20ha with a combination of forest and upland. Least disturbed sites, idle/fallow or lightly grazed field/meadow (>15ha) with adjacent woodlands."
c. Although there are polygons that have been characterized as FOD7-4, they do not fit the characteristics of the community beyond being Black Walnut dominated. As stated in the report: *Where intact, the FOD7-4 community is represented by relatively undisturbed Walnut dominated floodplain and is provincially ranked S2S3, indicating it is rare in Ontario. Based on the disturbance indicators observed within Polygon 5, it is Aquafor's opinion that this community is not representative of the rare, S2S3 Black Walnut community described in the ELC first approximation (Lee et. al., 1998). Notwithstanding, this community has been assigned as FOD7-4 in the absence of an ELC code better suited to its characteristics.*
d. Report text will be clarified that this is a Confirmed category.

Section 3.11.3, Ownership, Page 65

28. Regarding Erosion Site 1, the presence of a watercourse on private property does not mean it is encroaching on their lands; particularly when the watercourse's location has not shifted. It is understood that the watercourse has remained in this location for some time with no significant movement.
Aquafor's response:
Noted. The text description is updated as per the comment.

29. Land acquisition is encouraged in this case as well as maintenance of a buffer between the watercourse and the employment/storage uses on site. Staff note that encroachments toward the watercourse appear to have been on-going in this location for some time and the system would likely benefit from a widened naturalized buffer.
Aquafor's response:
Noted. The text description is updated in the preferred alternative section.

Section 4.5 Selection and Description of the Preferred Alternative, Pages 73-85

General

30. Majority of the substrate material proposed within the designs do not occur naturally within the system. Staff recommend utilizing softer bioengineering approaches (i.e., root wades, live staking, vegetative buttress, log veins, etc.) to help reduce scale of works, address local erosion and sedimentation concerns, and help to sustain and enhance the existing aquatic and terrestrial habitat. It is generally recommended that the design approaches minimize use of in-situ materials (i.e., native shale/sediments) as well as native vegetation in addressing erosion risks. Use of imported materials, which are not naturally present in the system(s) (e.g., significant quantities of round stone) are not to be utilized, to the extent possible.
Aquafor's response:
The utilization of softer bioengineering materials as noted above have been included within the site-specific recommendation for each preferred alternative.

31. Include recommendations concerning the method of flow diversion which should be used to support construction of envisioned future works as applicable to each site. Specifically, identify dam and pump, partial flume, temporary diversion, etc. is suggested/recommended to support construction and for inclusion in the conceptual budget/estimates.
Note: Staff wish to identify that erosion control works were recently completed on the reach of Tuck Creek between Billings Road and Harvester Road and have thus far been proven quite successful. Staff would recommend consideration of similar design strategies/approaches for the studied erosion sites.
Aquafor's response:

The site-specific method of flow diversion is recommended for within site specific recommendation for each preferred alternative.

See comments for specific to each Erosion Site below:

32. Erosion Site 2, 3 and 4, 5, 6, and 7: Staff do not support the proposed alternative as shown as the erosion issues do not warrant level of works proposed. The erosion issues are more localized and could be stabilized with soft bioengineering approaches. Please consider the feasibility of softer bioengineering options and update the alternatives accordingly. Staff prefer this consideration not be left to detailed design.
    Aquafor's response:
    See response to comment 30.

Section 4.5, Erosion Site 1 – Alternative 3, Page 73

33. The removal of concrete debris from the watercourse's banks may not reduce erosion risks, however the restoration would be viewed favorably from the perspective of enhancing an existing natural resource. Please confirm if the City if willing to remove debris as part of this project.
    Aquafor's response:
    As a follow-up to our recent discussion with this comment, the City is willing to remove debris as part of this project.

34. CH questions the extent of bank protection for the erosion concerns identified and recommend using soil bioengineering approaches to minimize scale of works.
    a. There is a concern with the watercourse realignment being is close proximity to the existing 600mm private outfall. Revise design to maintain distance from outfall or justify current design to address CH concerns. Potential revision could include the incorporation of level spreader and vegetation plantings to minimize future erosion concerns.
    Aquafor's response:
    The existing 600mm private outfall is to be protected and the storm outlet channel is recommended.

    b. The outfalls should be situated such that the discharge flows are in same direction as the flow in watercourse (i.e., not perpendicular to the main flow). This will decrease the potential for erosion on the bed and banks. Revise to address or provide better justification of current design.
    Aquafor's response:
    City owned 1650mm ø concrete storm outfall will be realigned to direct flows downstream at an angle.

· Staff request that opportunities to access this erosion site via the adjacent properties be explored. The conceptual route (as proposed) is likely to have significant impact(s) on riparian vegetation which could contribute to de-stabilization of banks and/or compaction of soils hindering vegetation establishment. Use of construction/wood matting will likely be required where heavy machinery is used.
Aquafor's response:
As per our follow-up discussion with the City and CH, the proposed conceptual route is chosen as the route which will have least significant impact on riparian vegetation. The construction/wood matting is discussed for the alternative 3.

· Opportunities to fence/deter encroachment into the channel is encouraged. If possible, incorporation of filter strip between the easterly property and the channel is recommended. Similarly, it is recommended that opportunities to expand the vegetative buffer along the east side of the channel be investigated.
Aquafor's response:
Noted.

35. Re-alignment of the watercourse toward outfalls is discouraged. Re-alignment of outfalls to direct flows in the downstream direction (i.e., acute angle to the watercourse) is recommended. Additionally,

consideration should be given to the potential of shifting outfalls back from the watercourse (i.e., away from active channel) as close to the property line as possible/feasible.

Aquafor's response:

The outfall will recessed and installed with new headwall and realigned to direct flows downstream at an angle.

Section 4.5, Erosion Site 2 – Alternative 3, Page 75

Staff suggest/raise concern that erosion observed may not warrant/require the scale of works being recommended.

36. Staff are unclear on the cause for concern regarding 'erosion behind failing armourstone wall (ref., Photo 2-5). In staff's opinion the wall appears to be functioning as intended; and any erosion observed appears minor. Please provide additional justification/information to support the raised concern(s).

    Aquafor's response:

    As a follow-up to our recent discussion with this comment, the existing armourstone wall appears to be at poor condition, and without intervention the armourstone retaining wall will eventually fail putting the road crossing at risk.

37. Localized plantings and/or live staking would likely address the minor bank erosion observed (ref., Photo 2-4). This may be a more cost-effective approach which would also benefit the system. Please consider this and incorporate it into the design where appropriate.

    Aquafor's response:

    As per our recent discussion with CH and City, the reach scale works is to be carried forward to address the failure of armourstone wall, bifurcation of the channel and the bank erosion.

- It is staff's understanding that the accumulation of materials situated downstream of the Fairview Street culvert is likely the result of upstream erosion control works (constructed in 2013) failing during the August 2014 storm event and these materials washing downstream. Removal of this accumulation would be encouraged to support rehabilitation of the channel.

  Aquafor's response:

  Noted. The reach scale works will be addressing the removal of the accumulated materials.

- Where access is proposed through natural areas, CH may require use of construction matting to lessen impacts of heavy machinery on these areas (i.e., avoid compaction, etc.). This would be reviewed at detailed design; however, minimizing potential access routes is encouraged to be considered at this time.

  Aquafor's response:

  Noted. The text with the use of construction/wood matting is added to the description of the preferred alternative.

Erosion Site 3 – Alternative 2, Page 77

38. Engineering staff generally supports the preferred alternative. It is noted that the removal of concrete debris from the watercourse's banks may not reduce erosion risks, however the restoration is viewed favorably from the perspective of enhancing an existing natural resource. Please consider, and incorporate into the project, where appropriate.

    Aquafor's response:

    Noted. The text is revised.

39. As the access route is near the watercourse, it will require additional ESC measures to minimize additional erosion/sedimentation impacts. This should be considered now, however would be reviewed through detailed design.

    Aquafor's response:

    Noted. The text is added as per the comment.

Erosion Site 4 – Alternative 3, Page 79

40. CH is not supportive of the large amount round stone proposed. Please revise. Staff note that the bed material present within the reach consists of shale bedrock, therefore recommend utilizing existing substrate materials for the channel planform or incorporate softer bioengineering option to maintain and enhance existing aquatic habitat and terrestrial habitat.
    Aquafor's response:
    As a follow-up to our recent discussion with this comment, the preferred conceptual design is carried forward for the EA recommendation.

41. The outfall scour pool should be reconfigured, so it is angled in the same direction as the main flow in the watercourse to help reduce potential erosion.
    Aquafor's response:
    The outfall scour pool is reconfigured to direct flows downstream at an angle.

42. The erosion observed may not warrant/require the scale of works being recommended. In Staff's opinion local restoration works could very likely resolve the erosion issues avoiding more significant disturbances to the existing watercourse which is already providing good aquatic/terrestrial habitat. Please comment on considering a lesser approach which may equally address erosion concerns where they are present.
    Aquafor's response:
    See response to comment 40.

43. Coordination with the owners of 3482 Ketelbey Court is encouraged as opportunities to establish more deeply rooted vegetation in vicinity of the top of bank. Specifically, establishment of a butter (or fencing) to limit mowing in this area may be advantageous to all if the owners are agreeable. Additionally, it is recommended that minor grading/leveling of any unstable sections of the existing embankment be explored and/or have access limited for unstable areas. The City should explore this potential at this time, as it may resolve erosion concerns.
    Staff also recommends incorporating fencing into the design to limit encroachment and mowing activities.
    Aquafor's response:
    Noted. The required coordination with the owners of 3482 Ketelbey Court is added to the text.

44. Regarding the staging and storage location: Significant tree removals are anticipated to facilitate works. The staging area will need to be minimized to preserve as many trees and vegetation as possible. This is specifically important due to the Confirmed and Candidate SWH and SAR bat habitat. The restoration plan should mimic existing habitat to encourage long term sustainability of habitat form and function.
    Aquafor's response:
    The conceptual staging and storage location is minimized to preserve as many trees and vegetation as possible. The text in the preferred alternative is updated as per the comment.

Erosion Site 5 – Alternative 2, Page 81

45. Minimal erosion risks were identified at this location. In staff's opinion these minimal erosion risks could be managed via implementation of a monitoring program and minor works to shift existing armourstone(s) back from the creek if/as required. Staff suggest that the erosion observed does not warrant/require the scale of works being recommended to address the erosion concerns identified. Staff note that the preferred alternative may be too extensive for the site conditions. Please revise to best address the situation or provide more justification to support the current preferred alternative.
    Aquafor's response:

The armourstone wall will continue to degrade and the City need to address this concern. The conceptual design is revised to limit works to both left and right banks, and no works to be undertaken on the channel bed. The armourstone will be removed and reset in revetment alignment to provide the long-term erosion protection to the adjacent properties.

46. Staff recommend repairing only the areas where the armourstone wall is failing to avoid utilizing new armourstone bank treatment. CH does not support the use of round stone (non naturally occurring material) to build the bed of a channel. Consider utilizing existing bed materials that support aquatic habitat present. Following comment 45 above, further consideration is requested at this location as there may be an alternative which address the hazard without over-hardening/extensive disturbance of the system.
    Aquafor's response:
    See response to comment 45.

47. There is a concern with the proposed access route, as it will remove a large area of the Significant Woodland and portion of SWH Provincially rare vegetation community FOD7-4. The existing community trail should/could be used for access to creek to avoid the sensitive features.
    Aquafor's response:
    The existing informal trail is to be used for the access to the creek.

Erosion Site 6 – Alternative 3, Page 83

48. Increasing riparian buffer width and plantings with deep rooted native vegetation would help stabilize banks and contribute to the enhancement of aquatic and terrestrial habitat. This should be incorporated.
    Aquafor's response:
    Noted. The riparian buffer is expanded between the asphalt trail and watercourse.

49. Root wads and/or stumps could be used as grade control structures and should be considered at this time.
    Aquafor's response:
    As a follow-up to our recent discussion with this comment, the riffle pool sequence is required to address the erosion risk to this site.

50. There may be opportunities to expand the Riparian Buffer along this reach and/or to include a filter strip between the asphalt trail and watercourse; this should be considered and incorporated as appropriate.
    Aquafor's response:
    See response to comment 48.

Erosion Site 7 – Alternative 2, Page 85

51. While, from an engineering perspective, the preferred alternative could be supported, the length of the retaining wall is of concern; consideration should be made to include soft bioengineering techniques to minimize hardening approach.
    Aquafor's response:
    The length of the preferred alternative is 30 meters which could include the use of soft bioengineering techniques.

52. The proposed access route is located within identified riparian wetland (MAS2-1). Therefore, efforts to re-route and minimize impacts to wetland's form and function during and post construction will need to be demonstrated. A site visit with CH staff to flag wetland boundary (during appropriate time of year) should take place to determine the areas of impacts. The restoration plan and planting efforts will need to mimic existing vegetation to promote long-term sustainability of wetland post construction, should impacts be proposed.

Aquafor's response:
Noted. The text is added to the preferred alternative as per the comment.

53. Consideration should be given to completing these works using hand tools etc., to reduce impacts on existing riparian vegetation. Inclusion of root wads and/or stumps as well as re-use of in-situ materials/sediments (i.e., shale/sediments) is encouraged at this location. Please provide comment on this potential.
Aquafor's response:
Noted. As a follow-up to our recent discussion with this comment, the restoration works could potentially be undertaken by the Hamilton-Halton Stewardship Program and, Field and Stream Rescue Team who could use low impact equipment to reduce impacts on existing riparian vegetation.

54. Staff note that the cause of erosion in this case was likely rear lot drainage in combination with mowing/removal of riparian vegetation from the right overbank. Opportunities to limit mowing in this area are encouraged, and consideration for placement of signage/minor fencing (post/rope) to discourage mowing is suggested/recommended to be explored by the City.
Aquafor's response:
Noted.

Section 5.2.1 Terrestrial Vegetation, Page 90:

55. The report should identify that all landscaping, restoration, and rehabilitation works within CH's regulated area will follow CH's most up-to-date landscaping guidelines.
Aquafor's response:
The text as per the comment is added to the project file.

Section 5.2.3 Aquatic Communities, Page 91 & 92:

56. With the presence of white sucker within the system and spawning activity typically begins in early spring, CH recommends the construction timing for no in water works should begin March 1st. This timing window restriction will be identified/confirmed at detailed design however should be considered early in the project planning process.
Aquafor's response:
Noted. The construction timing window is updated with no in-water works should take place between March 1st and July 15th.

Section 5.2.6 Impacts to Water Quality during Construction, Page 93:

57. Turbidity monitoring should be included for both during and post construction activities as an additional mitigation measure.
Aquafor's response:
The inclusion of turbidity monitoring is added to the recommended mitigation measures.

Section 6.2 Environmental Approvals and Permitting, Page 96:

58. Revise this section to indicate CH Ontario Regulation 162/06.
Aquafor's response:
The text is revised.

Appendix C – Natural Environment Report
Section 3.1, Vegetation Communities, Table C-1 Vegetation Communities Descriptions, Pg. 7-13

59. The report and table should be updated to fully classify and identify the ELC ecosites for Polygons 8, 11 and 14 to determine if the polygons fall under FOD7-4 to ensure appropriate mitigation measures are applied to minimize negative impact to habitat form and function.
Aquafor's response:

Unfortunately, these communities could not be classified further than ecosite. These polygons were not dominated by one species but rather were a jumble of lowland species which is highly typical of narrow urban riparian corridors that experience a high level of disturbance. Polygon 8, 11, and 14 were not dominated by Black Walnut and would not meet the characteristics of FOD7-4.

Appendix G –

First Nations Consultation

siwakoti.s@aquaforbeech.com

From: Shahzad, Arif <Arif.Shahzad@burlington.ca>
Sent: February 13, 2020 3:10 PM
To: maxime.picard@cnhw.qc.ca
Subject: Tuck Creek Erosion Control EA, Notice of Study Commencement
Attachments: 20200213145854993.pdf

FYI..

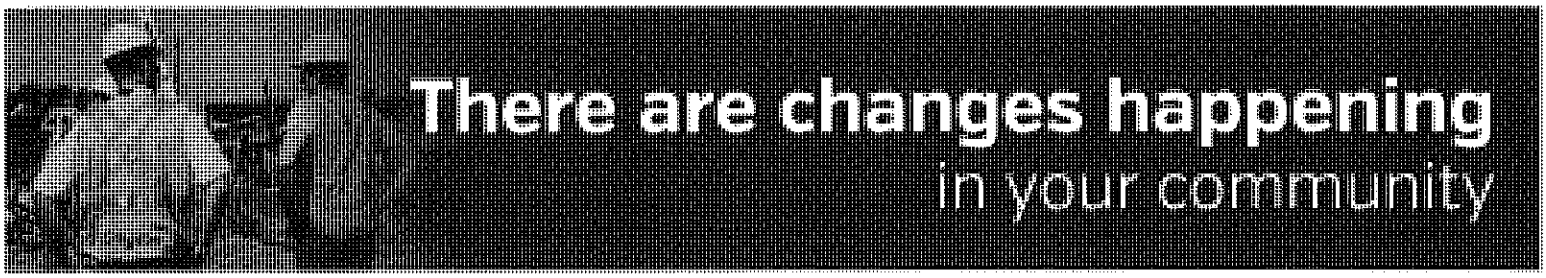
Please See attached

Regards,

Arif Shahzad, M.Eng., P.Eng.
Senior Project Manager
Stormwater Engineering
Capital Works Department

P. 905-335-7600 ext. 7486| **E**. Arif.Shahzad@burlington.ca
Address 426 Brant Street P.O.Box 5013, Burlington, Ontario, L7R 3Z6
City of Burlington| www.burlington.ca

P ***Please consider the environment before printing this e-mail.***



February 13th, 2020

Huron-Wendat First Nation
255 Place Chef Michel-Laveau
Wendake, QC G0A 4V0

Attention: Maxime Picard, Project Coordinator
Re: Tuck Creek Erosion Control – Class Environmental Assessment

The City of Burlington is undertaking a Schedule B Municipal Class Environmental Assessment (Class EA) to study the risk of erosion related to three reaches of Tuck Creek from Dundas Street to Headon Road, Palmer Drive to CN Rail, and Harvester Road to Hydro Right of Way.

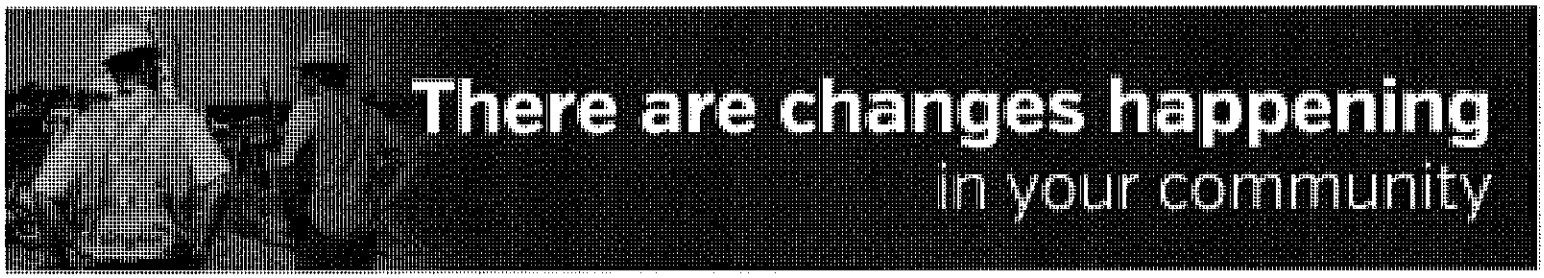
Through the City-Wide Creek Erosion Inventory and Erosion Assessment (2016), the City of Burlington identified the failure of existing bank protection and erosion throughout the study area and have potential to impact residential properties. The study will identify existing erosion problems, potential future risks, protect public infrastructure and private properties, and enhance natural heritage along Tuck Creek. The extents of the study area are illustrated on the following page.

As part of the study, areas of risks will be identified, and alternatives will be developed for each area of risk. A Stage 1 Archaeologic Screening and Stage 1 investigation will be undertaken in Spring, 2020.

Your input is important. If you have any questions or comments, or would like to receive copies of the Stage 1 Archaeologic study when it becomes available, please contact myself at 905-335-7600 ext. 7486, or Arif.Shahzad@burlington.ca.

Sincerely,

Arif Shahzad, M.Eng., P.Eng.
City of Burlington,
Senior Project Manager
905-335-7600, ext. 7486
Arif.Shahzad@burlington.ca



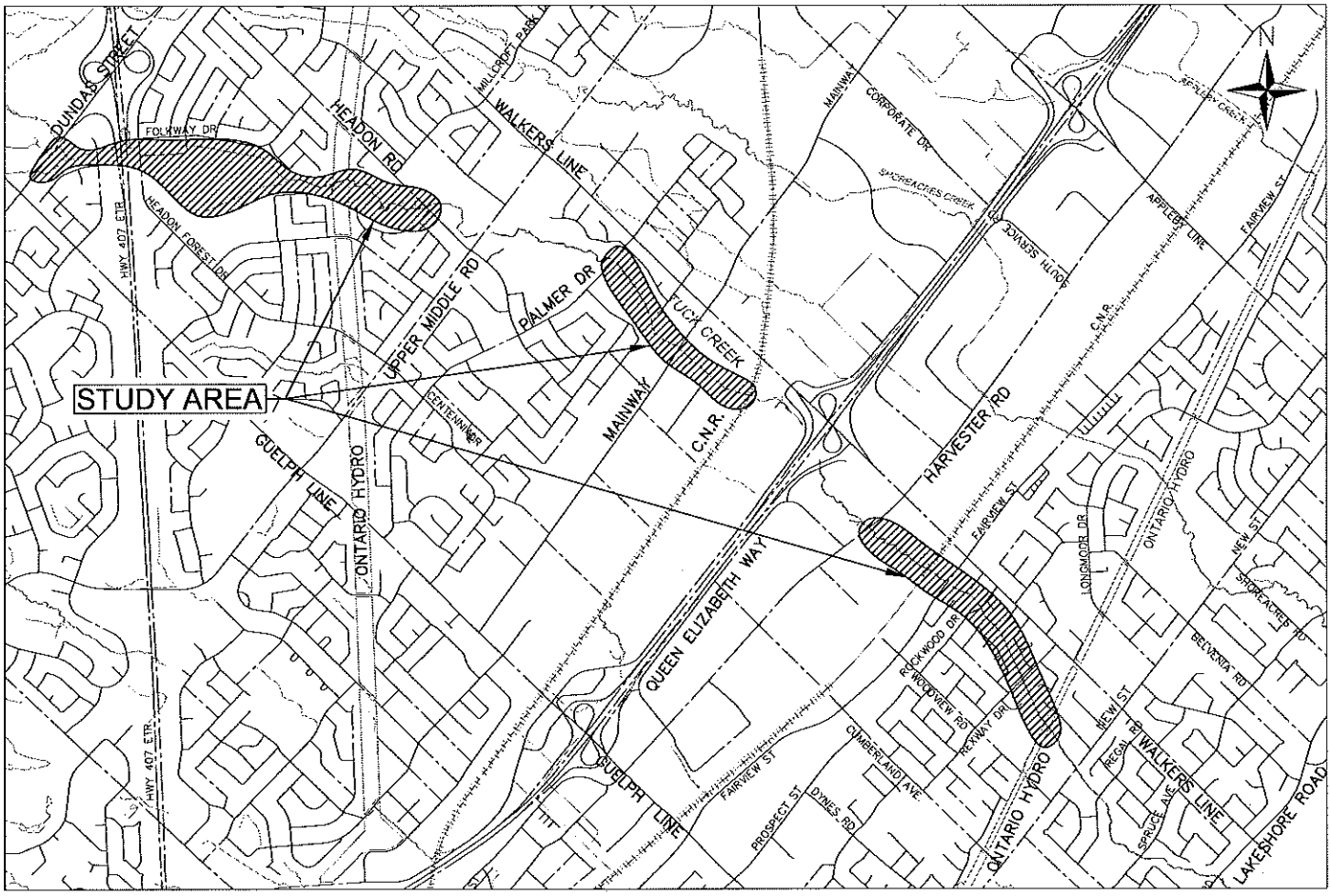


Figure 1. Tuck Creek Erosion Control Study Area

siwakoti.s@aquaforbeech.com

From: Shahzad, Arif <Arif.Shahzad@burlington.ca>
Sent: February 13, 2020 3:08 PM
To: tworowarchaeology@gmail.com
Subject: Tuck Creek Erosion Control EA, Notice of Study Commencement
Attachments: 20200213145843794.pdf

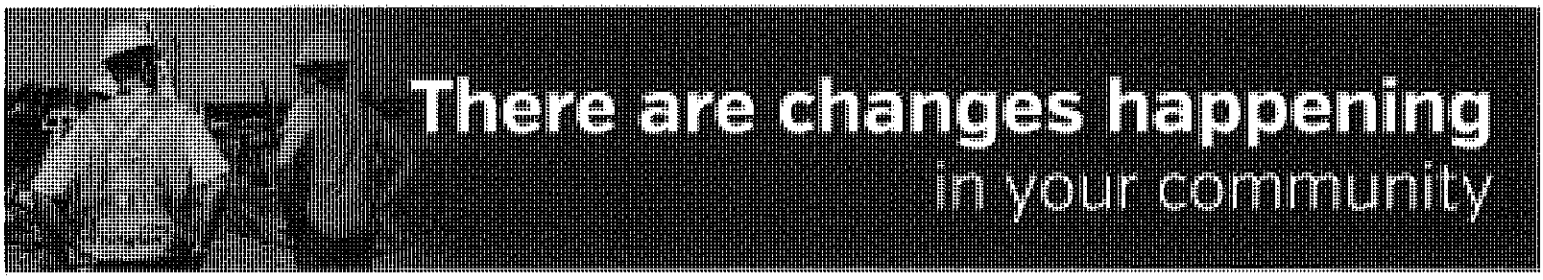
FYI..
Please See attached

Regards,

Arif Shahzad, M.Eng., P.Eng.
Senior Project Manager
Stormwater Engineering
Capital Works Department

P. 905-335-7600 ext. 7486| **E**. Arif.Shahzad@burlington.ca
Address 426 Brant Street P.O.Box 5013, Burlington, Ontario, L7R 3Z6
City of Burlington| www.burlington.ca

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February 13th, 2020

Haudenosaunee Development Institute
16 Sunrise Court, Suite 600
P.O. Box 714
Ohsweken, ON NOA 1M0

Attnention: Wayne Hill
Re: Tuck Creek Erosion Control – Class Environmental Assessment

The City of Burlington is undertaking a Schedule B Municipal Class Environmental Assessment (Class EA) to study the risk of erosion related to three reaches of Tuck Creek from Dundas Street to Headon Road, Palmer Drive to CN Rail, and Harvester Road to Hydro Right of Way.

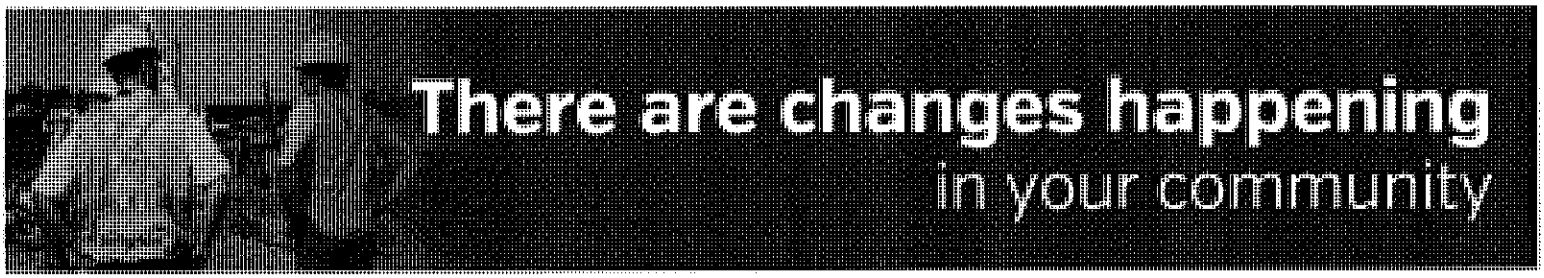
Through the City-Wide Creek Erosion Inventory and Erosion Assessment (2016), the City of Burlington identified the failure of existing bank protection and erosion throughout the study area and have potential to impact residential properties. The study will identify existing erosion problems, potential future risks, protect public infrastructure and private properties, and enhance natural heritage along Tuck Creek. The extents of the study area are illustrated on the following page.

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Your input is important. If you have any questions or comments, or would like to receive copies of the Stage 1 Archaeologic study when it becomes available, please contact myself at 905-335-7600 ext. 7486, or Arif.Shahzad@burlington.ca.

Sincerely,

Arif Shahzad, M.Eng., P.Eng.
City of Burlington,
Senior Project Manager
905-335-7600, ext. 7486
Arif.Shahzad@burlington.ca



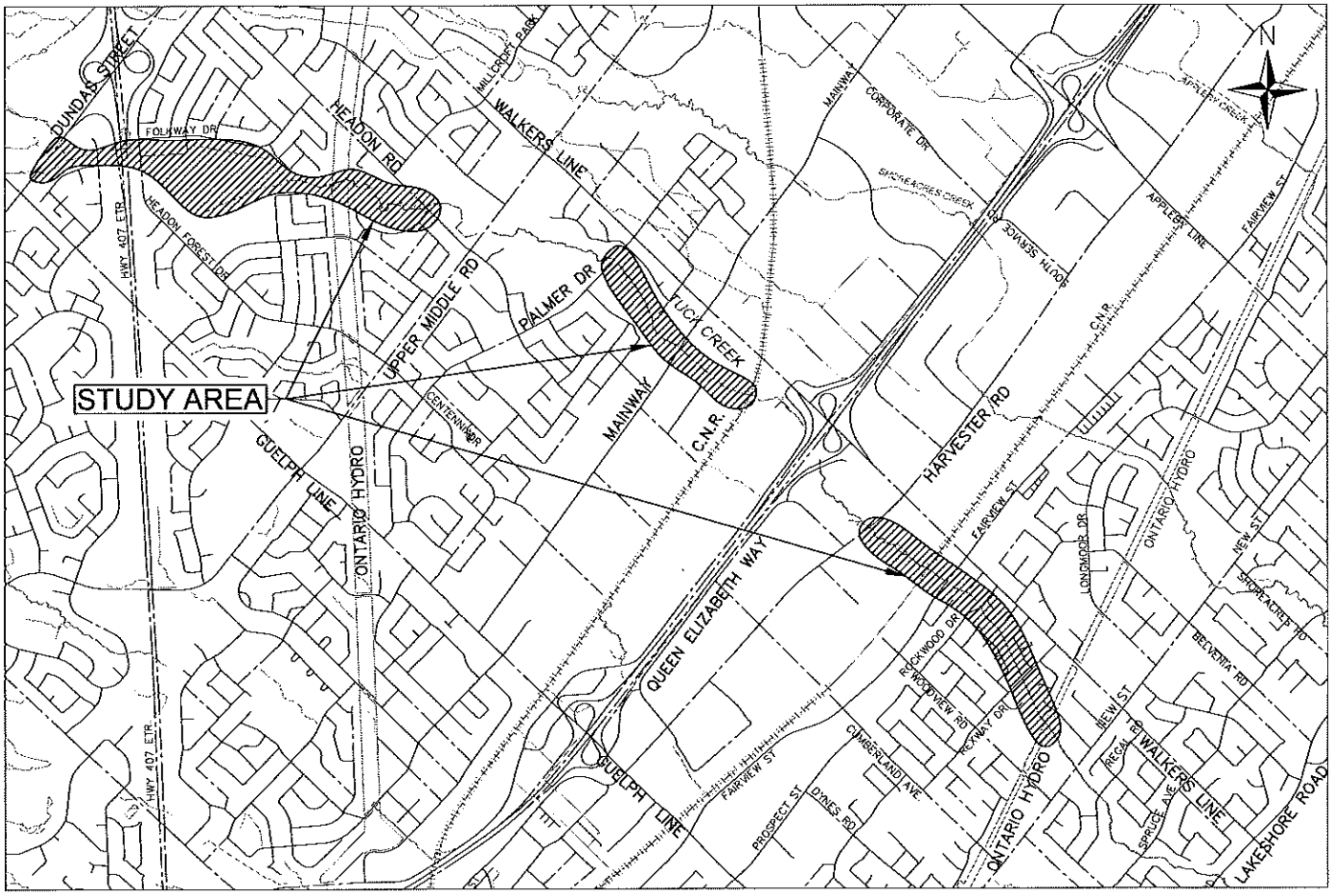


Figure 1. Tuck Creek Erosion Control Study Area

siwakoti.s@aquaforbeech.com

From: Shahzad, Arif <Arif.Shahzad@burlington.ca>
Sent: February 13, 2020 3:12 PM
To: megan.devries@newcreditfirstnation.com
Subject: Tuck Creek Erosion Control EA, Notice of Study Commencement
Attachments: 20200213145913596.pdf

FYI..

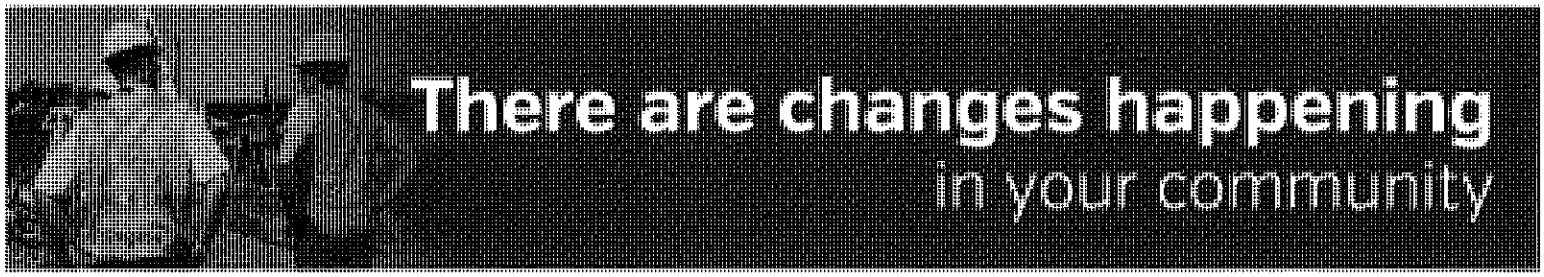
Please See attached

Regards,

Arif Shahzad, M.Eng., P.Eng.
Senior Project Manager
Stormwater Engineering
Capital Works Department

P. 905-335-7600 ext. 7486| **E**. Arif.Shahzad@burlington.ca
Address 426 Brant Street P.O.Box 5013, Burlington, Ontario, L7R 3Z6
City of Burlington| www.burlington.ca

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February 13th, 2020

Mississaugas of the Credit First Nations
Department of Consultation & Accommodation
2789 Mississauga Road R.R. #6
Hagersville, ON N0A 1H0

Attention: Megan DeVries
Re: Tuck Creek Erosion Control – Class Environmental Assessment

The City of Burlington is undertaking a Schedule B Municipal Class Environmental Assessment (Class EA) to study the risk of erosion related to three reaches of Tuck Creek from Dundas Street to Headon Road, Palmer Drive to CN Rail, and Harvester Road to Hydro Right of Way.

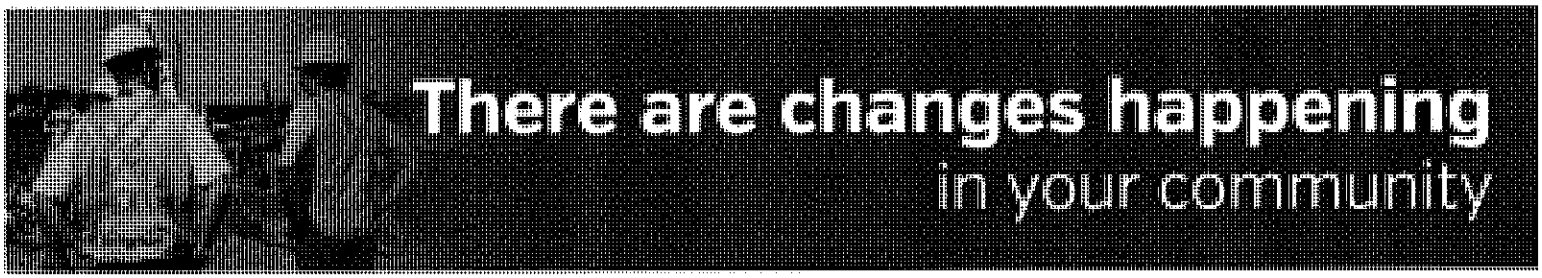
Through the City-Wide Creek Erosion Inventory and Erosion Assessment (2016), the City of Burlington identified the failure of existing bank protection and erosion throughout the study area and have potential to impact residential properties. The study will identify existing erosion problems, potential future risks, protect public infrastructure and private properties, and enhance natural heritage along Tuck Creek. The extents of the study area are illustrated on the following page.

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Your input is important. If you have any questions or comments, or would like to receive copies of the Stage 1 Archaeologic study when it becomes available, please contact myself at 905-335-7600 ext. 7486, or Arif.Shahzad@burlington.ca.

Sincerely,

Arif Shahzad, M.Eng., P.Eng.
City of Burlington,
Senior Project Manager
905-335-7600, ext. 7486
Arif.Shahzad@burlington.ca



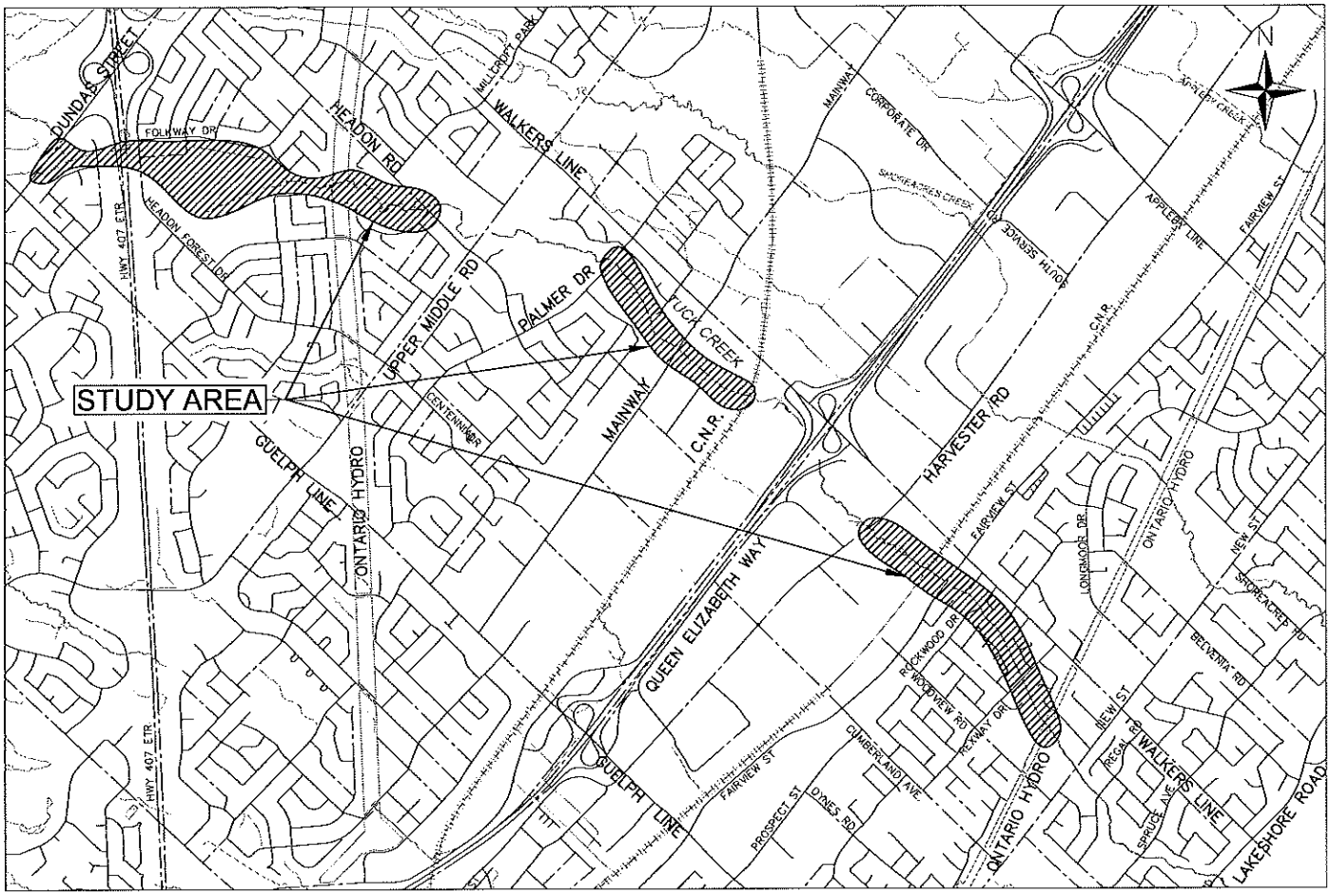


Figure 1. Tuck Creek Erosion Control Study Area

siwakoti.s@aquaforbeech.com

From: Shahzad, Arif <Arif.Shahzad@burlington.ca>
Sent: February 13, 2020 3:14 PM
To: jthomas@sixnations.ca
Subject: Tuck Creek Erosion Control EA, Notice of Study Commencement
Attachments: 20200213145903791.pdf

FYI..

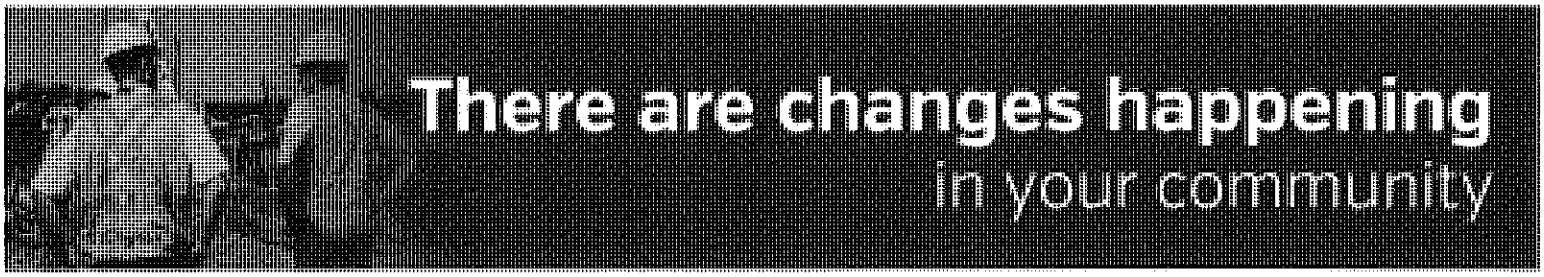
Please see attached

Regards,

Arif Shahzad, M.Eng., P.Eng.
Senior Project Manager
Stormwater Engineering
Capital Works Department

P. 905-335-7600 ext. 7486| **E**. Arif.Shahzad@burlington.ca
Address 426 Brant Street P.O.Box 5013, Burlington, Ontario, L7R 3Z6
City of Burlington| www.burlington.ca

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February 13th, 2020

Six Nations of the Grand River
Land Use Unit
1695 Chiefswood Road
P.O. Box 5000
Oshweken, ON N0A 1M0

Attention: Joanne Thomas
Re: Tuck Creek Erosion Control – Class Environmental Assessment

The City of Burlington is undertaking a Schedule B Municipal Class Environmental Assessment (Class EA) to study the risk of erosion related to three reaches of Tuck Creek from Dundas Street to Headon Road, Palmer Drive to CN Rail, and Harvester Road to Hydro Right of Way.

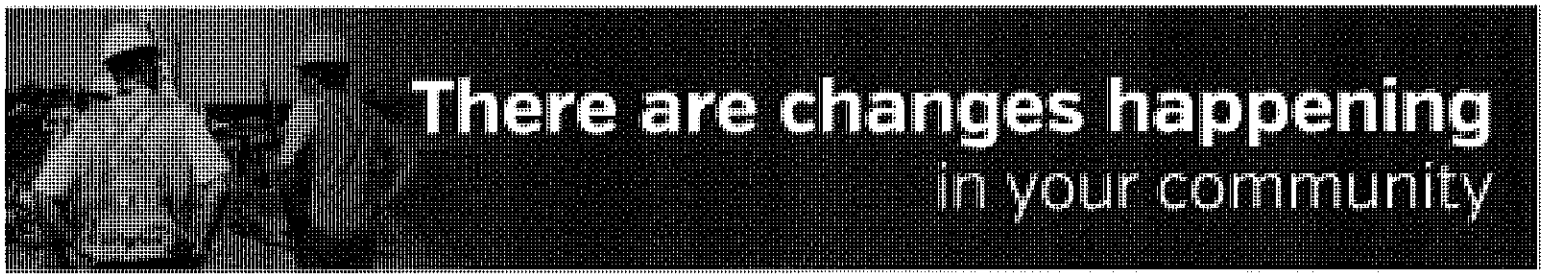
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Your input is important. If you have any questions or comments or would like to receive copies of the Stage 1 Archaeologic study when it becomes available, please contact myself at 905-335-7600 ext. 7486, or Arif.Shahzad@burlington.ca.

Sincerely,

Arif Shahzad, M.Eng., P.Eng.
City of Burlington,
Senior Project Manager
905-335-7600, ext. 7486
Arif.Shahzad@burlington.ca



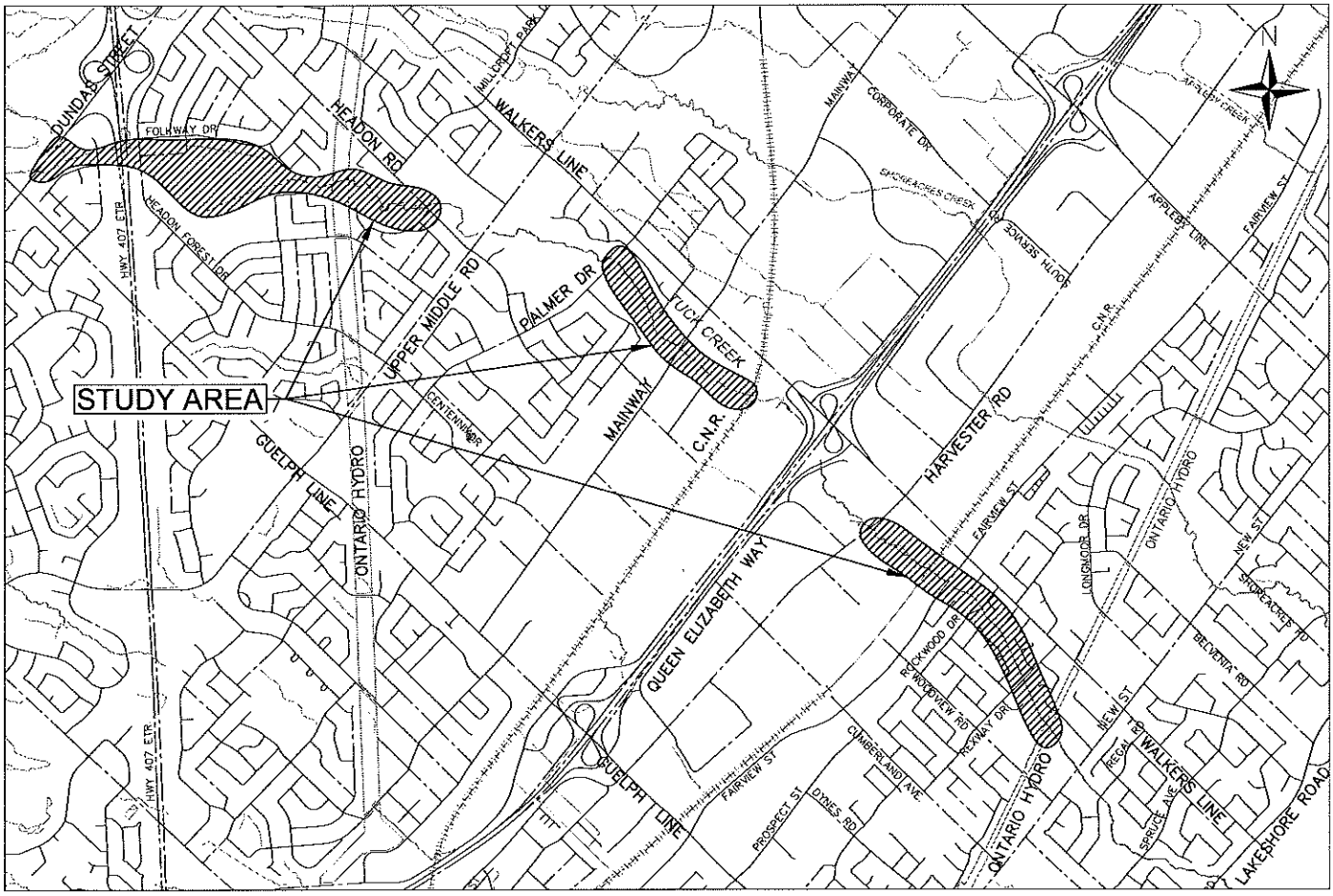


Figure 1. Tuck Creek Erosion Control Study Area

siwakoti.s@aquaforbeech.com

From: Rob Amos <amos.r@aquaforbeech.com>
Sent: January 5, 2022 3:34 PM
To: siwakoti.s@aquaforbeech.com
Subject: FW: Tuck Creek Erosion Control EA, Notice of Study Commencement

Robert Amos MASc. P.Eng.
Fluvial Geomorphologist
905.629.0099 x 284
amos.r@aquaforbeech.com

From: Shahzad, Arif [mailto:Arif.Shahzad@burlington.ca]
Sent: Wednesday, January 5, 2022 3:32 PM
To: amos.r@aquaforbeech.com
Subject: FW: Tuck Creek Erosion Control EA, Notice of Study Commencement

From: Shahzad, Arif
Sent: Wednesday, February 19, 2020 2:51 PM
To: Megan DeVries <Megan.DeVries@mncfn.ca>
Cc: Fawn Sault <Fawn.Sault@mncfn.ca>; amos.r@aquaforbeech.com
Subject: RE: Tuck Creek Erosion Control EA, Notice of Study Commencement

Hi Megan: Thank you for your email. I copied the project consultant, Rob Amos, on this email for follow-up as required.

Regards,

Arif

From: Megan DeVries <Megan.DeVries@mncfn.ca>
Sent: Wednesday, February 19, 2020 10:25 AM
To: Shahzad, Arif <Arif.Shahzad@burlington.ca>
Cc: Fawn Sault <Fawn.Sault@mncfn.ca>
Subject: RE: Tuck Creek Erosion Control EA, Notice of Study Commencement

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Hello Arif,

Thank you for the information. MCFN would like to receive a copy of the draft Stage 1 archaeological assessment of our review prior to its submission to the Ministry of Heritage, Sport, Tourism, and Culture Industries. MCFN also requires the participation of our Field Liaison Representatives during any natural environment or archaeological fieldwork associated with the project; please let us know if any such studies are scheduled to commence. I have CC'd DOCA's Consultation Coordinator, Fawn Sault, for any follow up that may be required.

Sincerely,
Megan.

Megan DeVries, M.A.
Archaeological Operations Supervisor

Department of Consultation and Accommodation (DOCA)
Mississaugas of the Credit First Nation (MCFN)
4065 Highway 6 North, Hagersville, ON N0A 1H0
P: 905-768-4260 | M: 289-527-2763
http://www.mncfn.ca

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From: Shahzad, Arif <Arif.Shahzad@burlington.ca>
Sent: Thursday, February 13, 2020 3:12 PM
To: Megan DeVries <Megan.DeVries@mncfn.ca>
Subject: Tuck Creek Erosion Control EA, Notice of Study Commencement

FYI..

Please See attached

Regards,

Arif Shahzad, M.Eng., P.Eng.
Senior Project Manager
Stormwater Engineering
Capital Works Department

P. 905-335-7600 ext. 7486| **E**. Arif.Shahzad@burlington.ca
Address 426 Brant Street P.O.Box 5013, Burlington, Ontario, L7R 3Z6
City of Burlington| www.burlington.ca

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siwakoti.s@aquaforbeech.com

From:	Rob Amos <amos.r@aquaforbeech.com>
Sent:	January 5, 2022 3:35 PM
To:	siwakoti.s@aquaforbeech.com
Subject:	FW: Tuck Creek Erosion Control Class Environmental Assessment - Notice of Public Information Centre
Attachments:	RE: Tuck Creek Erosion Control EA, Notice of Study Commencement (16.4 MB)

Robert Amos MASc. P.Eng.
Fluvial Geomorphologist
905.629.0099 x 284
amos.r@aquaforbeech.com

From: Shahzad, Arif [mailto:Arif.Shahzad@burlington.ca]
Sent: Wednesday, January 5, 2022 3:28 PM
To: amos.r@aquaforbeech.com
Subject: FW: Tuck Creek Erosion Control Class Environmental Assessment - Notice of Public Information Centre

From: Shahzad, Arif
Sent: Monday, November 23, 2020 1:32 PM
To: Maxime Picard <maxime.picard@cnhw.qc.ca>
Cc: amos.r@aquaforbeech.com
Subject: RE: Tuck Creek Erosion Control Class Environmental Assessment - Notice of Public Information Centre

Hi Maxime: The Stage 1 Archeological study completed as part of this EA was forwarded to you by Rob. In case you have not received the email, please see attached.

If there are any further studies required as part of the detailed design of the project we will let you know.

Regards,

Arif Shahzad, M.Eng., P.Eng.
Senior Project Manager - Stormwater Engineering
Capital Works

(905) 335-7600 ext.7486
arif.shahzad@burlington.ca



From: Maxime Picard <maxime.picard@cnhw.qc.ca>
Sent: Monday, November 23, 2020 1:25 PM
To: Shahzad, Arif <Arif.Shahzad@burlington.ca>
Subject: Re: Tuck Creek Erosion Control Class Environmental Assessment - Notice of Public Information Centre

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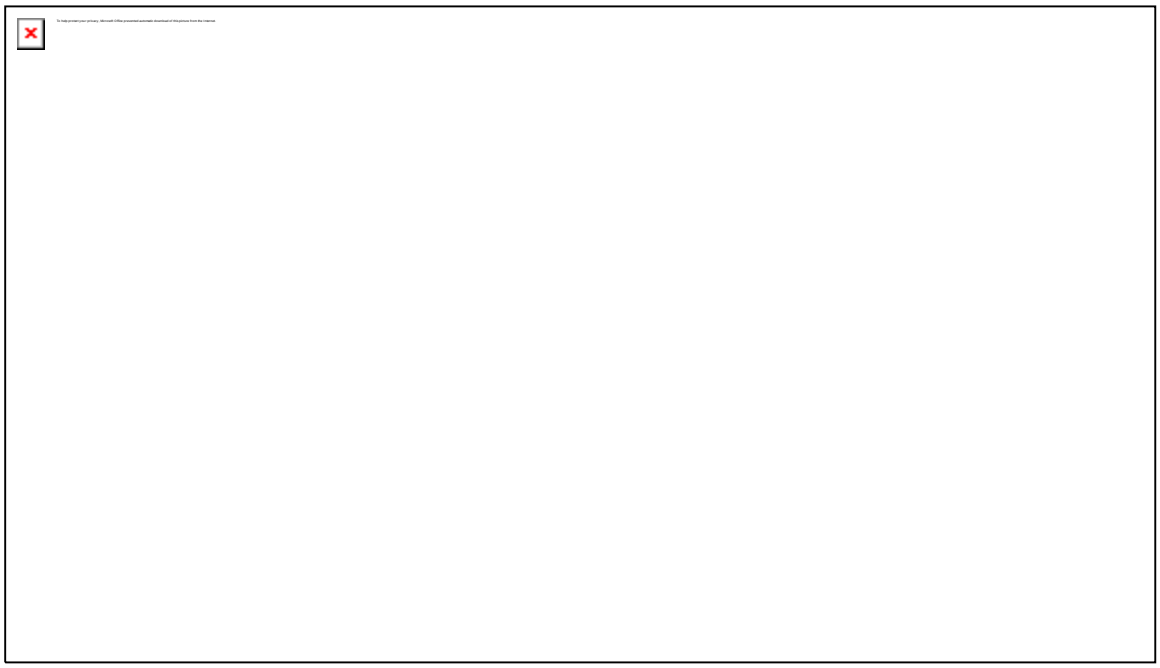
Good afternoon Arif,

This is to acknowledge reception of your email and notice on the Tuck Creek Erosion Control Class Environmental Assessment Project.

Coud you please let us know if any archaeological studies are planned as part of this EA process ?

Thanks and best regards,

Maxime Picard



De: "Arif Shahzad" <Arif.Shahzad@burlington.ca>
À: "Arif Shahzad" <Arif.Shahzad@burlington.ca>
Envoyé: Lundi 23 Novembre 2020 11:07:36
Objet: Tuck Creek Erosion Control Class Environmental Assessment - Notice of Public Information Centre

Notice of Public Information Centre

The City of Burlington has retained Aquafor Beech Limited to undertake a Municipal Class Environmental Assessment (EA) to study erosion related risks to three segments of Tuck Creek:

1. Dundas Street to Headon Road,
2. Palmer Drive to the CN Rail, and
3. Harvester Road to the Hydro Right of Way.

The study areas are illustrated on the attached PIC notice. The objective of the study is to address creek erosion, protect infrastructure and private properties, and enhance the natural heritage of the Tuck Creek corridor. Alternative strategies will be investigated, including restoration and stabilization of Tuck Creek using natural and engineered approaches.

The Class EA process includes public and review agency consultation, an evaluation of alternatives, an assessment of potential environmental effects of the proposed improvements, and identification of reasonable measures to mitigate any potential adverse impacts. Due to the ongoing Public Health Emergency related to COVID-19, an Online Public Information Centre (PIC) will be available to the public to provide input on the Tuck Creek Erosion Control EA.

How to Participate:

Step 1: Visit https://www.burlington.ca/en/services-for-you/tuck-creek-erosion-control-ea-at-3-locations.asp by using your computer or mobile phone
Step 2: View the PIC boards provided on the website. PIC boards will be available for review from Thursday, December 10th, 2020.
Step 3: Attend the web presentation as per the details below:

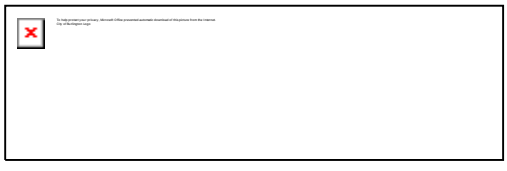
When: Tuesday, December 15th, 2020, 6:00pm to 7:30pm (1 hour presentation, 30 minute Q&A)

Where: WebEx - https://amosr.my.webex.com/join/Amos

The City is committed to informing and engaging the public on the Tuck Creek Erosion Control Class EA and will also be posting Public Information Centre content on the City's website starting December 10th, 2020 to January 11th, 2021.

Thank you,

Arif Shahzad, M.Eng., P.Eng.
Senior Project Manager - Stormwater Engineering
Capital Works
(905) 335-7600 ext.7486
arif.shahzad@burlington.ca



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siwakoti.s@aquaforbeech.com

From: amos.r@aquaforbeech.com
Sent: November 12, 2020 7:22 AM
To: maxime.picard@cnhw.qc.ca
Cc: Shahzad, Arif; 'Sachet Siwakoti'
Subject: RE: Tuck Creek Erosion Control EA, Notice of Study Commencement
Attachments: 20EA-146 Stage 1 Report - Tuck Creek EA.pdf

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Hi Maxime,

Please find a copy of the Tuck Creek EA - Stage 1 Archaeological Assessment.

Upon your review, we'll look forward to receiving any comments or input which we'll gladly include within the EA Report.

Thanks,

Rob Amos, MASc., P.Eng.
Aquafor Beech Ltd.
Mobile: 416.705.2367

From: Shahzad, Arif <Arif.Shahzad@burlington.ca>
Sent: November 11, 2020 3:44 PM
To: amos.r@aquaforbeech.com
Subject: FW: Tuck Creek Erosion Control EA, Notice of Study Commencement

Please forward the Stage 1 archaeological report as requested and copy me.

Thanks,

Arif

From: Maxime Picard <maxime.picard@cnhw.qc.ca>
Sent: Monday, February 17, 2020 9:10 AM
To: Shahzad, Arif <Arif.Shahzad@burlington.ca>
Subject: RE: Tuck Creek Erosion Control EA, Notice of Study Commencement

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Good morning Arif,

Thanks for your letter.
Please note that the Huron-Wendat Nation is requesting to receive a copy of the Stage 1 archaeological report once available.

Best regards,

Maxime Picard



Avis sur la protection et la confidentialité des informations

L'information contenue dans ce courriel est confidentielle et protégée en vertu des lois et règlements applicables. Son contenu est réservé au(x) destinataire(s) à qui il est adressé. Il est donc interdit de le diffuser ou d'en dévoiler les intentions. Si vous recevez ce message par erreur, veuillez le détruire et nous en faire part dans les plus brefs délais.

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De : Shahzad, Arif [mailto:Arif.Shahzad@burlington.ca]
Envoyé : 13 février 2020 15:10
À : maxime.picard@cnhw.qc.ca
Objet : Tuck Creek Erosion Control EA, Notice of Study Commencement

FYI..

Please See attached

Regards,

Arif Shahzad, M.Eng., P.Eng.
Senior Project Manager
Stormwater Engineering
Capital Works Department

P. 905-335-7600 ext. 7486| **E**. Arif.Shahzad@burlington.ca
Address 426 Brant Street P.O.Box 5013, Burlington, Ontario, L7R 3Z6
City of Burlington| www.burlington.ca

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permanently delete this email from your computer/shred this fax, including any attachments, without making a copy. Access to this email/fax by anyone else is unauthorized. Thank you.

siwakoti.s@aquaforbeech.com

From: Rob Amos <amos.r@aquaforbeech.com>
Sent: January 5, 2022 3:35 PM
To: siwakoti.s@aquaforbeech.com
Subject: FW: Tuck Creek Erosion Control EA, Notice of Study Commencement

Robert Amos MASc. P.Eng.
Fluvial Geomorphologist
905.629.0099 x 284
amos.r@aquaforbeech.com

From: Shahzad, Arif [mailto:Arif.Shahzad@burlington.ca]
Sent: Wednesday, January 5, 2022 3:29 PM
To: amos.r@aquaforbeech.com
Subject: FW: Tuck Creek Erosion Control EA, Notice of Study Commencement

From: amos.r@aquaforbeech.com <amos.r@aquaforbeech.com>
Sent: Thursday, November 12, 2020 7:30 AM
To: Megan.DeVries@mncfn.ca
Cc: Shahzad, Arif <Arif.Shahzad@burlington.ca>; 'Sachet Siwakoti' <siwakoti.s@aquaforbeech.com>
Subject: RE: Tuck Creek Erosion Control EA, Notice of Study Commencement

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Hi Megan,

Please find a copy of the draft Tuck Creek EA - Stage 1 Archaeological Assessment for your review.

Upon your review, we'll look forward to receiving any comments or input which we'll gladly include within the EA Report.

With regards to any natural environment or archaeological fieldwork associated with the project, we'll be happy to inform you of any Stage 2 works scheduled for next spring, with Field Liaison Representative agreements to be coordinated in concert with Arif from the City (cc'd).

Thanks,

Rob Amos, MASc., P.Eng.
Aquafor Beech Ltd.
Mobile: 416.705.2367

From: Shahzad, Arif <Arif.Shahzad@burlington.ca>
Sent: November 11, 2020 3:46 PM

To: amos.r@aquaforbeech.com
Subject: FW: Tuck Creek Erosion Control EA, Notice of Study Commencement

Please forward the Stage 1 archaeological report as requested and copy me.

Thanks,

Arif

From: Megan DeVries <Megan.DeVries@mncfn.ca>
Sent: Wednesday, February 19, 2020 10:25 AM
To: Shahzad, Arif <Arif.Shahzad@burlington.ca>
Cc: Fawn Sault <Fawn.Sault@mncfn.ca>
Subject: RE: Tuck Creek Erosion Control EA, Notice of Study Commencement

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Hello Arif,

Thank you for the information. MCFN would like to receive a copy of the draft Stage 1 archaeological assessment of our review prior to its submission to the Ministry of Heritage, Sport, Tourism, and Culture Industries. MCFN also requires the participation of our Field Liaison Representatives during any natural environment or archaeological fieldwork associated with the project; please let us know if any such studies are scheduled to commence. I have CC'd DOCA's Consultation Coordinator, Fawn Sault, for any follow up that may be required.

Sincerely,
Megan.

Megan DeVries, M.A.
Archaeological Operations Supervisor

Department of Consultation and Accommodation (DOCA)
Mississaugas of the Credit First Nation (MCFN)
4065 Highway 6 North, Hagersville, ON N0A 1H0
P: 905-768-4260 | M: 289-527-2763
http://www.mncfn.ca

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From: Shahzad, Arif <Arif.Shahzad@burlington.ca>
Sent: Thursday, February 13, 2020 3:12 PM

To: Megan DeVries <Megan.DeVries@mncfn.ca>
Subject: Tuck Creek Erosion Control EA, Notice of Study Commencement

FYI..

Please See attached

Regards,

Arif Shahzad, M.Eng., P.Eng.
Senior Project Manager
Stormwater Engineering
Capital Works Department

P. 905-335-7600 ext. 7486| **E**. Arif.Shahzad@burlington.ca
Address 426 Brant Street P.O.Box 5013, Burlington, Ontario, L7R 3Z6
City of Burlington| www.burlington.ca

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siwakoti.s@aquaforbeech.com

From: Rob Amos <amos.r@aquaforbeech.com>
Sent: January 5, 2022 3:35 PM
To: siwakoti.s@aquaforbeech.com
Subject: FW: Tuck Creek Erosion Control EA, Notice of Study Commencement

Robert Amos MASc. P.Eng.
Fluvial Geomorphologist
905.629.0099 x 284
amos.r@aquaforbeech.com

From: Shahzad, Arif [mailto:Arif.Shahzad@burlington.ca]
Sent: Wednesday, January 5, 2022 3:29 PM
To: amos.r@aquaforbeech.com
Subject: FW: Tuck Creek Erosion Control EA, Notice of Study Commencement

From: amos.r@aquaforbeech.com <amos.r@aquaforbeech.com>
Sent: Thursday, November 12, 2020 7:22 AM
To: maxime.picard@cnhw.qc.ca
Cc: Shahzad, Arif <Arif.Shahzad@burlington.ca>; 'Sachet Siwakoti' <siwakoti.s@aquaforbeech.com>
Subject: RE: Tuck Creek Erosion Control EA, Notice of Study Commencement

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Hi Maxime,

Please find a copy of the Tuck Creek EA - Stage 1 Archaeological Assessment.

Upon your review, we'll look forward to receiving any comments or input which we'll gladly include within the EA Report.

Thanks,

Rob Amos, MASc., P.Eng.
Aquafor Beech Ltd.
Mobile: 416.705.2367

From: Shahzad, Arif <Arif.Shahzad@burlington.ca>
Sent: November 11, 2020 3:44 PM
To: amos.r@aquaforbeech.com
Subject: FW: Tuck Creek Erosion Control EA, Notice of Study Commencement

Please forward the Stage 1 archaeological report as requested and copy me.

Thanks,

Arif

From: Maxime Picard <maxime.picard@cnhw.qc.ca>
Sent: Monday, February 17, 2020 9:10 AM
To: Shahzad, Arif <Arif.Shahzad@burlington.ca>
Subject: RE: Tuck Creek Erosion Control EA, Notice of Study Commencement

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Good morning Arif,

Thanks for your letter.
Please note that the Huron-Wendat Nation is requesting to receive a copy of the Stage 1 archaeological report once available.

Best regards,

Maxime Picard

NATION HURONNE-WENDAT
Bureau du Nionwentsïo

Maxime Picard, B. Sc. A.
Coordonnateur de projets - Ontario
255, Place Chef Michel-Laveau
Wendake (Qc) G0A 4V0
Téléphone : 418-843-3767 # 2105
Courriel : maxime.picard@cnhw.qc.ca

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De : Shahzad, Arif [mailto:Arif.Shahzad@burlington.ca]
Envoyé : 13 février 2020 15:10
À : maxime.picard@cnhw.qc.ca
Objet : Tuck Creek Erosion Control EA, Notice of Study Commencement

FYI..

Please See attached

Regards,

Arif Shahzad, M.Eng., P.Eng.
Senior Project Manager
Stormwater Engineering
Capital Works Department

P. 905-335-7600 ext. 7486| **E**. Arif.Shahzad@burlington.ca
Address 426 Brant Street P.O.Box 5013, Burlington, Ontario, L7R 3Z6
City of Burlington| www.burlington.ca

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siwakoti.s@aquaforbeech.com

From: Rob Amos <amos.r@aquaforbeech.com>
Sent: January 5, 2022 3:35 PM
To: siwakoti.s@aquaforbeech.com
Subject: FW: Tuck Creek Erosion Control EA, Notice of Study Commencement

Robert Amos MASc. P.Eng.
Fluvial Geomorphologist
905.629.0099 x 284
amos.r@aquaforbeech.com

From: Shahzad, Arif [mailto:Arif.Shahzad@burlington.ca]
Sent: Wednesday, January 5, 2022 3:28 PM
To: amos.r@aquaforbeech.com
Subject: FW: Tuck Creek Erosion Control EA, Notice of Study Commencement

From: Maxime Picard <maxime.picard@cnhw.qc.ca>
Sent: Monday, November 16, 2020 9:47 AM
To: Rob Amos <amos.r@aquaforbeech.com>
Cc: Shahzad, Arif <Arif.Shahzad@burlington.ca>; siwakoti <siwakoti.s@aquaforbeech.com>
Subject: Re: Tuck Creek Erosion Control EA, Notice of Study Commencement

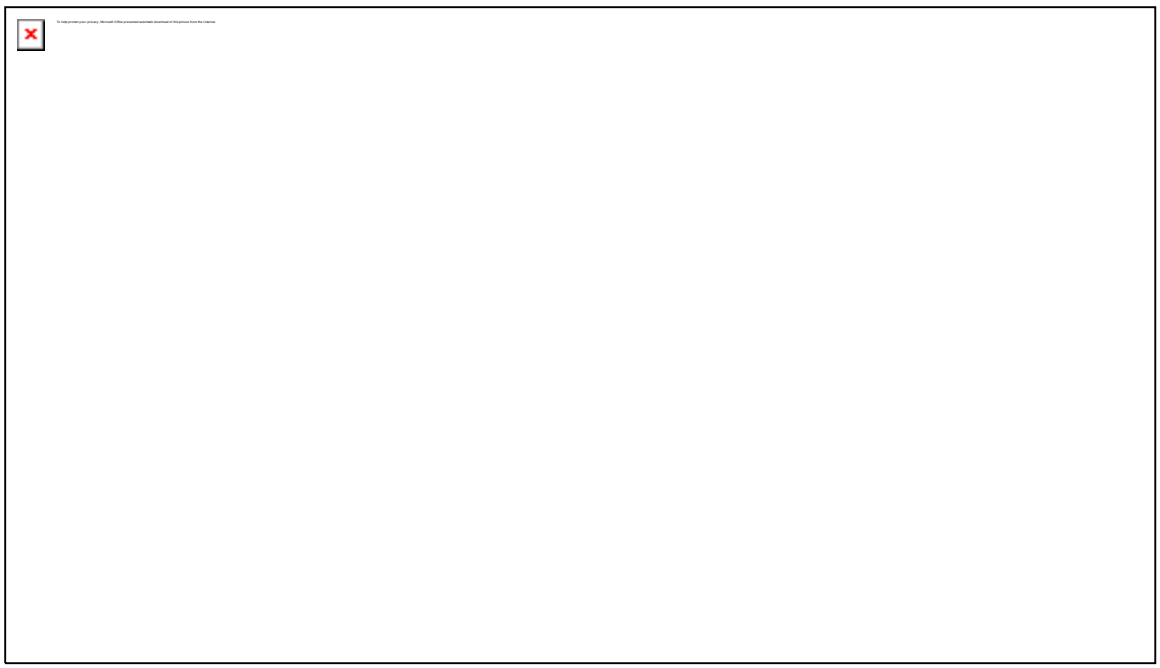
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Good morning Rob,

After review we do not have any specific comments on the Stage 1 report.
However, please note that we would appreciate to have the opporunity to participate in the Stage 2 fieldwork.

Thanks and best regards,

Maxime Picard



De: "Rob Amos" <amos.r@aquaforbeech.com>
À: "Maxime Picard" <maxime.picard@cnhw.qc.ca>
Cc: "Arif Shahzad" <Arif.Shahzad@burlington.ca>, "siwakoti" <siwakoti.s@aquaforbeech.com>
Envoyé: Jeudi 12 Novembre 2020 07:22:05
Objet: RE: Tuck Creek Erosion Control EA, Notice of Study Commencement

Hi Maxime,

Please find a copy of the Tuck Creek EA - Stage 1 Archaeological Assessment.

Upon your review, we'll look forward to receiving any comments or input which we'll gladly include within the EA Report.

Thanks,

Rob Amos, MASc., P.Eng.
Aquafor Beech Ltd.
Mobile: 416.705.2367

From: Shahzad, Arif <Arif.Shahzad@burlington.ca>
Sent: November 11, 2020 3:44 PM
To: amos.r@aquaforbeech.com
Subject: FW: Tuck Creek Erosion Control EA, Notice of Study Commencement

Please forward the Stage 1 archaeological report as requested and copy me.

Thanks,

Arif

From: Maxime Picard <maxime.picard@cnhw.qc.ca>
Sent: Monday, February 17, 2020 9:10 AM
To: Shahzad, Arif <Arif.Shahzad@burlington.ca>
Subject: RE: Tuck Creek Erosion Control EA, Notice of Study Commencement

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Good morning Arif,

Thanks for your letter.
Please note that the Huron-Wendat Nation is requesting to receive a copy of the Stage 1 archaeological report once available.

Best regards,

Maxime Picard

NATION HURONNE-WENDAT
Bureau du Nionwentsïo

Maxime Picard, B. Sc. A.
Coordonnateur de projets - Ontario
255, Place Chef Michel-Laveau
Wendake (Qc) G0A 4V0
Téléphone : 418-843-3767 # 2105
Courriel : maxime.picard@cnhw.qc.ca

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De : Shahzad, Arif [mailto:Arif.Shahzad@burlington.ca]
Envoyé : 13 février 2020 15:10
À : maxime.picard@cnhw.qc.ca
Objet : Tuck Creek Erosion Control EA, Notice of Study Commencement

FYI..

Please See attached

Regards,

Arif Shahzad, M.Eng., P.Eng.
Senior Project Manager
Stormwater Engineering
Capital Works Department

P. 905-335-7600 ext. 7486| **E**. Arif.Shahzad@burlington.ca
Address 426 Brant Street P.O.Box 5013, Burlington, Ontario, L7R 3Z6
City of Burlington| www.burlington.ca

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siwakoti.s@aquaforbeech.com

From: Rob Amos <amos.r@aquaforbeech.com>
Sent: January 5, 2022 3:36 PM
To: siwakoti.s@aquaforbeech.com
Subject: FW: Tuck Creek Erosion Control Class Environmental Assessment - Notice of Public Information Centre
Attachments: Tuck Creek Erosion EA PIC Notice.pdf

Robert Amos MASc. P.Eng.
Fluvial Geomorphologist
905.629.0099 x 284
amos.r@aquaforbeech.com

From: Shahzad, Arif [mailto:Arif.Shahzad@burlington.ca]
Sent: Wednesday, January 5, 2022 3:28 PM
To: amos.r@aquaforbeech.com
Subject: FW: Tuck Creek Erosion Control Class Environmental Assessment - Notice of Public Information Centre

From: Shahzad, Arif
Sent: Monday, November 23, 2020 11:22 AM
To: Joanne Thomas <jthomas@sixnations.ca>
Subject: Tuck Creek Erosion Control Class Environmental Assessment - Notice of Public Information Centre

Notice of Public Information Centre

The City of Burlington has retained Aquafor Beech Limited to undertake a Municipal Class Environmental Assessment (EA) to study erosion related risks to three segments of Tuck Creek:

1. Dundas Street to Headon Road,
2. Palmer Drive to the CN Rail, and
3. Harvester Road to the Hydro Right of Way.

The study areas are illustrated on the attached PIC notice. The objective of the study is to address creek erosion, protect infrastructure and private properties, and enhance the natural heritage of the Tuck Creek corridor. Alternative strategies will be investigated, including restoration and stabilization of Tuck Creek using natural and engineered approaches.

The Class EA process includes public and review agency consultation, an evaluation of alternatives, an assessment of potential environmental effects of the proposed improvements, and identification of reasonable measures to mitigate any potential adverse impacts. Due to the ongoing Public Health Emergency related to COVID-19, an Online Public Information Centre (PIC) will be available to the public to provide input on the Tuck Creek Erosion Control EA.

How to Participate:

Step 1: Visit https://www.burlington.ca/en/services-for-you/tuck-creek-erosion-control-ea-at-3-locations.asp by using your computer or mobile phone
Step 2: View the PIC boards provided on the website. PIC boards will be available for review from Thursday, December 10th, 2020.
Step 3: Attend the web presentation as per the details below:

When: Tuesday, December 15th, 2020, 6:00pm to 7:30pm (1 hour presentation, 30 minute Q&A)

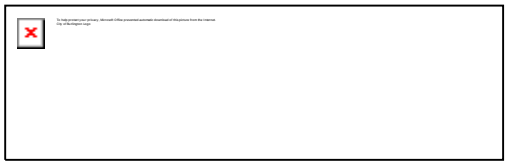
Where: WebEx - https://amosr.my.webex.com/join/Amos

The City is committed to informing and engaging the public on the Tuck Creek Erosion Control Class EA and will also be posting Public Information Centre content on the City's website starting December 10th, 2020 to January 11th, 2021.

Thank you,

Arif Shahzad, M.Eng., P.Eng.
Senior Project Manager - Stormwater Engineering
Capital Works

(905) 335-7600 ext.7486
arif.shahzad@burlington.ca



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Tuck Creek Erosion Control Class Environmental Assessment

Harvester Road to Hydro Right of Way, Palmer Drive to CN Rail & Dundas Street to Headon Road

Notice of Public Information Centre

The Study

The City of Burlington has retained Aquafor Beech Limited to undertake a Municipal Class Environmental Assessment (EA) to study erosion related risks to three segments of Tuck Creek: i) from Dundas Street to Headon Road, ii) Palmer Drive to the CN Rail, and iii) Harvester Road to the Hydro Right of Way. The study areas are illustrated on the following page.

The objective of the study is to address creek erosion, protect infrastructure and private properties, and enhance the natural heritage of the Tuck Creek corridor. Alternative strategies will be investigated, including restoration and stabilization of Tuck Creek using natural and engineered approaches.

The Process

The Tuck Creek Erosion Control Municipal Class Environmental Assessment will be conducted as a Schedule B Project in accordance with the Municipal Class Environmental Assessment which is an approved process under the *Ontario Environmental Assessment Act*. The Class EA process includes public and review agency consultation, an evaluation of alternatives, an assessment of potential environmental effects of the proposed improvements, and identification of reasonable measures to mitigate any potential adverse impacts.

Online Public Information Centre

Due to the ongoing Public Health Emergency related to COVID-19, an Online Public Information Centre (PIC) will be available to the public to provide input on the Tuck Creek Erosion Control EA.

How to Participate:

Step 1: Visit https://www.burlington.ca/en/services-for-you/tuck-creek-erosion-control-ea-at-3-locations.asp by using your computer or mobile phone

Step 2: View the PIC boards provided on the website. PIC boards will be available for review from Thursday, December 10th, 2020.

Step 3: Attend the web presentation as per details below:

When: Tuesday, December 15th, 2020, 6:00pm to 7:30pm (1 hour presentation, 30 minute Q&A)

Where: WebEx - https://amosr.my.webex.com/join/Amos

The City is committed to informing and engaging the public on the Tuck Creek Erosion Control Class EA and will also be posting Public Information Centre content on the City's website starting December 10th, 2020 to January 11th, 2021.

We are interested in hearing any comments or concerns you may have with respect to this study. Comments received through the course of the study will be considered in selecting the preferred solution. Information will be collected in accordance with the Municipal Freedom of Information and Protection of Privacy Act. With the exception of personal information, all comments will be become part of the public record.

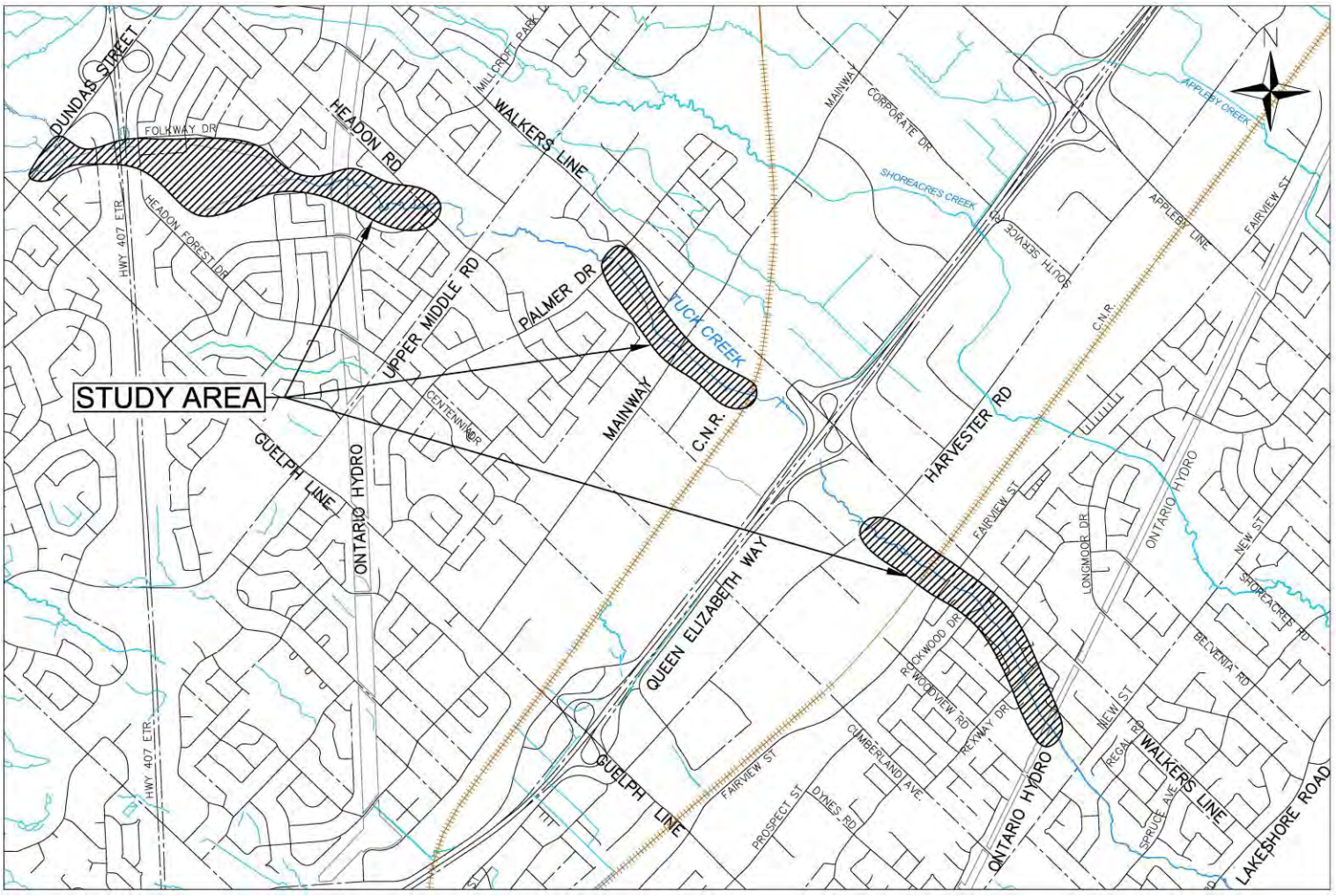
If you would like more information or would like to be placed on the Study mailing list, please contact:

Arif Shahzad, M. Eng., P. Eng.
City of Burlington, Senior Project Manager
426 Brant Street, P.O. Box 5013
Burlington, ON L7R 3Z6
905-335-7600 ext. 7486
Arif.Shahzad@burlington.ca

Robert Amos, MASc., P.Eng.
Aquafor Beech Ltd.
2600 Skymark Ave. Building 6, Unit 2
Mississauga, ON L4W 5B2
Ph 416-705-2367
Amos.R@Aquaforbeech.com

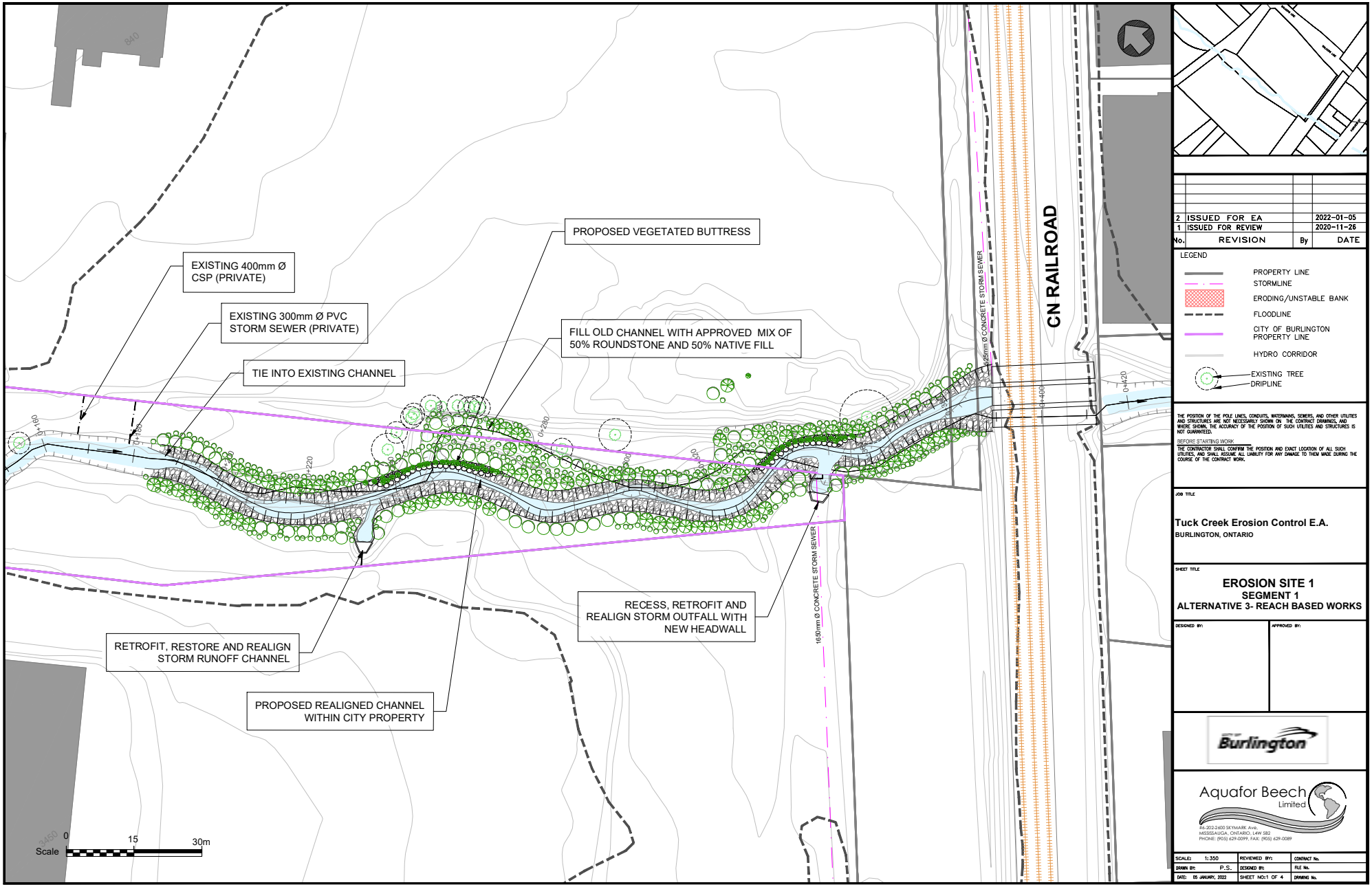
Please contact the Project Manager regarding disability accommodation requirements.

Study Area



Appendix G –

Conceptual Design Drawings for the Preferred Alternatives



No.	REVISION	By	DATE
2	ISSUED FOR EA		2022-01-05
1	ISSUED FOR REVIEW		2020-11-26

LEGEND

- PROPERTY LINE
- STORMLINE
- ERODING/UNSTABLE BANK
- FLOODLINE
- CITY OF BURLINGTON PROPERTY LINE
- HYDRO CORRIDOR
- EXISTING TREE DRIPLINE

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BEFORE STARTING WORK

THE CONTRACTOR SHALL CONFIRM THE POSITION AND EXACT LOCATION OF ALL SUCH UTILITIES, AND SHALL ASSUME ALL LIABILITY FOR ANY DAMAGE TO THEM MADE DURING THE COURSE OF THE CONTRACT WORK.

JOB TITLE

Tuck Creek Erosion Control E.A.
BURLINGTON, ONTARIO

SHEET TITLE

EROSION SITE 1
SEGMENT 1
ALTERNATIVE 3- REACH BASED WORKS

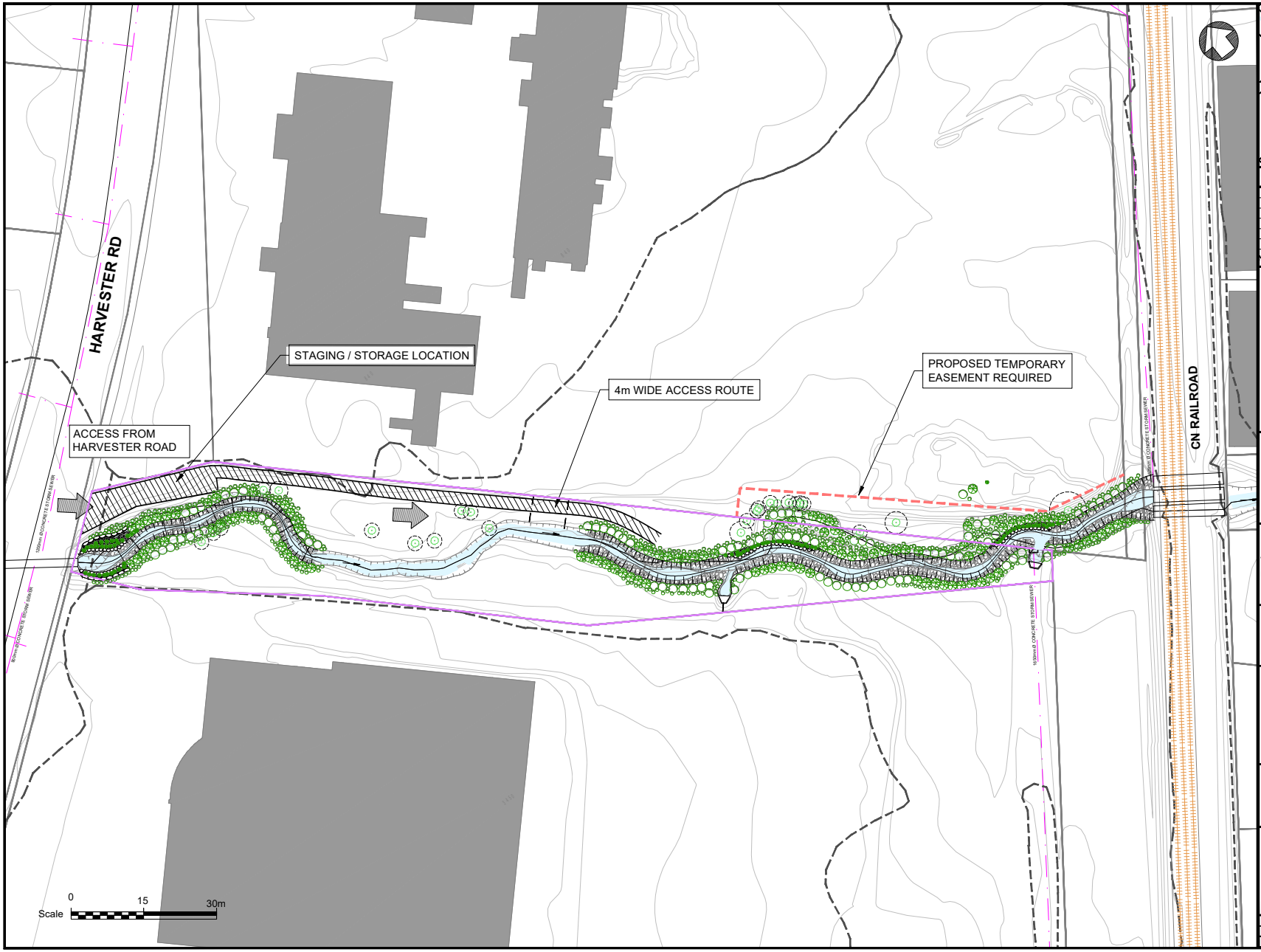
DESIGNED BY:

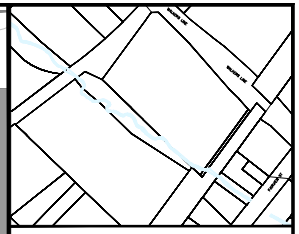
APPROVED BY:

Burlington

Aquafor Beech Limited
Unit 2-202-2400 SKYMARK Ave.,
MISSISSAUGA, ONTARIO, L4W 5B2
PHONE: (905) 629-0099, FAX: (905) 629-0089

SCALE: 1:350	REVIEWED BY:	CONTRACT No.	
DRAWN BY: P.S.	DESIGNED BY:	FILE No.	
DATE: 05 JANUARY, 2022	SHEET NO:1 OF 4	DRAWING No.	





No.	REVISION	By	DATE
2	ISSUED FOR EA		2022-01-05
1	ISSUED FOR REVIEW		2020-11-26

LEGEND

- PROPERTY LINE
- STORMLINE
- ERODING/UNSTABLE BANK
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JOB TITLE

Tuck Creek Erosion Control E.A.
BURLINGTON, ONTARIO

SHEET TITLE

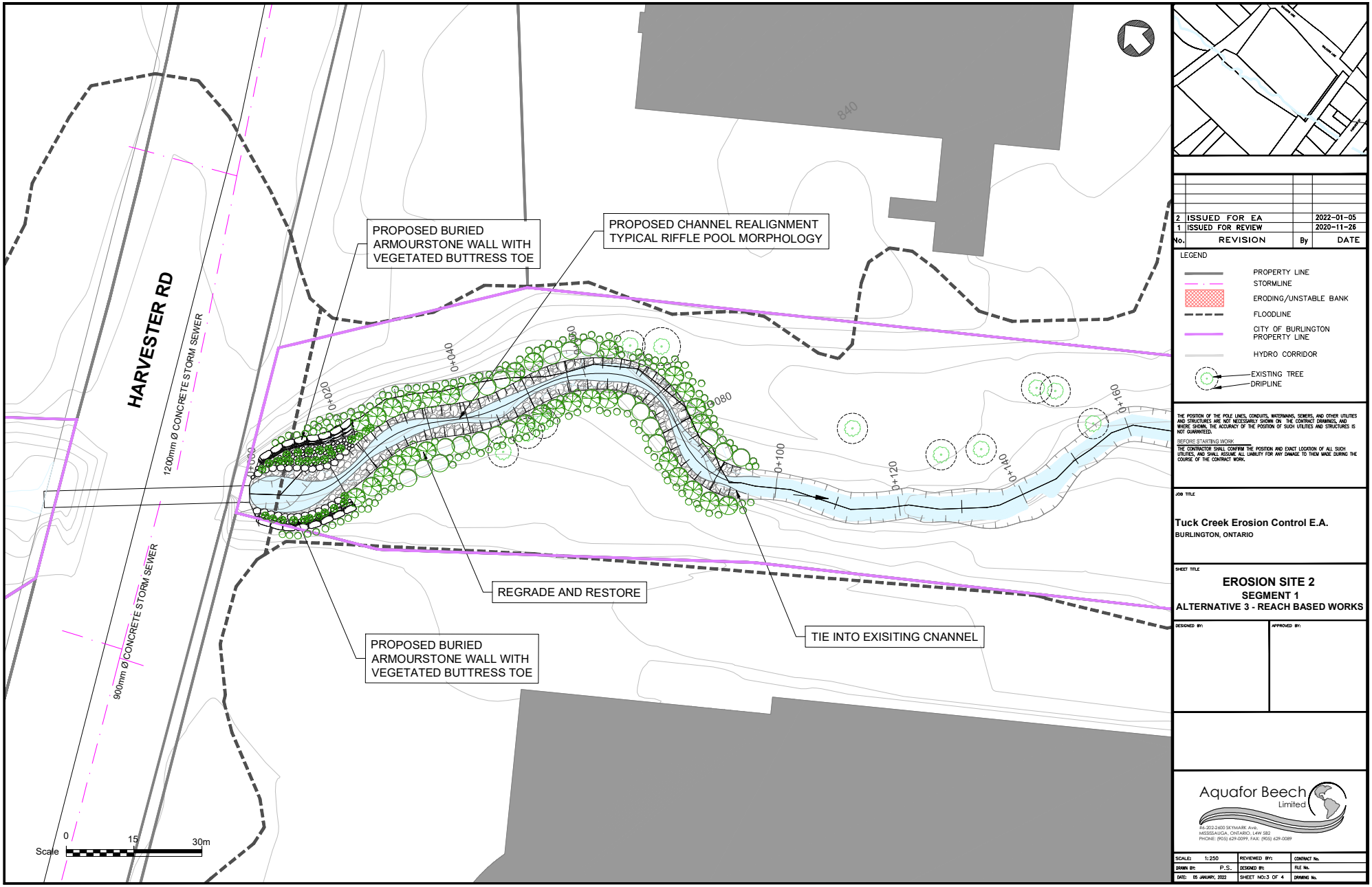
EROSION SITE 1
SEGMENT 1
ACCESS AND STAGING

DESIGNED BY:	APPROVED BY:

Burlington

Aquafor Beech Limited
Unit 2-2-2400 SKYMARK Ave.,
MISSISSAUGA, ONTARIO, L4W 5B2
PHONE: (905) 629-0099, FAX: (905) 629-0089

SCALE: 1:350	REVIEWED BY:	CONTRACT No.	
DRAWN BY: P.S.	DESIGNED BY:	FILE No.	
DATE: 05 JANUARY, 2022	SHEET NO: 4 OF 4	DRAWING No.	



No.	REVISION	By	DATE
2	ISSUED FOR EA		2022-01-05
1	ISSUED FOR REVIEW		2020-11-26

LEGEND

- PROPERTY LINE
- STORMLINE
- ERODING/UNSTABLE BANK
- FLOODLINE
- CITY OF BURLINGTON PROPERTY LINE
- HYDRO CORRIDOR
- EXISTING TREE DRIPLINE

THE POSITION OF THE POLE LINES, CONDUITS, WATERMAINS, SEWERS, AND OTHER UTILITIES AND STRUCTURES ARE NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED.

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JOB TITLE

Tuck Creek Erosion Control E.A.
BURLINGTON, ONTARIO

SHEET TITLE

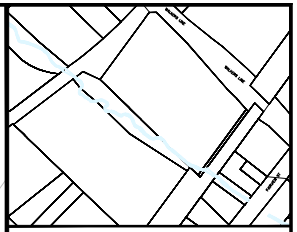
EROSION SITE 2
SEGMENT 1
ALTERNATIVE 3 - REACH BASED WORKS

DESIGNED BY:	APPROVED BY:

Aquafor Beech Limited
Unit 2-2200 SKYMARK Ave.,
MISSISSAUGA, ONTARIO, L4W 5B2
PHONE: (905) 629-0099, FAX: (905) 629-0089

SCALE: 1:250	REVIEWED BY:	CONTRACT No.
DRAWN BY: P.S.	DESIGNED BY:	FILE No.
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BURLINGTON, ONTARIO

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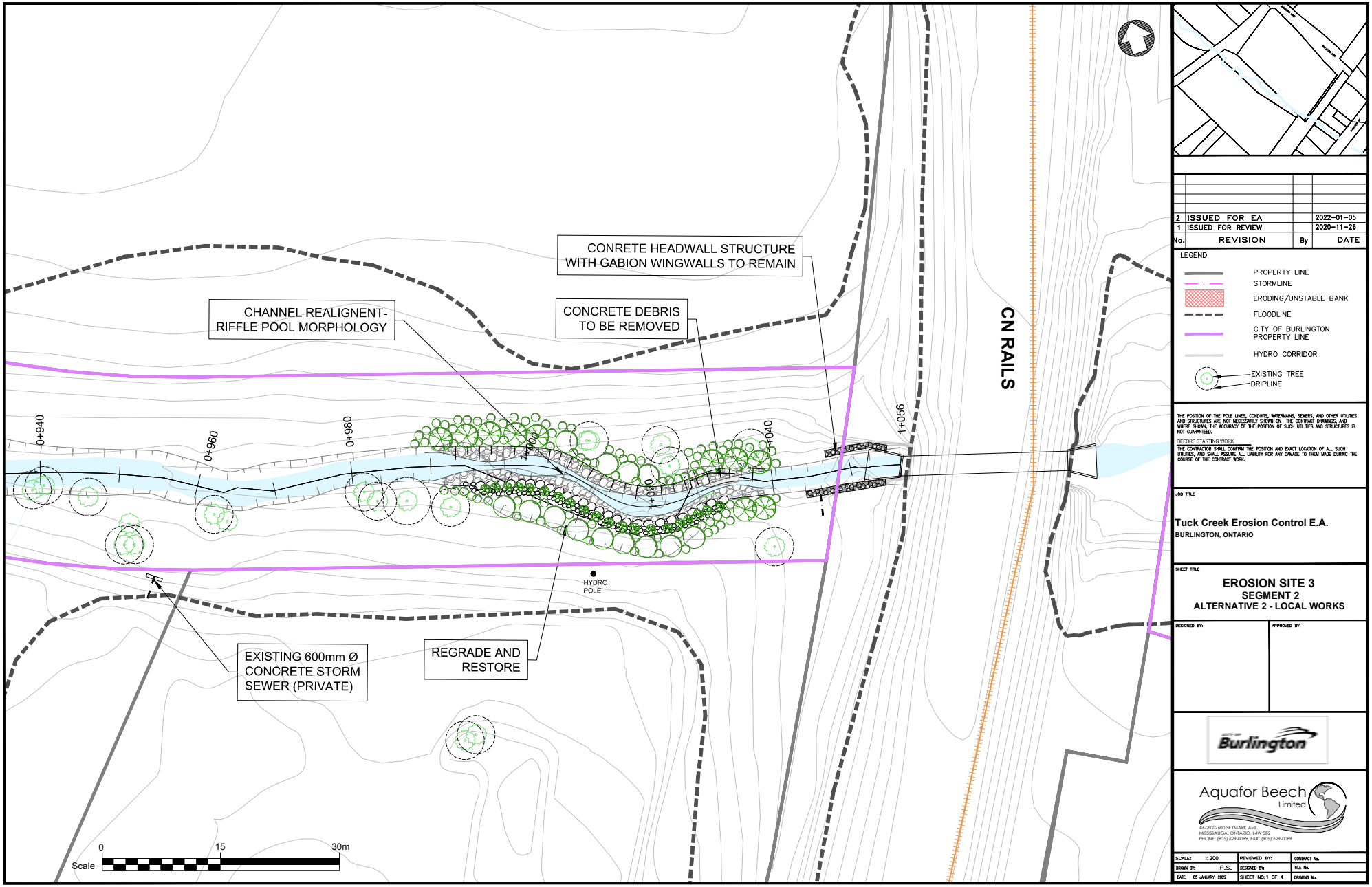
EROSION SITE 2
SEGMENT 1
ACCESS AND STAGING

DESIGNED BY:

APPROVED BY:

Aquafor Beech Limited
Unit 2-202-2400 SKYMARK Ave.,
MISSISSAUGA, ONTARIO, L4W 5B2
PHONE: (905) 629-0099, FAX: (905) 629-0089

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JOB TITLE

Tuck Creek Erosion Control E.A.

BURLINGTON, ONTARIO

SHEET TITLE

EROSION SITE 3

SEGMENT 2

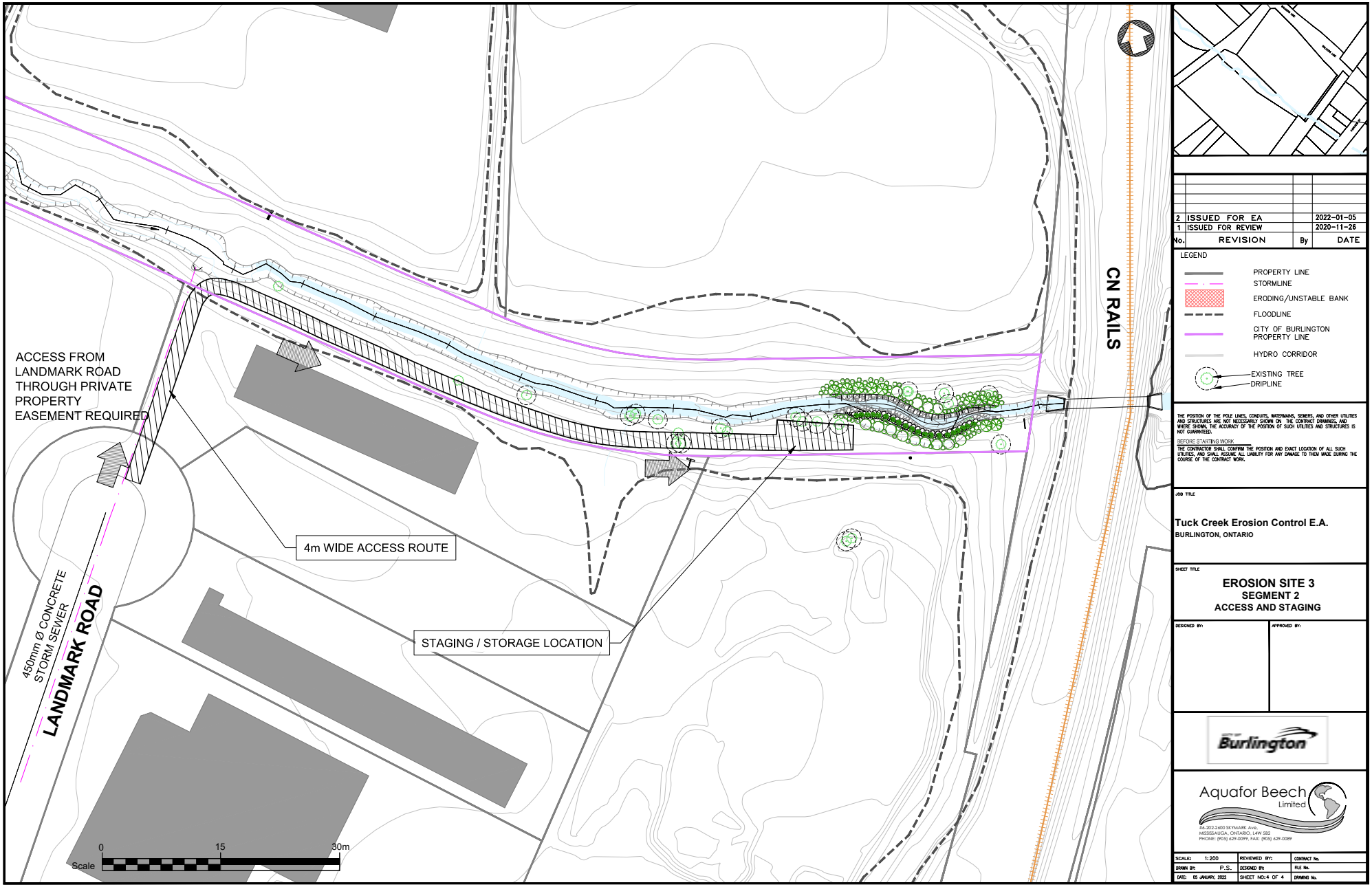
ALTERNATIVE 2 - LOCAL WORKS

DESIGNED BY:	APPROVED BY:

City of Burlington

Aquafor Beech Limited
#4-2224400 SKYMARK Ave.,
MISSISSAUGA, ONTARIO, L4W 5B2
PHONE: (905) 629-0099, FAX: (905) 629-0089

SCALE: 1:200	REVIEWED BY:	CONTRACT No.	
DRAWN BY: P.S.	DESIGNED BY:	FILE No.	
DATE: 05 JANUARY, 2022	SHEET NO:1 OF 4	DRAWING No.	



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BURLINGTON, ONTARIO

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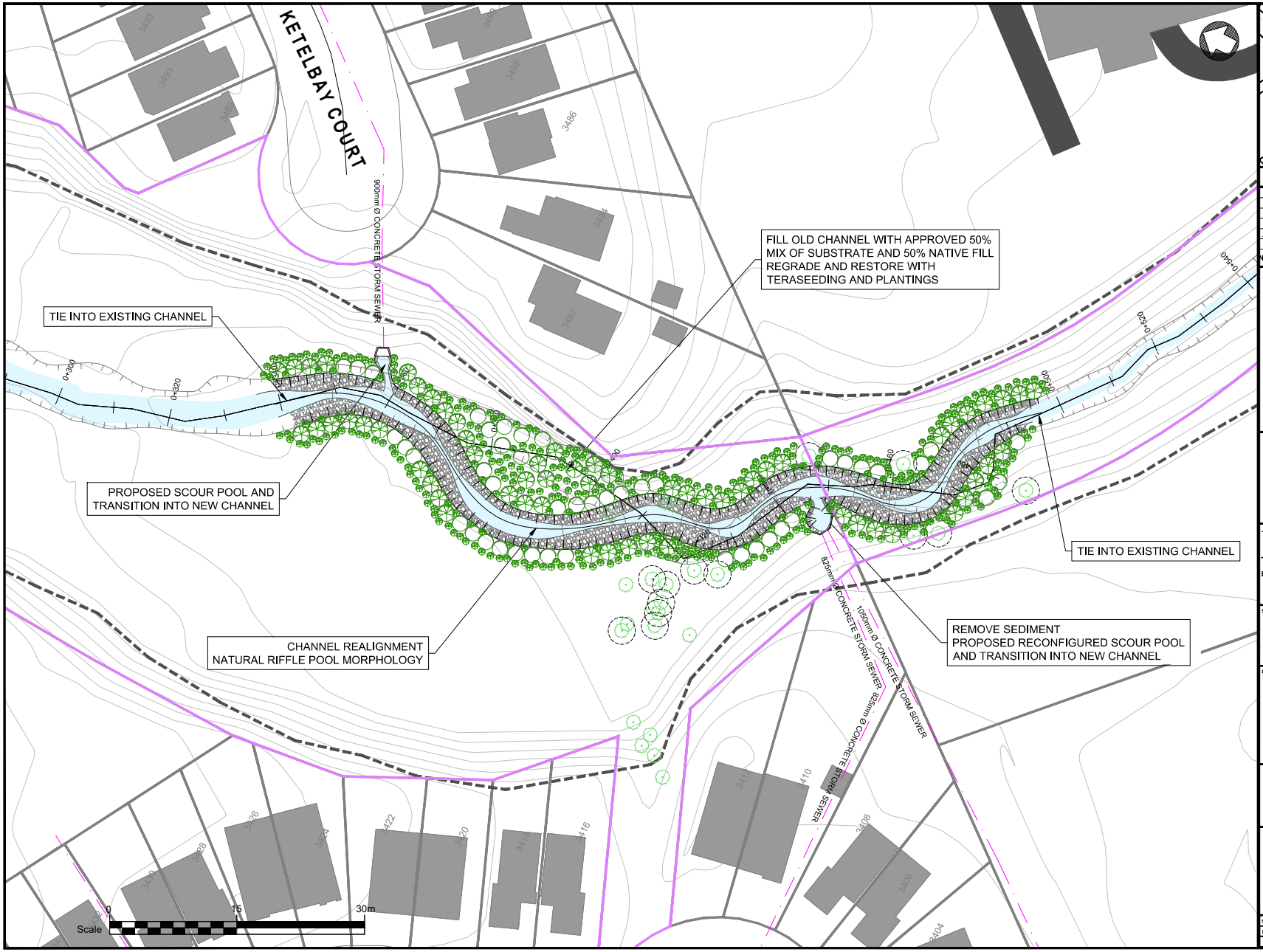
EROSION SITE 3
SEGMENT 2
ACCESS AND STAGING

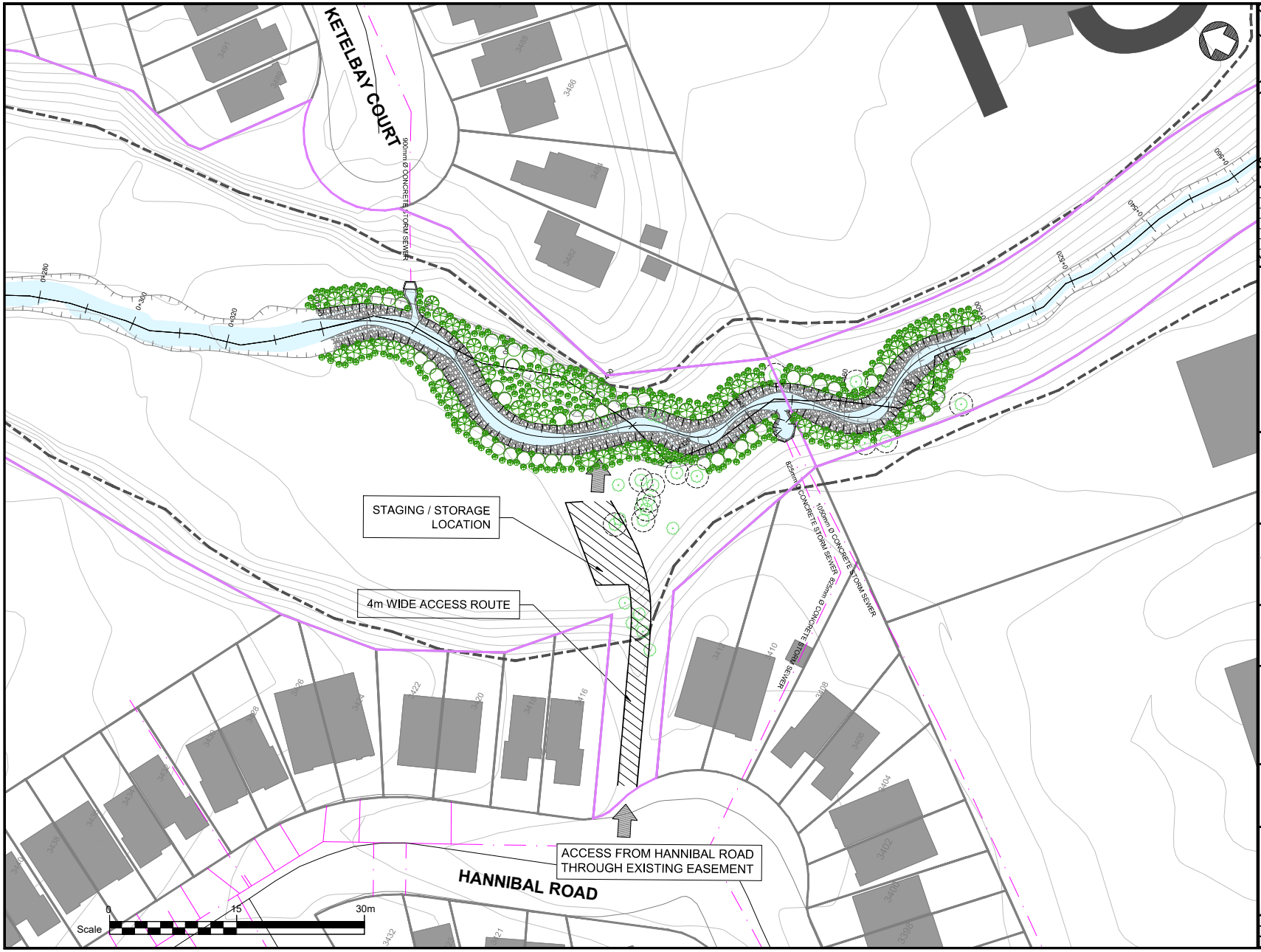
DESIGNED BY:	APPROVED BY:

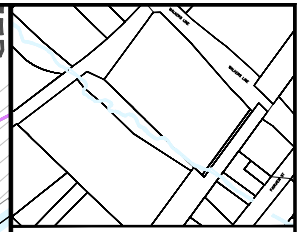
Burlington

Aquafor Beech Limited
Unit 2-2020 2400 SKYMARK Ave.,
MISSISSAUGA, ONTARIO, L4W 5B2
PHONE: (905) 629-0099, FAX: (905) 629-0089

SCALE: 1:200	REVIEWED BY:	CONTRACT No.
DRAWN BY: P.S.	DESIGNED BY:	FILE No.
DATE: 05 JANUARY, 2022	SHEET NO: 4 OF 4	DRAWING No.


KETELBAY COURT
900mm Ø CONCRETE STORM SEWER
FILL OLD CHANNEL WITH APPROVED 50% MIX OF SUBSTRATE AND 50% NATIVE FILL REGRADE AND RESTORE WITH TERASEEDING AND PLANTINGS
TIE INTO EXISTING CHANNEL
PROPOSED SCOUR POOL AND TRANSITION INTO NEW CHANNEL
CHANNEL REALIGNMENT NATURAL RIFFLE POOL MORPHOLOGY
TIE INTO EXISTING CHANNEL
REMOVE SEDIMENT PROPOSED RECONFIGURED SCOUR POOL AND TRANSITION INTO NEW CHANNEL
825mm Ø CONCRETE STORM SEWER
1050mm Ø CONCRETE STORM SEWER
825mm Ø CONCRETE STORM SEWER
0+300
0+320
0+500
0+520
0+540
0+560
0+580
0+600
0+620
0+640
0+660
0+680
0+700
0+720
0+740
0+760
0+780
0+800
0+820
0+840
0+860
0+880
0+900
0+920
0+940
0+960
0+980
1+000
1+020
1+040
1+060
1+080
1+100
1+120
1+140
1+160
1+180
1+200
1+220
1+240
1+260
1+280





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Tuck Creek Erosion Control E.A.
BURLINGTON, ONTARIO

SHEET TITLE

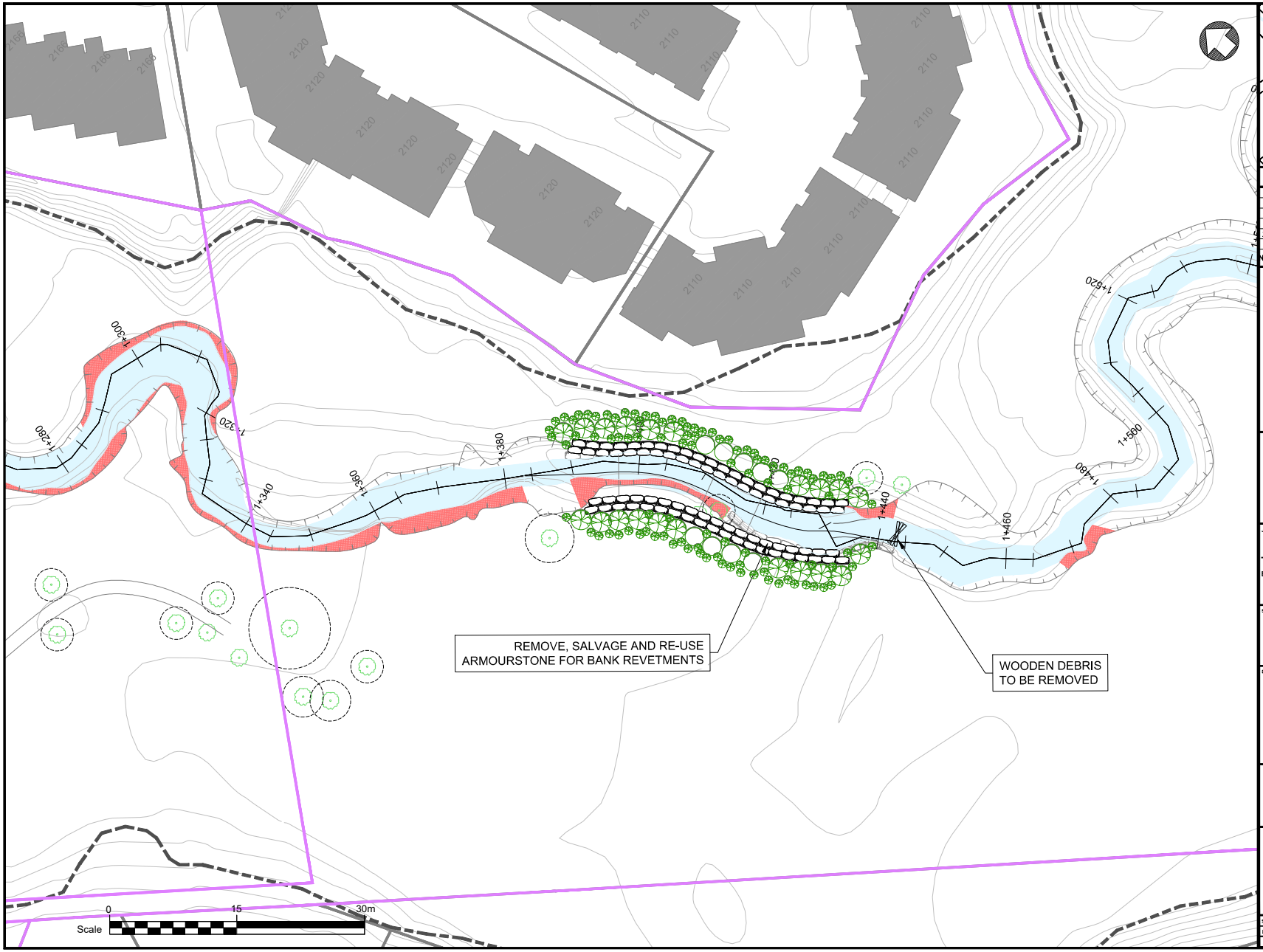
EROSION SITE 4
SEGMENT 2
ACCESS AND STAGING

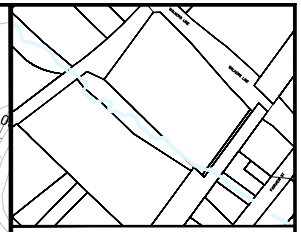
DESIGNED BY:	APPROVED BY:

Burlington

Aquafor Beech Limited
14-2122400 SKYMARK Ave,
MISSISSAUGA, ONTARIO, L4W 5B2
PHONE: (905) 629-0099, FAX: (905) 629-0089

SCALE: 1:350	REVIEWED BY:	CONTRACT No.	
DRAWN BY: P.S.	DESIGNED BY:	FILE No.	
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Tuck Creek Erosion Control E.A.
BURLINGTON, ONTARIO

SHEET TITLE

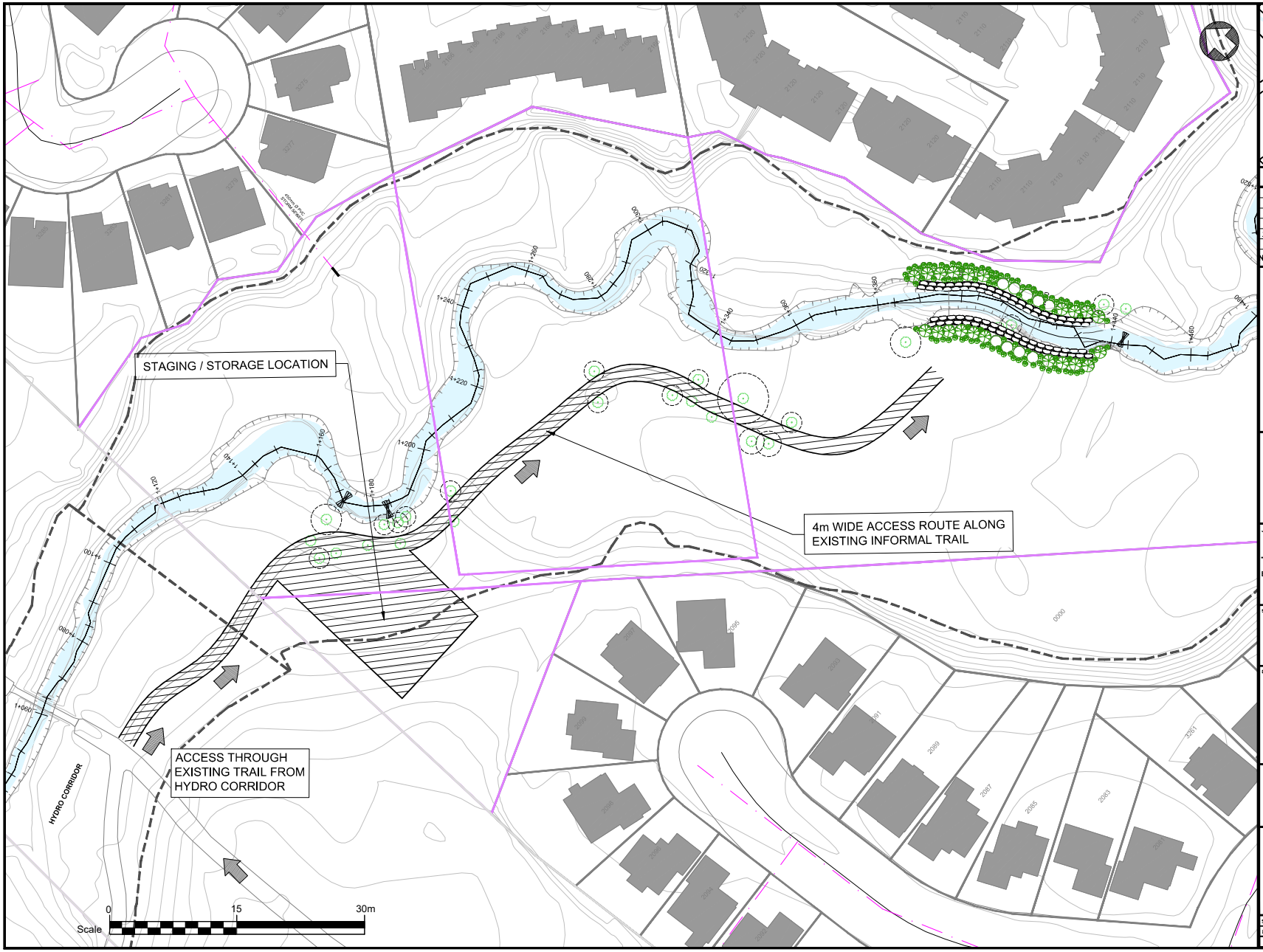
EROSION SITE 5
SEGMENT 3
ALTERNATIVE 2 - LOCAL WORKS

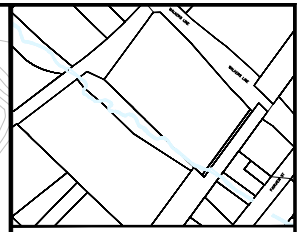
DESIGNED BY:	APPROVED BY:

City of Burlington

Aquafor Beech Limited
1A-2022400 SKYMARK Ave,
MISSISSAUGA, ONTARIO, L4W 5B2
PHONE: (905) 629-0099, FAX: (905) 629-0089

SCALE: 1:250	REVIEWED BY:	CONTRACT No.	
DRAWN BY: P.S.	DESIGNED BY:	FILE No.	
DATE: 05 JANUARY, 2022	SHEET NO:2 OF 4	DRAWING No.	





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Tuck Creek Erosion Control E.A.
BURLINGTON, ONTARIO

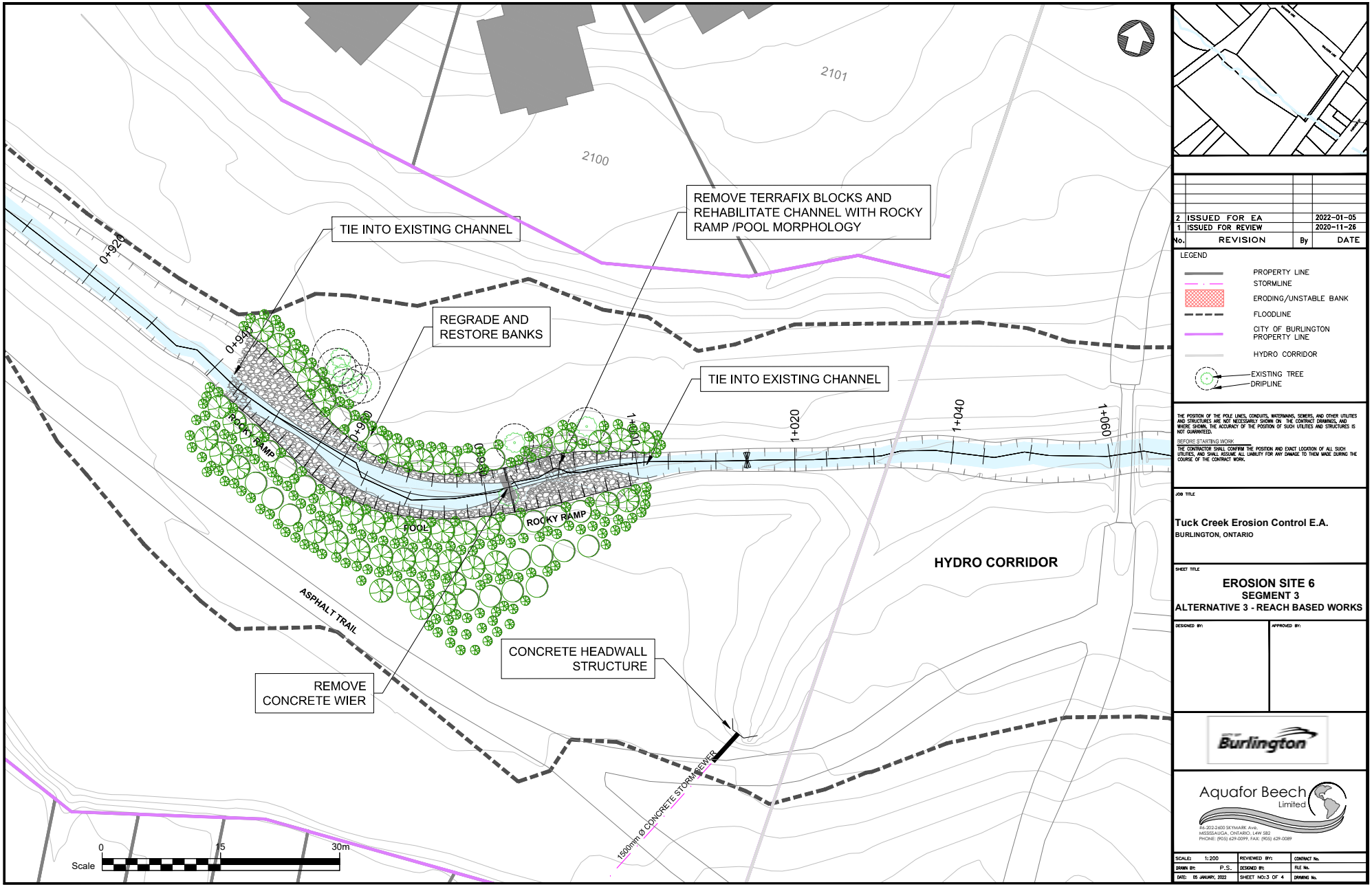
SHEET TITLE

EROSION SITE 5
SEGMENT 3
ACCESS AND STAGING

DESIGNED BY:	APPROVED BY:

Aquafor Beech Limited
#4-2122400 SKYMARK Ave.,
MISSISSAUGA, ONTARIO, L4W 5B2
PHONE: (905) 629-0099, FAX: (905) 629-0089

SCALE: 1:400	REVIEWED BY:	CONTRACT No.	
DRAWN BY: P.S.	DESIGNED BY:	FILE No.	
DATE: 05 JANUARY, 2022	SHEET NO: 4 OF 4	DRAWING No.	



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BURLINGTON, ONTARIO

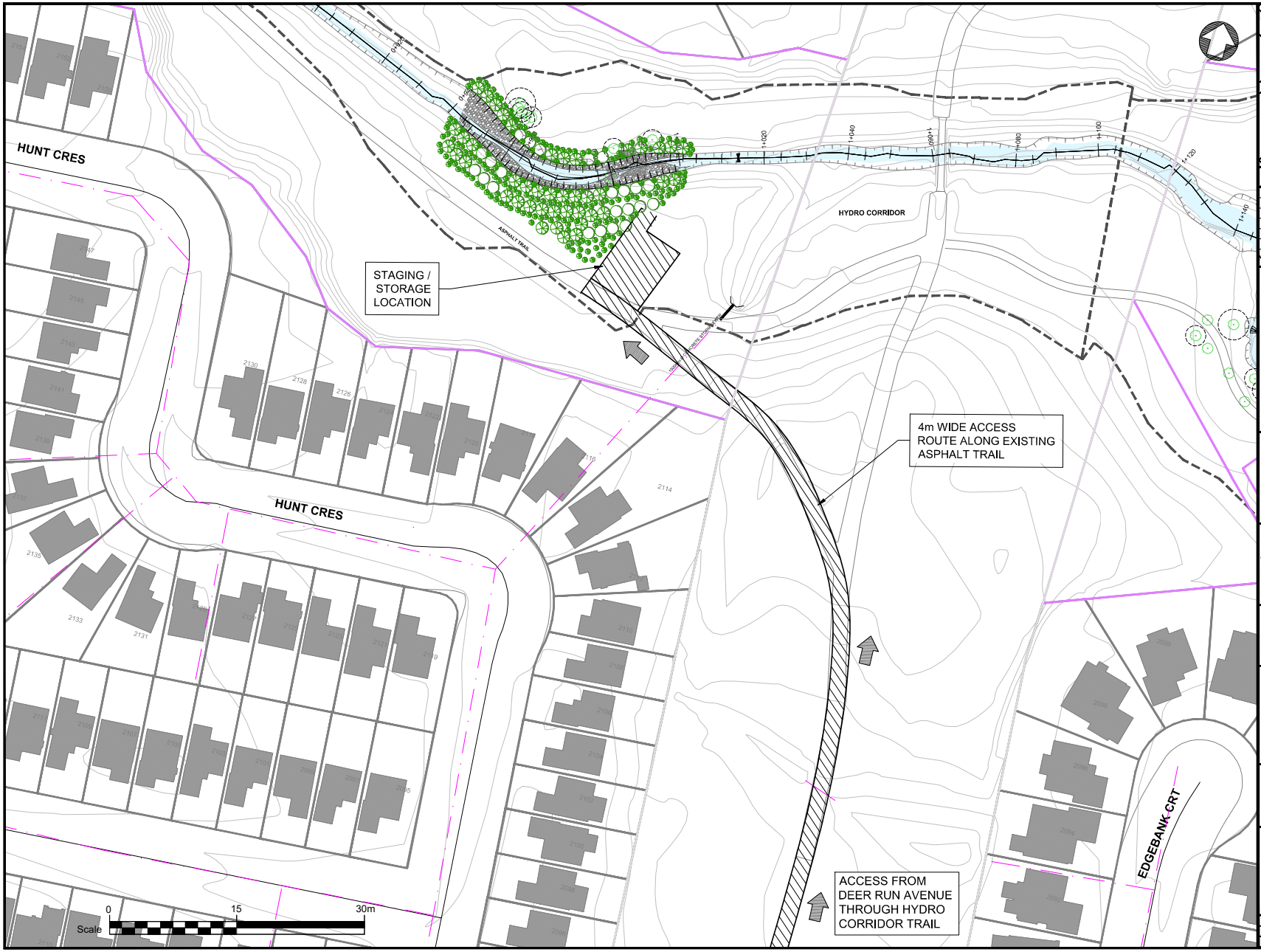
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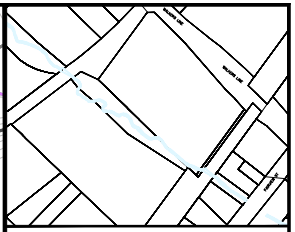
EROSION SITE 6
SEGMENT 3
ALTERNATIVE 3 - REACH BASED WORKS

DESIGNED BY:	APPROVED BY:

Aquafor Beech Limited
#4-2323400 SKYMARK Ave.,
MISSISSAUGA, ONTARIO, L4W 5B2
PHONE: (905) 629-0099, FAX: (905) 629-0089

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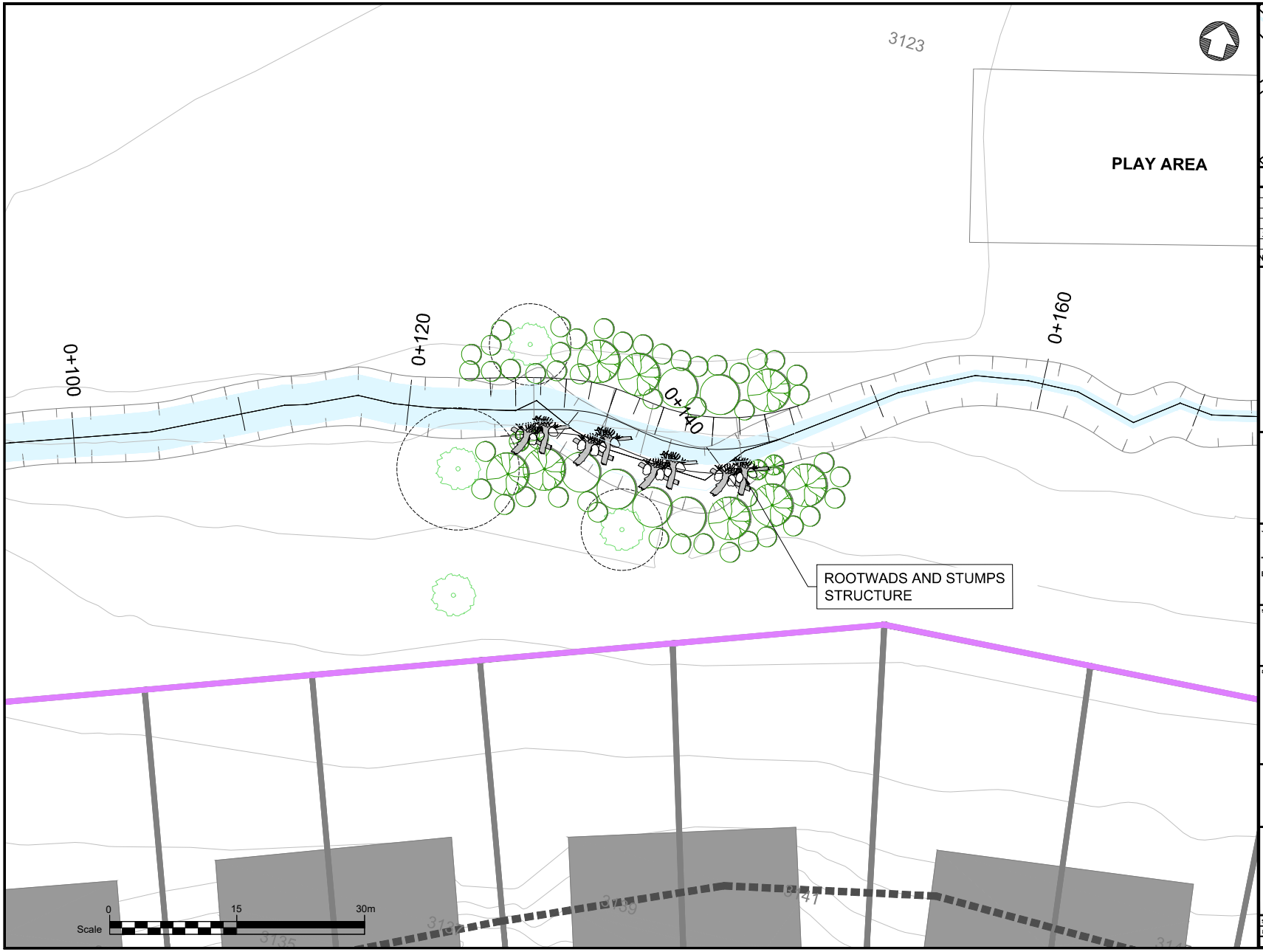
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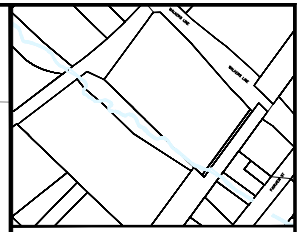
EROSION SITE 6
SEGMENT 3
ACCESS AN STAGING

DESIGNED BY:	APPROVED BY:

Aquafor Beech Limited
14-2122400 SKYMARK Ave,
MISSISSAUGA, ONTARIO, L4W 5B2
PHONE: (905) 629-0099, FAX: (905) 629-0089

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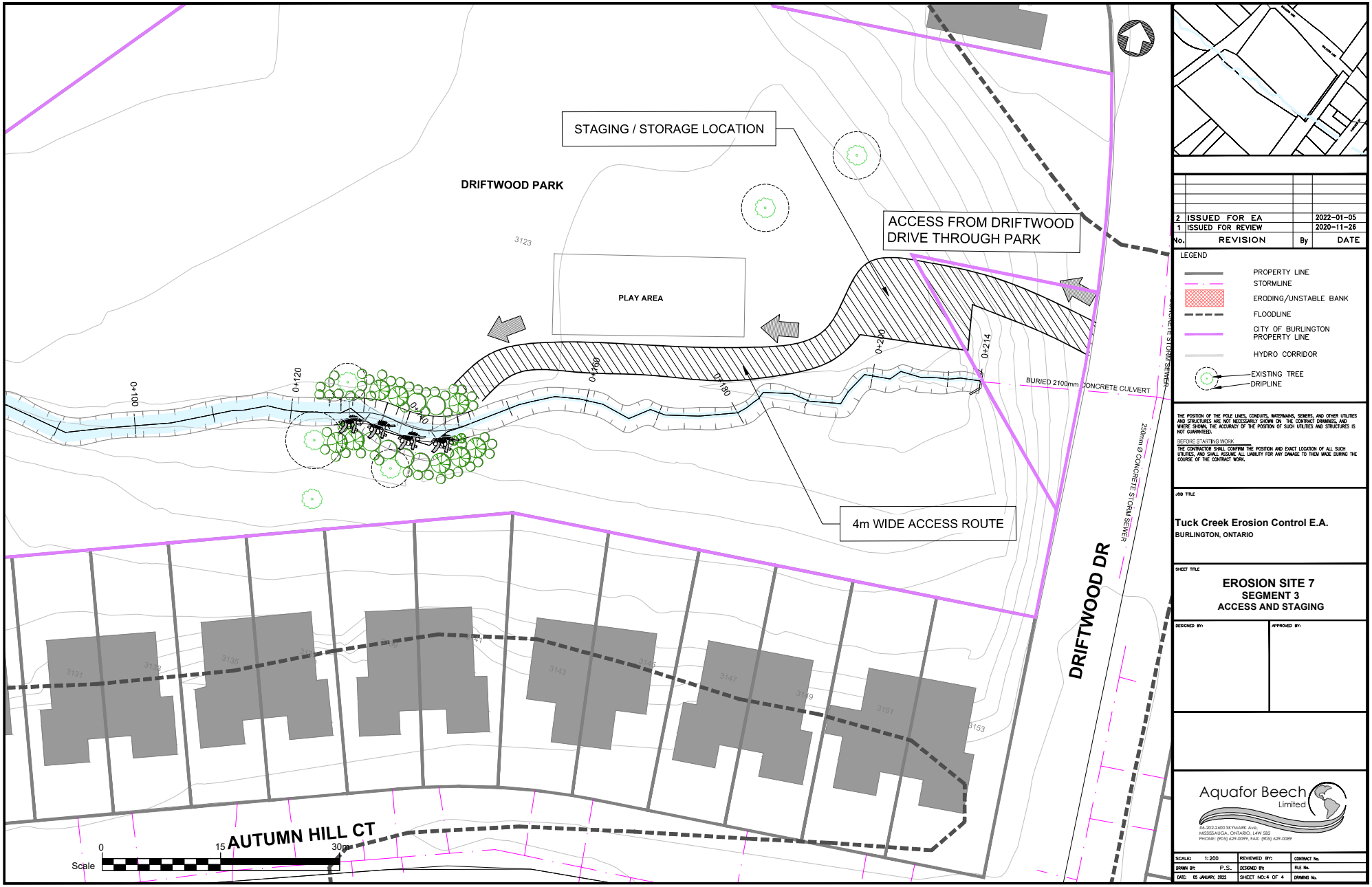
SHEET TITLE

EROSION SITE 7
SEGMENT 3
ALTERNATIVE 2 - NATURAL DESIGN

DESIGNED BY:	APPROVED BY:

Aquafor Beech Limited
#4-2224400 SKYMARK Ave.,
MISSISSAUGA, ONTARIO, L4W 5B2
PHONE: (905) 629-0099, FAX: (905) 629-0089

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BURLINGTON, ONTARIO

SHEET TITLE

EROSION SITE 7
SEGMENT 3
ACCESS AND STAGING

DESIGNED BY:

APPROVED BY:

Aquafor Beech Limited
Unit 2-22-2400 SKYMARK Ave.,
MISSISSAUGA, ONTARIO, L4W 5B2
PHONE: (905) 629-0099, FAX: (905) 629-0089

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