Submitted to:
The Regional Municipality of Halton

BRITANNIA ROAD TRANSPORTATION CORRIDOR IMPROVEMENTS: TREMAINE ROAD TO HIGHWAY 407 CLASS EA STUDY

ENVIRONMENTAL STUDY REPORT – TERRESTRIAL AND AQUATIC RESOURCES

A Report Submitted by:
Aquafor Beech Limited

In association with

North-South Environmental Inc.
and
Aboud & Associates

September 8th 2014

Contact:

Greg Frew, M.Sc., P.Eng
Aquafor Beech Ltd.
frew.g@aquaforbeech.com

2600 Skymark Ave.
Suite 202, Building 6
Mississauga, ON, L4W 5B2
T. 905-629-0099 x 276

The information contained within this report, particularly as it pertains to the Boyne Survey Secondary Plan Area, is based in part on recommendations from draft versions of the *Boyne Survey Secondary Plan Area Functional Stormwater and Environmental Management Strategy (FSEMS), Boyne Survey Secondary Plan Area Conceptual Fisheries Compensation Plan (CFCP)* and *Sixteen Mile Creek Areas 2 and 7 Subwatershed Update Study (SUS)*. Further updates on the recommendations contained in this report may be required at detail design, once the FSEMS, CFCP and SUS have been finalized and approved by Conservation Halton. The information contained in the final versions of these reports will need to be incorporated into the detailed design of the roadway corridor where appropriate.

Table of Contents

List of Figures

List of Tables

List of Appendices – (Separate Document)

1.0 INTRODUCTION

The study area is located within the Town of Milton in Halton Region and consists of a 12 km stretch of road between Hwy 407 in the East to Tremaine Road in the West. The land uses within the project limits are predominantly agricultural with residential properties scattered throughout its length. The study area contains 18 watercourse crossings, one of which is located within the Sixteen Mile Creek Valley Environmentally Sensitive Area. This Environmentally Sensitive Area is an incised valley cut into both the Queenston Formation and Georgian Bay Formation shales containing mature maple-oak-beech-pine woodlots and almost 400 species of vascular plants.

2.0 METHODOLOGY

2.1 Background Information

Existing background information for environmental resources within the projects limits was collected and reviewed from the following sources:

- Bronte Creek and Supplemental Monitoring: Long Term Environmental Monitoring Program. Conservation Halton (October 2009).
- Functional Stormwater and Environmental Management Strategy: Boyne Survey Secondary Plan Area. AMEC Earth & Environmental (March 2011).
- Draft Milton Urban Expansion Conceptual Fisheries Compensation Plan: Boyne Survey Area. AMEC Earth & Environmental (March 2011).
- Functional Stormwater and Environmental Management Strategy: Derry Green Secondary Plan Area. AMEC Earth & Environmental (September, 2010).
- Halton Region Environmentally Sensitive Areas Consolidation Report. (Halton Region and North-South Environmental Inc. April 2005).
- Indian Creek/Sixteen Mile Creek Sherwood Survey Subwatershed Management Study. Philips Engineering Ltd. (December, 2004).
- Sixteen Mile Creek Areas 2 and 7 Subwatershed Update Study. AMEC Earth & Environmental (July, 2010)
- Sixteen Mile Creek, Grindstone Creek and Supplemental Monitoring: Long Term Environmental Monitoring Program. Conservation Halton (October, 2010).
- Town of Milton Official Plan (August, 2010).

- Regional Municipality of Halton Official Plan (2006).

2.2 Field Work

2.2.1 Terrestrial Resources

As part of the Environmental Assessment of the proposed widening of Britannia Road between Highway 407 and Tremaine Road, a comprehensive field survey and assessment of terrestrial resources was undertaken. This information documents existing conditions and permits an assessment of potential environmental impacts of design alternatives. The terrestrial ecological studies include the following work program:

1. Review background reports / studies / models
2. Vegetation Inventory/Assessment – for the preferred alternative. Vegetation inventory/assessment included:
    - Tree inventory - documenting species and caliper of tree; the location of trees > 250 mm DBH have been recorded by handheld GPS for mapping.
    - Ecological Land Classification - East and Main branches of Sixteen Mile Creek 125 meters north and south of Britannia Road, and two woodlands that abut Britannia Road (Western Woodland and Eastern Woodland)
3. Wildlife Inventory – Breeding bird point counts were conducted along Britannia Road and with the Western Woodland in order to identify any species at risk and document any significant wildlife habitat. Amphibian calling surveys were conducted at 13 stations along the length of the study area.
4. Wildlife habitats were identified based on available information
    - opportunities for species migrations will be identified
    - occupied habitats for any species at risk will be identified
    - propose mitigation strategies
5. Delineate wetlands within 125 m of Britannia Road according to the Ontario Wetland Evaluation System (OWES)
    - map wetlands and propose mitigation strategies

Field inventories were completed between June 26th and October 4th 2011, and between April 15th and June 24th, 2013. Table 2.1 provides a summary of the dates for which field work was undertaken.

Table 2.1: Dates of field work completed for the terrestrial ecology assessment of the Britannia Road EA.

Field Work Tasks	Date(s) Completed
Breeding bird surveys	June 26, and June 27, 2011; June 19, 2013
Vegetation surveys and ELC	September 16 and 22, 2011; June 18, 2013
Tree inventory	July 18 and 19, 2011
Wetland staking and delineation	October 4, 2011
Calling Amphibian Surveys	April 15, May 8, and June 24, 2013

2.2.1.1 Ecological Land Classification

Vegetation communities along the proposed road widening were classified according to ELC protocols (Lee et al. 1998). In the locations where Britannia Road crosses the Main Branch and the East Branch of Sixteen Mile Creek as well as the two woodlands, a more comprehensive ELC characterization was completed including vegetation classification to "Vegetation Type". For the Main Branch and East Branch of Sixteen Mile Creek ELC characterization, the area of study extended 125 meters north and south of Britannia Road and included the valley slopes and floodplain of Sixteen Mile Creek. In other areas the ELC characterization classified vegetation communities to "Community Series" for areas adjacent to the existing roadway.

2.2.1.2 Tree Inventory and Assessment

Trees of a size greater than 25 cm DBH located within 40 meters north and south of Britannia Rd. were included in the inventory excluding trees within the two woodlands. The approximate average size and condition of the trees within the woodlands was noted. Tree diameter was measured using a DBH tape and tree health was recorded according to trunk integrity, crown structure, and crown vigour using criteria provided in APPENDIX 2. The tree health parameters are combined to provide a tree vigour class from excellent (1) to dead (6) for each tree recorded (refer to APPENDIX 2 for further explanations of each tree vigour class). The location of each tree was recorded using a handheld GPS unit.

2.2.1.3 Wetland Delineation

In order to better understand the potential impact of the proposed road widening on wetlands the boundary of a larger wetland located on the north side of Britannia Road west of Highway 407 was delineated. Wetland delineation was completed following the protocols in the Ontario Wetland Evaluation System Southern Manual (OMNR, 2002). Wetland boundaries determined in the field were flagged by North-South Environmental and verified by Conservation Halton staff on October 4th, 2011. UTM coordinates were recorded at each flag using a hand-held GPS.

2.2.1.4 Calling Amphibian Surveys

The study area was surveyed for calling amphibians over their entire breeding season following Marsh Monitoring Program (MMP) protocols (Bird Studies Canada, 2013). This included three surveys conducted at least 2 weeks apart between April and July. Night-time air temperatures conformed to MMP standards, including greater than 5°C for the first survey, greater than 10°C for the second survey, and greater than 17°C for the third survey. Each station was surveyed for 3 minutes sometime within one half hour after sunset and before midnight. Species name, call code (1-individual calls; 2-individual and small groups; 3-full chorus) and approximate number of individuals were recorded at each monitoring station. The thirteen stations were visited on the evenings of April 15th, May 8th and June 24th, 2013.

2.2.1.5 Breeding Bird Surveys

Breeding bird surveys were completed at twenty-two locations along the existing roadway following Breeding Bird Atlas protocols whereby open communities were surveyed every 500 m and closed communities were surveyed every 250 m. At each survey point Forest Bird Monitoring Program point counts (10 min) were made. See Figures 1-3 (APPENDIX 1) for the location where point counts were conducted.

The Western Woodland was also assessed for breeding birds on June 19th, 2013, between 0600 and 0730, to record evidence of breeding birds within the woodland and in the immediately adjacent neighbouring lands. The temperature at the beginning of the survey was 12°C, with a slight breeze and 80 percent clear skies. Conditions remained similar throughout the survey. The survey consisted of a comprehensive area search of the woodland and the immediately adjacent neighbouring lands, incorporating point counts and ongoing observations.

Breeding evidence was evaluated using the following guidelines (Ontario Breeding Bird Atlas 2001), with the highest apparent level used to describe the breeding status of the species:

- "Observed" evidence is recorded when a species is observed in its breeding season but with no evidence of breeding.
- "Possible breeding" is indicated by the presence of a singing male (or breeding calls heard) in suitable habitat or the presence of a bird observed in suitable breeding habitat in its breeding season.
- "Probable breeding" is defined as an observation of any of the following: (1) a pair in breeding season in suitable habitat, (2) courtship or display between a male and a female or two males, including courtship feeding or copulation; (3) visiting probable nest site; agitated behaviour or anxiety calls of an adult; brood patch on an adult female or cloacal protuberance on an adult male; nest building or excavation of a nest hole.

- "Confirmed breeding" is defined as observation of any of the following: (1) a distraction display or injury feigning; (2) used nest or egg shell found (occupied or laid within the period of the study); (3) recently fledged young or downy young, including young incapable of sustained flight; (4) adults entering or leaving nest site in circumstances indicating occupied nest (e.g., adult carrying fecal sac; adult carrying food for young), or (5) nest containing eggs, or nest with young seen or heard.

2.2.2 Aquatic Resources

The study area is drained by tributaries within both the Bronte Creek and Sixteen Mile Creek Watersheds. The western limits of the study area are within the Indian Creek subwatershed, a tributary of Bronte Creek. The remaining study area is contained within three subwatersheds of Sixteen Mile Creek: the West Branch subwatershed (also known as Subwatershed 2), the Lower Middle Branch subwatershed (also known as Subwatershed 7), and the East-Lisgar Branch subwatershed.

Within the boundaries of the Study Area, Britannia Road crosses over three watercourses within the Indian Creek subwatershed, six watercourses within both the West Branch and Lower Middle Branch subwatersheds (which include crossings of both the Main Branch and East Branch of Sixteen Mile Creek), and three watercourses within the East-Lisgar Branch subwatershed. In total, the 12 km of study area along Britannia Road crosses 18 watercourses within four subwatersheds. These crossings are illustrated in Figures 1-3 (APPENDIX 1).

As part of the Environmental Assessment of the proposed widening of Britannia Road between Highway 407 and Tremaine Road, a comprehensive field survey and assessment of aquatic resources was undertaken. This information documents the existing aquatic conditions within the study area and permits an assessment of potential environmental impacts of design alternatives. The aquatic resource studies include the following work program:

1. Review background reports/studies
2. Fish habitat assessment – following Ministry of Transportation (MTO) Environmental Guide for Fish and Fish Habitat (2009) guidelines.
3. Drainage Feature Classification – supplement existing drainage feature classifications at road crossings per the Evaluation, Classification and Management of Headwater Drainage Features: Interim Guidelines (CVC & TRCA 2009).
4. Fisheries Assessment – supplement existing fisheries data with electrofishing surveys where data is insufficient.

Field inventories were completed between August 30 and November 24, 2011. Table 2.2 provides a summary of the dates for which aquatic field work was undertaken.

Table 2.2: Timing of Aquafor Beech Limited aquatic field work.

Field Work Tasks	Date Completed
Fish Habitat Assessment	August 30 to November 4, 2011
Drainage Feature Classification	August 30 to November 4, 2011
Fisheries Assessment	November 24, 2011

2.2.2.1 Aquatic Habitat Assessment

Aquafor Beech Limited completed fish habitat assessments at each of the 18 road crossings within the study area where landowner permission was granted. To characterize fish habitat, surveys were completed in accordance with Ministry of Transportation (MTO) Environmental Guide for Fish and Fish Habitat protocols (2009).

2.2.2.2 Aquatic Drainage Feature Classification

The drainage features classification for the study area are presented in the Sixteen Mile Creek Areas 2 and 7 Subwatershed Update Study (AMEC 2010), the Functional Stormwater and Environmental Management Strategy: Boyne Survey Secondary Plan Area (AMEC 2011), and are presented for each road crossing in Table 3.5 and illustrated in Figures 1-3 (APPENDIX 1). The road crossings within the study area not classified in AMEC 2010 or AMEC 2011 were classified by Aquafor Beech Limited biologists (Table 3.5) in accordance with the Evaluation, Classification and Management of Headwater Drainage Features: Interim Guidelines (CVC, TRCA 2009). Broad-level constraints (High, Medium, Low) have been assigned to each sub-class of management recommendations (AMEC 2011) and are outlined below:

1. **Protection** – Permanent Fish Habitat, Critical Habitat and Species at Risk (SAR).

Protection 1 ***(High Constraint)*** – permanent, critical fish habitat or habitat associated with species at risk. Generally associated with permanent groundwater discharge or wetland storage – either habitat and/or flow source characteristics may be difficult to replicate or maintain.

- Preserve the existing drainage feature and groundwater discharge or wetland in-situ, particularly if species at risk are present;
- Maintain external drainage;
- Incorporation of shallow groundwater and base flow protection techniques such as infiltration treatment;
- Use natural channel design techniques or wetland design to restore and enhance existing habitat features, if necessary; realignment not generally permitted;

- Drainage feature must connect to downstream watercourse/habitat;
- Stormwater management (e.g. extended detention outfalls) are to be designed and located to avoid and/or minimize impacts (i.e. sediment, temperature) to fish habitat;
- Examine need to incorporate groundwater flows through infiltration measures (i.e. third pipes, etc.) to ensure no net loss and potential gain.

Protection 2 ***(High Constraint with rehabilitation potential)*** – permanent fish habitat generally with permanent standing surface water associated with a wetland and/or pond flows.

- Preference is to maintain existing surface water source;
- Maintain external drainage or if catchment drainage has been previously removed due to diversion of stormwater management flows, restore lost functions through enhanced lot level controls (i.e. restore original catchment using clean roof drainage) as necessary;
- Replicate on-site surface water sources including wetland creation and incorporating extended detention outlets, if necessary;
- Use natural channel design techniques to replace and enhance existing habitat features only if features are easily replicated;
- Drainage feature must connect to downstream watercourse/habitat;
- Examine need to incorporate groundwater flows through infiltration measures (i.e. third pipes, etc.) to ensure no net loss and potential gain.

2. **Conservation** – Seasonal Fish Habitat.

Conservation 1 ***(Medium Constraint)*** – seasonal fish habitat associated with seasonally high groundwater discharge or seasonally extended contributions from wetlands potential permanent refuge habitat may be provided by a storage feature.

- Maintain existing seasonal groundwater or wetland surface flows,
- If catchment drainage has been previously removed due to diversion of stormwater management flows, restore lost functions through enhanced lot level controls (i.e. restore original catchment using clean roof drainage), as feasible;
- Replicate on-site seasonal groundwater or surface flows using infiltration measures and/or wetland creation, if necessary;
- Maintain external flows,
- Use natural channel design techniques to replace existing habitat features to maintain overall fish productivity of the reach;
- Drainage feature must connect to downstream habitat.

Conservation 2 ***(Medium Constraint)*** – seasonal fish habitat associated with intermittent surface flows.

- Replicate on-site surface flows;
- Maintain external flows; or if catchment drainage has been removed restore lost functions through enhanced lot level controls, as feasible;
- Use natural channel design techniques to replace existing habitat features to maintain overall fish productivity of the reach;
- Drainage feature must connect to downstream habitat.

3. **Mitigation** – Contributing Fish Habitat

Mitigation 1 ***(Medium Constraint)*** – Complex contributing fish habitat: flows conveyed through natural vegetation communities that support complex, contributing fish habitat i.e. influences water quality, sediment, organic matter, food and nutrients to the downstream habitat.

- Replicate functions through enhanced lot level conveyance measures, such as well vegetated swales (herbaceous, shrub and tree material) to mimic online wet vegetation pockets, or replicate through constructed wetland features;
- Replicate on-site flow and outlet flows at the top end of system to maintain feature functions. If catchment drainage has been previously removed due to diversion of stormwater management flows, restore lost functions through enhanced lot level controls (i.e. restore original catchment using clean roof drainage);
- Feature form and flow that connects directly to downstream fish habitat (i.e. direct connection to other drainage features/watercourse or wetlands);

Mitigation 2 ***(Medium Constraint or Low Constraint)*** – Simple contributing fish habitat: flows that support simple contributing fish habitat, i.e. influences flow conveyance, attenuation and storage to downstream reaches.

- Replicate functions by lot level conveyance measures (e.g. vegetated swales) connected to the natural heritage system, as feasible and/or Low Impact Development (LID) stormwater options (refer to TRCA's Water Management Guidelines for details);
- Replicate on-site flows and outlet flows at the top end of vegetated swales, bioswales, etc. to maintain feature functions.

4. **No Management Recommendation Required** ***(Low Constraint)*** – Not Fish Habitat.

- The pre-screened drainage feature has been field verified to confirm that no feature and/or functions associated with headwater drainage features are present – generally

characterized by evidence of cultivation, furrowing, presence of a seasonal crop, and lack of natural vegetation.

5. **Recharge Protection – Recharge Zone -** No direct habitat or indirect habitat providing surface flow, sediment transport, or allochthonous contribution to downstream fish habitat.

- Maintain overall water balance by providing mitigation measures to infiltrate clean stormwater, unless the area qualifies as a Significant Recharge Area under the Source Water Protection Act. These areas will be subject to specific policies under their respective legislation.

2.2.2.3 Fish Population Assessment

The results of fish sampling conducted by C. Portt and Associates (2005 and 2008), LGL Limited (2007 and 2008) and other data on file with Conservation Halton are presented in the Sixteen Mile Creek Areas 2 and 7 Subwatershed Update Study (AMEC, 2010). To supplement existing fish collection data, Aquafor Beech Limited conducted electrofishing surveys at road crossings with no historical fisheries data that were classified as indirect or direct fish habitat. These data are presented as presence/absence at each road crossing within the study area in Table 3.6.

2.2.3 Significant Species

Significant species and significant vegetation communities previously documented from the study area were determined using the biodiversity explorer tool on the Ministry of Natural Resources Natural Heritage Information Centre website (http://nhic.mnr.gov.on.ca/). The Species at Risk biologist from the Aurora District office of the Ministry of Natural Resources (MNR) was also contacted to obtain the most current information relevant to study area (APPENDIX 14). During all field studies an effort was made to look for significant species and vegetation communities that could potentially exist within the study area and adjacent lands.

References used to evaluate significance of plant and animal species recorded during field work include:

- Committee On the Status of Endangered Wildlife In Canada (COSEWIC) which determines the national status of wild Canadian species that are suspected of being at risk of extinction or extirpation;
- Committee on the Status of Species At Risk in Ontario (COSSARO) which uses criteria developed by COSEWIC and COSSARO to assess and classifying species at risk in Ontario; and
- Species at Risk in Ontario (SARO) which includes endangered and threatened species that are protected by the Endangered Species Act in Ontario.
- Conservation Halton historical records.

3.0 EXISTING ENVIRONMENTAL CONDITIONS

Figures 1-3 (APPENDIX 1) include the results of Ecological Land Classification, Tree Survey Locations, location of Breeding Bird Surveys and Aquatic Drainage Feature Classification. These figures may be used in conjunction with the information provided below. Please note that ELC vegetation community designations have been updated for the Western and Eastern Woodlands, given that more detailed surveys were completed in 2013. The updated designations for these communities which more accurately reflect current conditions are found in Figure 3.1 and Figure 3.2.

3.1 Terrestrial Resources

3.1.1 Ecological Land Classification – Sixteen Mile Creek

Sixteen Mile Creek Main Branch

Four vegetation communities were identified along the creek including cultural meadow (CUM1-1), dry-fresh sugar maple deciduous forest (FOD5-1), dry-fresh hickory deciduous forest (FOD2-3), and silver maple mineral deciduous swamp (SWD3-2). The majority of the study area consisted of flood plain occupied by the cultural meadow community. The silver maple swamp was less than one hectare in size and was found in the flood plain. The slopes of the valley were comprised of the upland forest communities FOD5-1 and FOD2-3. The soil texture in all communities was classified as sandy clay loam. The soil moisture class varied from 3 (very fresh) on slopes to 4 (moderately moist) within the floodplain. More detailed description of each of the communities is provided below.

Cultural Meadow (CUM1-1)

This community occupies the floodplain of Sixteen Mile Creek. The cultural meadow is partly dominated by Canada goldenrod (*Solidago canadensis*), riverbank grape (*Vitis riparia*), and red raspberry (*Rubus idaeus*) with a lesser abundance of New England aster (*Symphyotrichum novae-angliae*), cow vetch (*Vicia cracca*), giant hogweed (*Heracleum mantegazzianum*). There are scattered trees and shrubs throughout this community where successional processes are leading to the transition of this community to a cultural thicket/woodland in parts.

Dry-fresh sugar maple deciduous forest (FOD5-1)

This community is found on both the east and west slopes north of Britannia Rd. The canopy is composed primarily of sugar maple (*Acer saccharum*) with a lesser abundance of bur oak (*Quercus macrocarpa*), red oak (*Quercus rubra*), shagbark hickory (*Carya ovata*) and bitternut hickory (*Carya cordiformis*). The understory is partly composed of sugar maple, hop hornbeam (*Ostrya virginiana*) and choke cherry (*Prunus virginiana*). The dominance in ground cover

species varies with the slope due to differences in microclimate where the northeast facing slope is more shaded than the southwest. Ground cover species includes spreading dogbane (*Apocynum androsaemifolium*) dames rocket (*Hesperis matrionalis*), zig-zag goldenrod (*Solidago flexicaulis*) and garlic mustard (*Alliaria petiolata*) to name a few.

Dry-fresh hickory deciduous forest (FOD2-3)

The hickory deciduous forest community is located on the drier and warmer west facing slope on the east side of Sixteen Mile Creek Main Branch south of Britannia Rd. The dominant canopy species is bitternut hickory followed by shagbark hickory with a lesser abundance of hop hornbeam and black cherry (*Prunus serotina*). The understory was dominated by hop hornbeam and the understory contained a moderate abundance of enchanters nightshade (*Circaea lutetiana*), poison ivy (*Rhus rydbergii*), Virginia creeper (*Parthenocissus quinquefolia*), and spreading dogbane.

Silver maple mineral deciduous swamp (SWD3-2)

The silver maple swamp is located in the floodplain north of Britannia Rd. The only canopy species in this community was silver maple. Few individuals of black walnut (*Juglans nigra*) were found in the understory. The groundcover was dominated by giant hogweed.

<u>Sixteen Mile Creek East Branch</u>

Five vegetation communities were identified along the creek including cultural meadow (CUM1-1), cultural thicket (CUT1-1), dry-fresh hickory deciduous forest (FOD2-3), dry-fresh white ash deciduous forest (FOD4-2), and dry-fresh sugar maple-ironwood deciduous forest (FOD5-4). The majority of the study area consisted of flood plain occupied by the cultural meadow community. The cultural thicket was located partly on the flood plain and along the slope north of Britannia Rd, east of the Creek. The slopes of the valley were comprised of the upland forested communities. The soil texture in all communities was classified as silty clay loam. The soil moisture class varied from 3 (very fresh) on slopes to 4 (moderately moist) within the floodplain. More detailed description of each of the communities is provided below.

Cultural Meadow (CUM1-1)

This community occupies the floodplain of Sixteen Mile Creek in the study area. The cultural meadow is mainly dominated by Canada goldenrod, reed canarygrass (*Phalaris arundinacea*), New England aster, and panicled aster (*Symphyotrichum lanceolatum*) with a lesser abundance of cow vetch (*Vicia cracca*), and riverbank grape to name a few. There are scattered trees and shrubs throughout this community including white ash (*Fraxinus americana*), American elm (*Ulmus americana*), hybrid willow (*Salix* x *rubens*) and Manitoba maple (*Acer negundo*).

Cultural Thicket (CUT1-1)

The cultural thicket community is located partly in the floodplain and partly up the slope of the valley. This thicket represents an early successional community partly composed of white ash, apple species (*Malus pumila*), willow species (*Salix* spp.) and hawthorn species (*Crataegus* spp.) in the sub-canopy and shrub layers. The groundcover is mainly composed of asters, goldenrods, wild carrot (*Daucus carota*), and butter-and-eggs (*Linaria vulgaris*).

Dry-fresh hickory deciduous forest (FOD2-3)

The hickory deciduous forest community is located on the drier and warmer west facing slope on the east side of Sixteen Mile Creek East Branch south of Britannia Rd. The dominant canopy species is bur oak, and white ash which only provide a 10-25% canopy cover. The dominant sub-canopy species were bitternut hickory with a lesser abundance of bur oak, white ash, and American elm with a canopy cover over 60%. Although the dominant canopy species were bur oak and white ash, based on the prism sweep these species were much less abundant than bitternut hickory which had a higher relative abundance resulting in the classification of this community as a hickory deciduous forest. The understory was dominated by black cherry, shagbark hickory, and to a lesser abundance American elm and hawthorn species. The ground cover was sparse, covering only 10-25%, including such species as common buckthorn (*Rhamnus cathartica*), Virginia strawberry (*Fragaria virginiana*), avens species (*Geum* spp.), and enchanters nightshade (*Circaea lutetiana*).

Dry-fresh white ash deciduous forest (FOD4-2)

This community is found along the valley slopes on the west slope of the valley, south of Britannia Rd. The canopy is composed mainly of white ash and bur oak a much lesser abundance of hybrid willow. The subcanopy includes species found in the canopy as well as American elm, and shinning willow (*Salix lucida*). The understory is partly composed of common buckthorn, white ash, black walnut, and black locust (*Robinia pseudo-acacia*). The ground cover was sparse with only a 10-25% cover and included Virginia strawberry, riverbank grape, Canada goldenrod, poison ivy (*Rhus rydbergii*) with a lesser abundance of herb robert (*Geranium robertanium*).

Dry-fresh sugar maple – ironwood deciduous forest (FOD5-4)

The sugar maple forest is located on the west valley slope north of Britannia Rd. Sugar maple was the dominant canopy species with a lesser abundance of bur oak, red oak, and American elm, The sub-canopy was also dominated by sugar maple with a lesser abundance of hop hornbeam, red oak, and common buckthorn. Common buckthorn dominated the understory which also included hawthorn species, white ash, and trembling aspen (*Populus tremuloides*). The groundcover was sparse (10-25% cover) and included Canada goldenrod, large-leaved aster (*Eurybia macrophylla*), Pennsylvania sedge (*Carex pennsylvanica*), and much lesser abundance of Virginia strawberry, Canada anemone (*Anemone canadensis*), and poison ivy to name a few.

At the ecotone of the toe-slope of this community and the cultural meadow community was a small (<0.5 ha) meadow marsh inclusion containing wetland species including American bur-reed (*Sparganium americanum*), hard-stemmed bulrush (*Scirpus acutus*), soft-stemmed bulrush (*Scirpus validus*), and broad-leaved water-plantain (*Alisma plantago-aquatica*). These species were mainly found surrounding a seasonally wet depression that is devoid of vegetation indicating the presence of a vernal pond.

3.1.1.1 Floristics - East and Main Branches of Sixteen Mile Creek

APPENDIX 3 and APPENDIX 4 provide summary statistics for all plants identified within each of the vegetation types identified along the East and Main branches of Sixteen Mile Creek.

FQI and Native Mean C provide a measure of "naturalness" of a vegetation community and the degree to which a vegetation community is composed of plant species that are habitat demanding or require more unique or rare natural habitat conditions. Typically, an urban plant community composed of predominantly native species is found to have a Native Mean C of over 4 and a native FQI greater than 40 (NSE 2011). The floristics of all of these communities is relatively low which is likely a result of a single season inventory (

Table 3.1). See APPENDIX 3 and APPENDIX 4 for the full list of flora identified on the subject property.

Table 3.1: Floristics of the East and Main Branches of Sixteen Mile Creek (see below for a discussion of native Floristic Quality Index (FQI) and Native Mean C).

Ecosite	Number of Native Plant Species	Number of Non-native Plant Species	Total	Percent Non-native Plants	Native FQI	Native Mean C
East Branch						
CUM1-1	37	18	58	31	17.91	2.94
CUT1-1	13	10	25	40	9.61	2.67
FOD2-3	12	4	19	21	10.71	3.09
FOD4-2	16	4	21	19	12.00	3.00
FOD5-4	32	4	39	10	17.91	3.17
Main Branch						
CUM1-1	41	17	59	29	17.48	2.73
FOD2-3	21	7	31	23	17.37	3.79
FOD5-1	33	11	48	23	21.68	3.77
SWD3-2	16	2	20	10	13.71	3.43

3.1.2 Ecological Land Classification - Woodlands

At the request of Conservation Halton, comprehensive Ecological Land Classification (ELC) vegetation characterization and mapping was also conducted within two woodlands that abut Britannia Road. The Western Woodland is situated on the south side of Britannia Road between Bronte Street South and Regional Road 25.The Eastern Woodland is found on the north side of Britannia Road just west of Highway 407. Property access could not be secured for the Eastern Woodland, and as such vegetation surveys were restricted to the roadside and adjacent Ontario Realty Corporation (ORC) lands to the east (where access had previously been secured). Field activities were undertaken on June 18, 2013. A comprehensive list of vascular flora found in both woodlands and adjacent natural areas can be found in APPENDIX 5. The completed ELC fieldsheets can be reviewed in APPENDIX 6.

Western Woodland

ELC mapping for the Western Woodland is found in Figure 3.1. The Western Woodland is composed of a Fresh-Moist Shagbark Hickory Deciduous Forest (FOD9-4), with a Grey Dogwood Cultural Thicket (CUT1-4) complex present along the western and eastern margins. A Mineral Meadow Marsh flanks the west tributary of Sixteen Mile Creek between the woodland and agricultural fields to the west.

In terms of landscape position, the Western Woodland is situated on the tablelands and exhibits a slight decline in elevation in a north-south direction. Vernal pooling was observed throughout the woodland (particularly within the northern half), and many pools still contained standing water a few centimeters deep at the time of field activities. The soil texture was a heavy clay, and composed of a thick A horizon (16cm) stained black with humus. Mottling was observed at the boundary of the A and B horizons, consequently indicating the woodland is very moist (engendered by the heavy clay soil).

The dominant canopy species include shagbark hickory, green ash, basswood (*Tilia americana*) and sugar maple, with lesser amounts of bur oak, American elm, ironwood, red maple (*Acer rubrum*) and red oak. Sugar maple (*Acer saccharum*) becomes more dominant as one travels south through the woodland. A few scattered individuals of white oak, American beech (*Fagus grandifolia*) and bitternut hickory were also observed as canopy trees. The understory contained mostly regenerating tree species (particularly shagbark hickory and green ash) along with grey dogwood (*Cornus foemina*), European buckthorn and musclewood (*Carpinus caroliniana*). Hawthorns (*Crataegus* spp.) and European buckthorn are more common along the eastern margin (particularly in the northern half) of the woodland where light penetration is more pronounced. Dominant groundcover species include wild geranium (*Geranium maculatum*), Virginia waterleaf (*Hydrophyllum virginianum*), garlic mustard, and enchanter's nightshade (*Circaea lutetiana*).

A Grey Dogwood Cultural Thicket (CUT1-4) complex was noted on the eastern and western margins of the woodland. The dominant species include grey dogwood, European buckthorn and various hawthorn species. Scattered American elm and bur oak trees were also observed. The groundcover consisted of a mix of both facultative species, including Kentucky blue grass (*Poa pratensis* ssp. *pratensis*), cow vetch (*Vicia cracca*), smooth brome (*Bromus inermis*), and panicled aster (*Symphyotrichum lanceolatum*). Scattered wetland species such as American water-horehound (*Lycopus americana*) and fragrant bedstraw (*Galium triflorum*) were noted in wetter hollows.

A Mineral Meadow Marsh (MAM2) dominated almost exclusively by meadow foxtail (*Alopecurus pratensis*) has developed along the west tributary of Sixteen Mile Creek between the Western Woodland and agricultural fields to the west. Only scattered individuals of path rush (*Juncus tenuis*), broad-leaved cattail (*Typha latifolia*), narrow-leaved cattail (*Typha angustifolia*), cursed crowfoot (*Ranunculus sceleratus*) and curly dock (*Rumex crispis*) were found amongst the broad expanse of meadow foxtail. Western chorus frog was found to be breeding within the tributary (see Section 3.1.5).

Eastern Woodland

ELC mapping for the Eastern Woodland is found in Figure 3.2. As noted previously, this mapping is based on surveys from the roadside and adjacent ORC lands.

The Eastern Woodland is composed of a Fresh-Moist Ash Lowland Deciduous Forest (FOD7-2) with a Meadow Marsh (MAM) present within a cleared area in the centre of the polygon. Despite being more heavily dominated by green ash, the Eastern Woodland consists of a similar assemblage of moist, upland species when compared to the Western Woodland, including shagbark hickory, red oak, ironwood, enchanter's nightshade and Virginia waterleaf. Nannyberry (*Viburnum lentago*), one-seeded hawthorn (*Crataegus monogyna*), sensitive fern (*Onoclea sensibilis*), multiflora rose (*Rosa multiflora*), common apple (*Malus pumila*), horse nettle (*Laportea canadensis*) and zigzag goldenrod (*Solidago flexicaulis*) are species found in the Eastern Woodland but not in the Western Woodland. The Meadow Marsh was not visible from the roadside or adjacent ORC lands. Further information on Meadow Marsh is contained within Section 3.1.4.

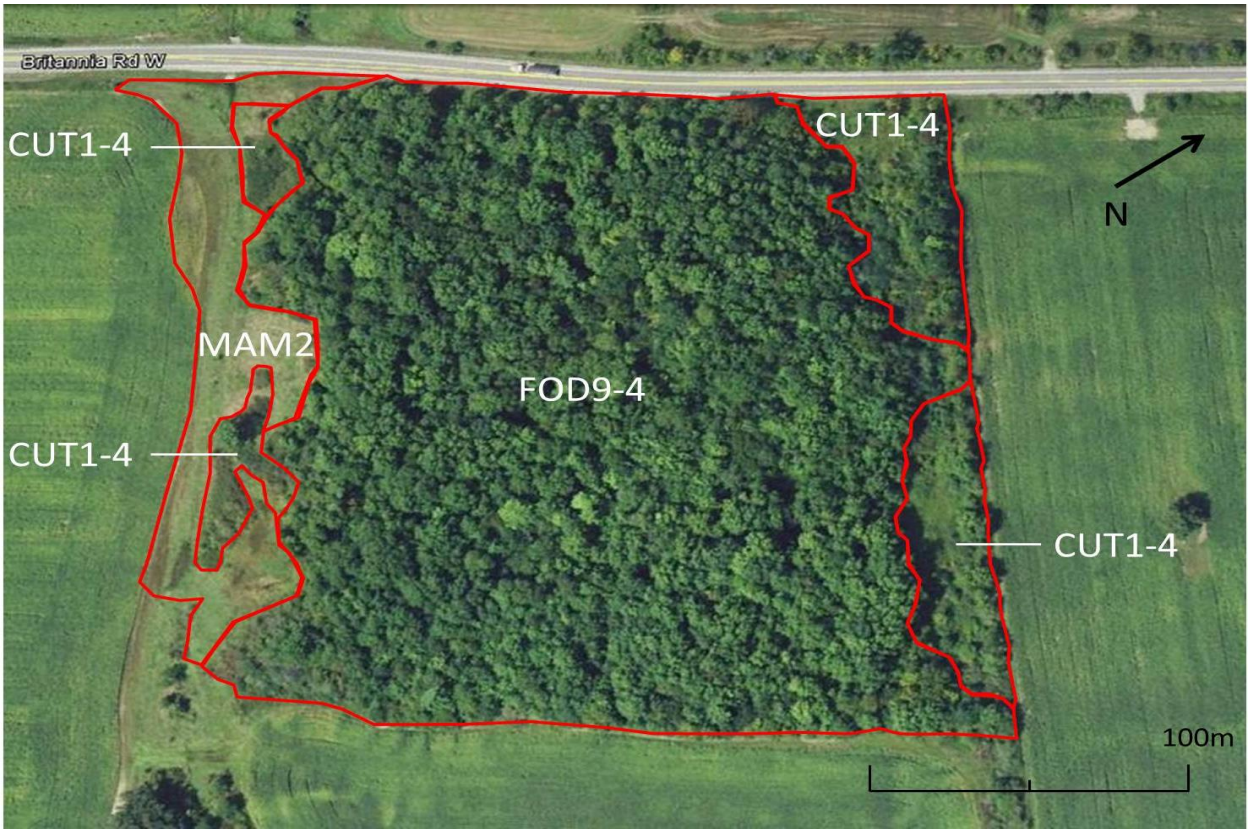


Figure 3.1: ELC Mapping for the Western Woodland and Adjacent Natural Areas

Figure 3.2: ELC Mapping for the Eastern Woodland and Adjacent Natural Areas

3.1.3 Tree Inventory

A total of 221 trees were surveyed and assessed within 40 meters north and south of Britannia Road. APPENDIX 11 provides a detailed list of all trees surveyed, including information regarding species, location, and tree condition and vigour class. A summary table organized by tree species is provided in Table 3.2.

A total of 31 different tree species greater than 25 cm DBH were recorded, 21 are native and 10 are non-native species (see Table 3.2). The majority of the trees recorded (172 of the 221; 78%) are species native to southern Ontario: Most notable of the native trees were eight large bur oak, including one that measured 119 cm DBH located on the south side of Britannia Rd. west of Regional Rd 25. Of the non-native trees recorded Manitoba maple, Norway maple, Scott's pine, black locust, and hybrid willow are considered invasive species.

Table 3.2: Summary of the 221 trees recorded within 40 meters north and south of Britannia Rd. (see APPENDIX 2 for an explanation of tree vigour classes and APPENDIX 11 for detailed information on individual trees. * denotes non-native species).

Trees Recorded		**Total Recorded**	**Total in each Tree Vigour Class**				
Scientific Name	**Common Name**		**1**	**2**	**3**	**4**	**5**
**Acer negundo*	Manitoba maple	15	2	11	1	1	
**Acer platanoides*	Norway maple	5	3		1	1	
Acer rubra	red maple	1		1			
Acer saccharinum	silver maple	18	3	8	1	5	1
Acer saccharum	sugar maple	5	2			2	1
Acer x freemanii	Freeman's maple	6	3		1	1	1
Betula papyrifera	white birch	2	2				
Carya cordiformis	bitternut hickory	3	2	1			
Carya ovata	shagbark hickory	21	11	8	1	1	
**Catalpa speciosa*	catalpa	1	1				
Crataegus sp.	hawthorn species	3		1	2		
Fraxinus americana	white ash	25	5	10	9		1
Fraxinus pennsylvanica	green ash	1		1			
Juglans nigra	black walnut	3	3				
**Malus pumila*	common apple	11	3	7		1	

Trees Recorded		Total Recorded	Total in each Tree Vigour Class				
Scientific Name	**Common Name**		**1**	**2**	**3**	**4**	**5**
**Picea abies*	Norway spruce	1	1				
Picea glauca	white spruce	2	2				
**Picea pungens*	blue spruce	2	2				
**Pinus nigra*	Austrian pine	2	2				
Pinus strobus	white pine	1	1				
**Pinus sylvestris*	Scots pine	2	1	1			
Populus balsamifera	balsam poplar	1		1			
Populus tremuloides	trembling aspen	1			1		
Quercus alba	white oak	1				1	
Quercus macrocarpa	bur oak	54	21	27	4	2	
Quercus rubra	red oak	5	3		1	1	
**Robinia pseudo-acacia*	black locust	1			1		
**Salix x rubens*	hybrid willow	9	1	5	2	1	
Tilia americana	basswood	10	2	5	3		
Ulmus americana	American elm	9	5	2	2		
	TOTAL	221					

3.1.4 Wetlands

Two wetland areas were identified near the intersection of Britannia Road East and Eighth Line: a meadow marsh within the Eastern Woodland, and a meadow marsh within a cleared area. These wetlands were staked and the boundaries verified by Conservation Halton staff on October 4th, 2011. The following provides a brief description of the wetlands.

Meadow Marsh within the Eastern Woodland

A meadow marsh community was identified within the Eastern Woodland along Britannia Road, east of Highway 407. This community is located within a portion of the woodland that appears to have been recently cut. Dominant species include reed canary grass (*Phalaris arundinacea*), purple loosestrife (*Lythrum salicaria*), red osier dogwood (*Cornus stolonifera*), American bugleweed (*Lycopus americanus*) and several different species of sedge. Several piles of felled trees were located within and at the perimeter of this wetland community. Within the clearing,

non-wetland portions were dominated by grass-leaved goldenrod (*Euthamia graminifolia*), lance-leaved aster (*Symphyotrichum lanceolatum*) and Canada goldenrod (*Solidago canadensis*). trembling aspen (*Populus tremuloides*) is beginning to regenerate along the western edge of the clearing, some reaching 2 m in height.

Meadow Marsh within the cleared area

A meadow marsh community was identified within cleared areas located north of Britannia Road East and east of Eight Line. This community borders Britannia Road and Eighth Line, and the adjacent woodland. This community is dominated by purple loosestrife, several species of willowherb (*Epilobium* spp.), Small-flowered water plantain (*Alisma plantago-aquatica*), *Eleocharis* spp., cattail (*Typha angustifolia*) and redtop (*Agrostis gigantea*). Reed canary grass is dominant along ditches, adjacent to the roadway. Upland portions of the field are dominated by wild carrot (*Daucus carota*), curly dock (*Rumex crispus*) and Canada thistle (*Cirsium arvense*).

3.1.5 Calling Amphibian Surveys

A total of twelve (12) amphibian monitoring stations were selected based on the results of an initial reconnaissance-level site assessment conducted in late winter, 2013. One additional monitoring station was added during the first survey, bringing the total number to thirteen (13). Eleven of the thirteen monitoring stations could be surveyed from the road or directly adjacent to the road. The remaining two stations (6 and 7) were a few hundred metres from the road and required a short walk to access. The location and direction of survey for each station is summarized in Table 3.3 and illustrated in Figure 3.3.

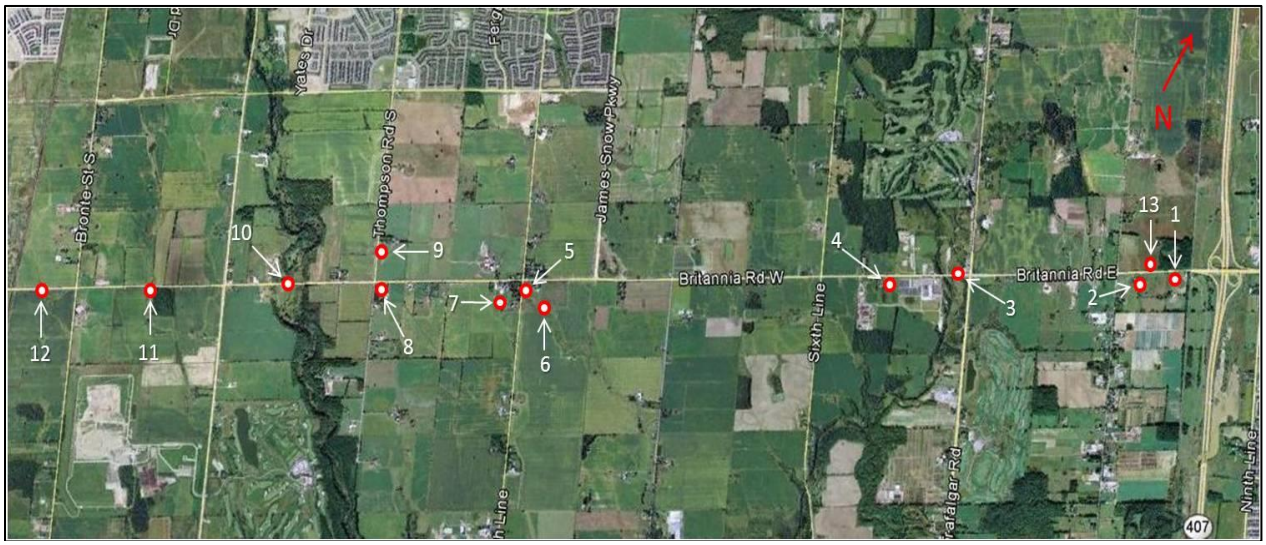


Figure 3.3: Location of Amphibian Calling Stations

Table 3.3. Calling Amphibian Survey Locations

Station	Zone	Easting	Northing	Accuracy (m)	Bearing
1	17T	599663	4822520	±4	89º
2	17T	599456	4822245	±4	161º
3	17T	598328	4820821	±4	323º
4	17T	598028	4820425	±6	128º
5	17T	595955	4817707	±6	305º
6	17T	596252	4817732	±5	42º
7	17T	595927	4817461	±4	96º
8	17T	595132	4816705	±5	120º
9	17T	594929	4816785	±5	24º
10	17T	594589	4816011	±4	229º
11	17T	593800	4814973	±5	134º
12	17T	593202	4814190	±5	128º
13	17T	599506	4822348	±4	296º

Over the course of the three site visits, spring peeper (*Pseudacris crucifer*), western chorus frog (*Pseudacris triseriata*), American toad (*Bufo americanus*), northern leopard frog (*Rana pipiens*), grey treefrog (*Hyla versicolor*) and green frog (*Rana clamitans*) were heard. The species name, call code and number of individuals heard are summarized in Table 3.4. Calling amphibians were heard at twelve (12) stations. Completed MMP fieldsheets can be found in APPENDIX 8.

Four of the five species recorded (spring peeper, American toad, leopard frog, and green frog) have stable populations in the Great Lakes Basin (Tozer, 2013) and are considered common and widely distributed. They are also fairly tolerant of urbanization and will persist even in populated areas if their breeding ponds and associated upland feeding habitats remain relatively undisturbed. Neither the Committee on the Status of Species at Risk in Ontario (COSSARO) nor the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) has assessed the status of spring peeper, green frog or American toad. Northern leopard frog is currently listed as Not at Risk by COSSARO and Not at Risk by COSEWIC.

Western chorus frogs were heard during the first two surveys at monitoring station 11, adjacent to the Western Woodland. As discussed further in Section 3.3.6, this species has experienced a consistent population decline in the Great Lakes Basin since 1995 (Tozer, 2013) and is federally listed as Threatened by COSEWIC. COSSARO has designated this species as Not-at-Risk. Chorus frogs require both breeding ponds devoid of fish predators and adjacent terrestrial habitat such as moist woods or meadows to feed and overwinter.

Table 3.4: Calling Amphibians per Monitoring Station

Date	Station	Species Name	Call Code (1-3)	Number of Individuals
4/15/2013	1			
	2			
	3	Spring Peeper	3	>8
	4	Spring Peeper	2	8
	5			
	6	Spring Peeper	1	1
	7			
	8			
	9			
	10			
	11	Western Chorus Frog	2	4
	12	Spring Peeper	3	>8
	13			
05/08/2013	1			
	2			
	3	Spring Peeper	3	>8
	4	Spring Peeper	3	>8
	5			
	6	Spring Peeper	1	2
	7			
	8			
	9	American Toad	1	1
	10			
	11	Western Chorus Frog	2	4
	11	Leopard Frog	1	1
	12	Spring Peeper	3	>8
	13	Spring Peeper	2	4
	13	American Toad	1	1
06/24/2013	1	Green Frog	1	5
	2	Green Frog	1	1
	2	Grey Tree Frog	1	1
	3	American Toad	1	1
	4	Green Frog	3	>8
	4	Grey Tree Frog	1	1
	5	Green Frog	1	1
	6	Green Frog	1	4

Date	Station	Species Name	Call Code (1-3)	Number of Individuals
	7	Green Frog	1	2
	7	Grey Tree Frog	1	1
	8	Green Frog	1	3
	9	Green Frog	1	1
	10			
	11	Green Frog	1	1
	12	Grey Tree Frog	1	1
	13			

3.1.6 Breeding Bird Survey - Roadside

Roadside breeding bird point counts recorded 41 species of birds along Britannia Road (APPENDIX 9). Most of the birds recorded are common to agricultural fields and smaller woodlots including species such as killdeer, eastern kingbird, warbling vireo, horned lark, gray catbird, chipping sparrow, and yellow warbler. Barn swallow and bobolink (both threatened species under the Endangered Species Act) as well as eastern wood-pewee (listed as special concern federally) were also observed. A discussion of significant bird species recorded is provided in Section 3.3.3.

3.1.7 Breeding Bird Survey – Western Woodland

A total of 11 species were detected within the Western Woodland and six (6) were detected in the immediately adjacent lands. Only one species was a 'Confirmed' breeder: Barn Swallow; which was observed visiting a nest site in a culvert running under Britannia, slightly to the West of the woodland. Seven (7) species were assigned 'Probable' breeding status, all of which were detected within the woodland, and seven (7) species were assigned 'Possible' breeding status, of which three (3) were solely in the woodland. One (1) species was observed both within the woodland and in the adjacent lands, with no evidence of breeding.

Of the 11 detected species, two (2) are listed as Species at Risk either federally (COSEWIC) and/or provincially (COSSARO). Barn Swallow (*Hirundo rustica*), listed as 'Threatened' provincially and federally, was confirmed as breeding in the culvert running under Britannia Road, just to the west of the woodland. Eastern Wood-pewee (*Contopus virens*), a federal species of 'Special Concern', was assigned 'Possible' breeding status within the woodland, as a result of a singing male frequenting the width of the Northern part of the woodlot. Three (3) of the detected species are listed as 'Uncommon' breeding summer residents in the Halton Natural Areas Inventory (2006). These three species (Horned Lark, Vesper Sparrow and Willow

Flycatcher) were all found in the lands immediately adjacent to the woodland and were assigned 'Possible' breeding status, as a result of detection of singing males.

At this point, it is worth noting that the breeding status of all detected species may have been under-estimated, as this designation is based upon only one visit. According to the *Atlas of the Breeding Birds of Ontario* (Cadman et al. 2007), a *"'Probable' status can be assigned where a permanent territory is presumed through registration of territorial song on at least two (2) days, a week or more apart, at the same place."*

3.2 Aquatic Resources

3.2.1 Fish Habitat Assessment and Drainage Feature Classification

Detailed habitat descriptions following MTO protocols were conducted within reaches 20 m upstream and 50 m downstream of each road crossing, the results of which are summarized in Table 3.5 together with the drainage feature classification and level of constraint associated with each watercourse. Upstream and downstream of the detailed habitat assessments, general habitat mapping was continued for an additional 30 m upstream and 150 m downstream. These general habitat maps can be seen for each road crossing in APPENDIX 12. Field Sheets can be found in APPENDIX 12 and photo documentation of each watercourse in APPENDIX 13.

Aquafor Beech Limited supplemented watercourse classifications in AMEC 2010 by classifying unclassified watercourses within the study area in accordance with the Evaluation, Classification and Management of Headwater Drainage Features: Interim Guidelines (CVC & TRCA 2009).

MTO habitat assessment included dividing each detailed reach into appropriate sections. These sections can be found in Table 3.5 under Station Characteristics and are defined as follows:

Riffle - Areas of relatively shallow, fast, turbulent flow where the water's surface is typically broken. Riffles have a hydraulic head of 8 mm or greater and fast velocities ranging from 0.25 – 0.40 m/s.

Run - Areas typically found at the head of a pool with rapidly flowing water and a similar hydraulic head ($\geq$8 mm) and velocity (0.25-0.40 m/s) as a riffle but greater depth. The water's surface is typically not agitated by bed material, but may be turbulent.

Pool - Areas of a stream that are deep with a relatively low velocity and a smooth unagitated surface. Pools have a hydraulic head of 0 to 3 mm and a velocity less than 0.05-0.15 m/s.

Flats - Low flowing water with a smooth unagitated surface (not as deep as a pool). Flats have a hydraulic head of 4-7 mm and a velocity between 0.15-0.30+ m/s.

3.2.2 Fish Population Assessment

The results of fish sampling conducted by C. Portt and Associates (2005 and 2008) and LGL Limited (2007 and 2008) are can be found in Tables 3.5.1 and 3.5.2 of the Sixteen Mile Creek Areas 2 and 7 Subwatershed Update Study (AMEC, 2010) with the corresponding sampling locations shown in Figure 3.5.3 (AMEC 2010). Fish data from other sources, on file with Conservation Halton, are presented in Table 3.5.3, with sampling locations shown of Figure 3.5.4. These data were summarized and combined with Aquafor Beech Limited 2011 sampling data and presented in Table 3.6 below as presence/absence at each road crossing.

Table 3.5: Results of fish habitat assessments for each watercourse crossing following the Ministry of Transportation Environmental Guide for Fish and Fish Habitat (2009). Drainage Classification (CVC, TRCA 2009) and fisheries constraint level (AMEC 2011) are also summarized.

Subwatershed	Crossing #	Drainage Classification	Fisheries Constraint Level	Station Characteristics	Habitat Description	Substrate Composition and Bank Stability	Instream/Riparian Vegetation	Fish Barriers and other disturbances
Indian Creek	1 - upstream	Seasonal	Medium	Run % of area: 100 Mean wetted depth (m): 0.14 Mean wetted width (m): 1.10 Mean bankfull width (m): 1.60 Mean bankfull depth (m): 0.45	This intermittent reach is located within an agricultural field and consists of a run throughout its length. Instream cover occurs throughout 65% of the surface area and consists of undercut banks, woody and organic debris as well as instream and overhanging macrophytes. Approximately 30-60% of the stream is shaded by shore cover.	Substrate is dominated by sand and silt deposits. Both left upstream bank and right upstream bank are slightly unstable. Approximately 10% of the 20 m section contains undercut banks.	All instream / Riparian vegetation consists of emergent vegetation which covers approximately 35% of the stream. Approximately 10% of instream cover is provided by instream macrophytes and 25% provided by overhanging vegetation.	The intermittent nature of this stream is the only barrier to fish movement. The surrounding transportation and agricultural land use may be a source of pollution.
	1 - downstream	Seasonal	Medium	Flat % of area: 100 Mean wetted depth (m): 0.15 Mean wetted width (m): 1.65 Mean bankfull width (m): 2.9 Mean bankfull depth (m): 0.5	This intermittent reach is located within an agricultural field and consists of a flat throughout its length. Instream cover occurs over 80% of the stream's surface area and consists of undercut banks, organic debris and both instream and overhanging vegetation. Approximately 60-90% of the stream is shaded by shore cover.	Substrate is dominated by clay and sand. Both left and right downstream banks are slightly unstable. Approximately 5% of the 50 m section contains undercut banks.	Instream vegetation covers approximately 20% of the stream and consists of both floating algae and emergent grasses and cattails. Overhanging riparian vegetation covers approximately 50% of the stream and consists mainly of grasses.	The intermittent nature of this stream is the only barrier to fish movement. The surrounding transportation and agricultural land use may be a source of pollution.
	2 – upstream	Seasonal	Medium	Run % of area: 100 Mean wetted depth (m): 0.1 Mean wetted width (m): 2.1 Mean bankfull width (m): 2.5 Mean bankfull depth (m): 0.45	This intermittent reach is located within an agricultural field and consists of a run throughout its length. Instream cover is high, with 90% of the stream's surface area covered by vascular macrophytes, mainly emergent cattails. Overhanging riparian grasses also cover parts of this reach. Approximately 60-90% of the stream is shaded by shore cover.	Substrate is dominated by clay and sand. Both left and right upstream banks are stable. There are no undercut banks throughout the length of this reach.	Emergent instream vegetation covers approximately 90% of the surface area of this reach. This vegetation is dominated by cattails and grasses.	The intermittent nature of this stream is the only barrier to fish movement. The surrounding transportation and agricultural land use may be a source of pollution.
	2 – downstream	Seasonal	Medium	Dry % of area: 100 Mean wetted depth (m): - Mean wetted width (m): - Mean bankfull width (m): 1.95 Mean bankfull depth (m): 0.44	This intermittent reach was dry when sampled on Oct 12, 2011, suggesting ephemeral flow. Stream runs through an agriculture field. Instream cover occurs over 85% of the stream's surface area and consisted only of emergent macrophytes and overhanging vegetation. 90-100% of the stream is shaded by shore cover.	Substrate is dominated by clay and sand. Both left and right downstream banks are stable. There are no undercut banks throughout the length of this reach.	Emergent and riparian vegetation covers approximately 85% of the surface area of this reach and is dominated by cattails and grasses.	The ephemeral nature of this stream is the only barrier to fish movement. The surrounding transportation and agricultural land use may be a source of pollution.
	3 – upstream	Drainage Ditch – Not Fish Habitat	Low					

Subwatershed	Crossing #	Drainage Classification	Fisheries Constraint Level	Station Characteristics	Habitat Description	Substrate Composition and Bank Stability	Instream/Riparian Vegetation	Fish Barriers and other disturbances
	3 - downstream	Simple Contributing	Low	<u>Dry</u> % of area: 100 Mean wetted depth (m): - Mean wetted width (m): - Mean bankfull width (m): 0.75 Mean bankfull depth (m): 0.14	This simple contributing stream was dry when sampled on Oct 12, 2011, suggesting ephemeral flow. Stream runs through an agricultural field. Instream cover occurs over 100% of the stream's surface area and consists equally of instream and overhanging vegetation. 60-90% of the stream is shaded by trees or shrubs that are more than 1 m above the water surface.	Substrate is dominated by clay and silt. Both left and right downstream banks are stable. There are no undercut banks throughout the length of this reach.	Emergent and riparian vegetation covers approximately 100% of the surface area of this reach and is dominated by cattails and grasses.	The ephemeral nature of this stream is the only barrier to fish movement. The surrounding transportation and agricultural land use may be a source of pollution.
West Branch	4 – upstream	NOT FISH HABITAT	Low					
	4 - downstream	Simple Contributing	Low	<u>Run</u> % of area: 100 Mean wetted depth (m): 0.24 Mean wetted width (m): 0.6 Mean bankfull width (m): 0.8 Mean bankfull depth (m): 0.43	This simple contributing stream is located within an agricultural field and consists of a run throughout its length. Moderate instream cover covers approximately 50% of the streams surface area and consists of organic debris as well as instream and overhanging vegetation. 60-90% of the stream is shaded by trees or shrubs that are more than 1 m above the water surface.	Substrate is dominated by sand and clay. Both left and right downstream banks are slightly unstable. Undercut banks account for approximately 5% of the total surface area within the reach.	Instream and riparian vegetation cover approximately 35% of the surface area of the stream, consisting of grasses, shrubs and cattails.	The intermittent nature of this stream is the only barrier to fish movement. The surrounding transportation and agricultural land use may be a source of pollution.
	5 – upstream	Seasonal	Medium	<u>Dry</u> % of area: 80 Mean wetted depth (m): - Mean wetted width (m): - Mean bankfull width (m): 0.9 Mean bankfull depth (m): 0.5 <u>Run</u> % of area: 15 Mean wetted depth (m): 0.5 Mean wetted width (m): 0.35 Mean bankfull width (m): 0.9 Mean bankfull depth (m): 0.55 <u>Pool</u> % of area: 5 Mean wetted depth (m): 0.35 Mean wetted width (m): 4.5 Mean bankfull width (m): 5.4 Mean bankfull depth (m): 0.45	This intermittent reach is located between agricultural fields and the 20 m reach upstream from the culvert was dry throughout 80% of its length. Of the wetted length, 5% was pool habitat and 15% was run habitat. Moderate instream cover covers approximately 50% of the streams surface area, consisting primarily of emergent and overhanging vegetation. 30-60 % of the stream is shaded by trees or shrubs that are more than 1 m above the water surface.	The dry and run habitat consisted of both sand and silt whereas the pool consisted of both clay and sand substrates. Both left and right upstream banks are slightly unstable.	Instream and riparian vegetation cover approximately 50% of the streams surface area and consist mainly of cattails and grasses.	The intermittent nature of this stream is the only barrier to fish movement. The surrounding transportation and agricultural land use may be a source of pollution.

Subwatershed	Crossing #	Drainage Classification	Fisheries Constraint Level	Station Characteristics	Habitat Description	Substrate Composition and Bank Stability	Instream/Riparian Vegetation	Fish Barriers and other disturbances
	5 - downstream	Seasonal	Medium	Run % of area: 85 Mean wetted depth (m): 0.25 Mean wetted width (m): 1.10 Mean bankfull width (m): 1.80 Mean bankfull depth (m): 0.52 Pool % of area: 15 Mean wetted depth (m): 0.28 Mean wetted width (m): 2.8 Mean bankfull width (m): 3.4 Mean bankfull depth (m): 0.34	This intermittent reach is bordered by an agricultural field to the west and a small woodlot to the east. 85% of the downstream reach was dominated by run habitat, while pool habitat accounted for the other 15%. Instream cover is good, with approximately 95% of stream surface area covered by organic debris and instream/overhanging vegetation. 30-60% of the stream is shaded by trees or shrubs that are more than 1 m above the surface of the water.	Run habitat is dominated by a clay substrate and pool habitat is dominated by sand substrate. Both left and right downstream banks are stable.	Instream and riparian vegetation cover approximately 95% of the stream surface area and consist mainly of grasses, cattails and herbaceous shrubs.	The intermittent nature of this stream is the only barrier to fish movement. The surrounding transportation and agricultural land use may be a source of pollution.
	6 - upstream	Seasonal	Medium	Run % of area: 100 Mean wetted depth (m): 6.25 Mean wetted width (m): 1.6 Mean bankfull width (m): 4.6 Mean bankfull depth (m): 0.62	This intermittent reach runs through agricultural fields next to Regional Road 25. The whole of the upstream reach is run habitat with a clay/silt substrate. Instream cover is good, with approximately 75% of stream surface area covered by organic debris and instream/overhanging vegetation. 60-90% of the stream is shaded by trees or shrubs that are more than 1 m above the surface of the water.	Substrate within this reach is dominated by clay and silt. Both left and right upstream banks are stable.	Instream and riparian vegetation cover approximately 70% of the stream surface area and consist mainly of grasses and cattails.	The intermittent nature of this stream is the only barrier to fish movement. The surrounding transportation and agricultural land use may be a source of pollution
	6 – downstream	Seasonal	Medium	Run % of area: 100 Mean wetted depth (m): 0.26 Mean wetted width (m): 0.75 Mean bankfull width (m): 1.85 Mean bankfull depth (m): 0.53	This intermittent reach runs through agricultural fields next to Regional Road 25. The whole of the downstream reach is run habitat with clay/silt substrate. Instream cover is good with approximately 90% of stream surface area covered by instream and overhanging vegetation. 60-90% of the stream is shaded by trees or shrubs that are more than 1 m above the surface of the water.	Substrate within this reach is dominated by clay and silt. Both left and right downstream banks are stable.	Instream and riparian vegetation cover approximately 90 of the stream surface area and consist mainly of grasses shrubs and cattails.	The intermittent nature of this stream is the only barrier to fish movement. The surrounding transportation and agricultural land use may be a source of pollution, especially being in such close proximity to Regional Road 25.

Subwatershed	Crossing #	Drainage Classification	Fisheries Constraint Level	Station Characteristics	Habitat Description	Substrate Composition and Bank Stability	Instream/Riparian Vegetation	Fish Barriers and other disturbances
	7- upstream	Permanent	High	<u>Pool</u> % of area: 60 Mean wetted depth (m): 0.56 Mean wetted width (m): 9.0 Mean bankfull width (m): 10.6 Mean bankfull depth (m): 1.00 <u>Run</u> % of area: 30 Mean wetted depth (m): 0.181 Mean wetted width (m): 10.45 Mean bankfull width (m): 12.5 Mean bankfull depth (m): 0.77 <u>Riffle</u> % of area: 10 Mean wetted depth (m): 0.18 Mean wetted width (m): 9.2 Mean bankfull width (m): 11.4 Mean bankfull depth (m): 0.93	This permanent watercourse is contained within an incised valley known as the Sixteen Mile Creek Valley Environmentally Sensitive Area (ESA). The upstream reach is split into pool/riffle/run habitat dominated by cobble substrate. Instream cover is excellent consisting mostly of unembedded rock, boulders and instream macrophytes. There is a moderate amount of overhanging vegetation, mostly grasses and shrubs. Approximately 1-30% of the stream is shaded by trees or shrubs that are more than 1m above the surface of the water. Giant hogweed located on both banks. Incidental fish sightings include both sucker and cyprinid sp.	Substrate within this reach is dominated by cobble. Both left and right upstream banks are stable.	Riparian vegetation provides good cover, covering approximately 10% of the surface area of the watercourse and consisting mainly of grasses and shrubs. Instream vegetation consists primarily of submergent moss, as well as some emergent vegetation.	There are no barriers to fish movement in the upstream reach of this river. Giant hogweed is located on both banks. The Britannia Rd bridge is a possible source of pollution.

Subwatershed	Crossing #	Drainage Classification	Fisheries Constraint Level	Station Characteristics	Habitat Description	Substrate Composition and Bank Stability	Instream/Riparian Vegetation	Fish Barriers and other disturbances
	7 - downstream	Permanent	High	<u>Riffle</u> % of area: 30 Mean wetted depth (m): 0.143 Mean wetted width (m): 15.7 Mean bankfull width (m): 17.9 Mean bankfull depth (m): 0.89 <u>Run</u> % of area: 10 Mean wetted depth (m): 0.257 Mean wetted width (m): 8.3 Mean bankfull width (m): 9.6 Mean bankfull depth (m): 0.78 <u>Riffle</u> % of area: 60 Mean wetted depth (m): 0.214 Mean wetted width (m): 10.1 Mean bankfull width (m): 11.1 Mean bankfull depth (m): 0.57	This permanent watercourse is contained within an incised valley known as the Sixteen Mile Creek Valley Environmentally Sensitive Area (ESA). The downstream reach is split into riffle/run/riffle habitat dominated by cobble, gravel and bedrock substrate. Instream cover is excellent consisting mostly of unembedded cobble, boulders, instream macrophytes and woody debris. There is a moderate amount of overhanging vegetation, mostly grasses and shrubs. Approximately 1-30% of the stream is shaded by trees or shrubs that are more than 1m above the surface of the water. Giant hogweed located on both banks. Incidental fish sightings include both sucker and cyprinid sp.	Substrate within riffle habitat is dominated by cobble. The run is dominated by bedrock and gravel. Left downstream banks is stable while the right downstream bank is slightly unstable containing undercut banks..	Riparian vegetation provides good cover, covering approximately 5% of the surface area of the watercourse along the banks. Riparian vegetation consists mainly of grasses and shrubs. Instream vegetation consists primarily of submergent moss, hornwort and other submergent vegetation.	There are no barriers to fish movement in the upstream reach of this river. Giant hogweed is located on both banks. The Britannia Rd bridge is a possible source of pollution.
	8 – upstream	NOT FISH HABITAT	Low					
	8 – downstream	NOT FISH HABITAT	Low					
	9 – upstream	Simple Contributing	Low	Did not receive permission to enter private property				
	9 – downstream	Seasonal	Medium	Did not receive permission to enter private property				
Lower Middle Branch	10 – upstream	NOT FISH HABITAT	Low					
	10 – downstream	NOT FISH HABITAT	Low					

Subwatershed	Crossing #	Drainage Classification	Fisheries Constraint Level	Station Characteristics	Habitat Description	Substrate Composition and Bank Stability	Instream/Riparian Vegetation	Fish Barriers and other disturbances
	11 – upstream	Seasonal	Medium	Run % of area: 100 Mean wetted depth (m): 0.04 Mean wetted width (m): 6.0 Mean bankfull width (m): 8.7 Mean bankfull depth (m): 0.34	This intermittent stream runs in a ditch alongside the west side 4th Line for approximately 50 m before passing under the road and continuing north. A tributary draining into the upstream reach of this stream is classified not fish habitat. The entire 50 m upstream is run habitat that is almost completely overgrown with cattails, providing cover for about 90% of the streams surface area.	Substrate throughout the reach is clay. Both banks are slightly unstable, the right bank consisting of a steep incline directly off of 4th Line.	Riparian vegetation consists of small roadside shrubs. Emergent cattails dominate this reach, covering more than 60% of the stream.	The intermittent nature of this stream and the density of cattails are the barriers to fish movement. The surrounding transportation and agricultural land use may be a source of pollution, especially being in such close proximity to 4th Line.
	11 – downstream	Seasonal	Medium	Pool % of area: 60 Mean wetted depth (m): 0.20 Mean wetted width (m): 4.1 Mean bankfull width (m): 5.2 Mean bankfull depth (m): 0.65 Dry % of area: 40 Mean wetted depth (m): - Mean wetted width (m): - Mean bankfull width (m): 1.2 Mean bankfull depth (m): 0.2	This intermittent reach runs through agricultural fields next to 4th Line. 60% of the downstream reach is pool habitat with the other 40% dry during the survey. Substrate is dominated by clay and sand. Instream cover is good with approximately 45% of stream surface area covered by instream vegetation and organic debris. 60-90% of the stream is shaded by overhanging vegetation more than 1 m above the surface of the water.	Substrate is dominated by clay and sand throughout the reach. Both left and right downstream banks are stable.	Riparian vegetation covers approximately 40% of stream surface area and consists of grasses and shrubs. Instream vegetation covers another 40% of stream surface area and consists mainly of emergent cattails, but also floating duckweed.	The intermittent nature of this stream is a barrier to fish movement. The surrounding transportation and agricultural land use may be a source of pollution, especially being in such close proximity to 4th Line.
	12 - upstream	NOT FISH HABITAT	Low		Upstream of crossing 12 is a roadside ditch.			
	12 - downstream	Simple Contributing	Low	Run % of area: 100 Mean wetted depth (m): 0.36 Mean wetted width (m): 0.60 Mean bankfull width (m): 1.00 Mean bankfull depth (m): 0.47	This simple contributing habitat flows within an agricultural field and the downstream reach consisted of a run throughout its length. There was no riparian vegetation or instream cover and the substrate was dominated by gravel and clay. Given the lack of riparian vegetation, there was no apparent shore cover and both left and right banks were moderately unstable.	Substrate is dominated by clay and gravel throughout the reach. Both left and right downstream banks are moderately unstable.	There is no riparian or instream vegetation.	The intermittent nature of this stream is a barrier to fish movement. The surrounding transportation and agricultural land use may be a source of pollution.
	13 – upstream	NOT FISH HABITAT	Low					
	13 - downstream	NOT FISH HABITAT	Low					

Subwatershed	Crossing #	Drainage Classification	Fisheries Constraint Level	Station Characteristics	Habitat Description	Substrate Composition and Bank Stability	Instream/Riparian Vegetation	Fish Barriers and other disturbances
	14 – upstream	Simple Contributing	Low	Run % of area: 100 Mean wetted depth (m): 0.12 Mean wetted width (m): 2.45 Mean bankfull width (m): 4.2 Mean bankfull depth (m): 0.23	This simple contributing habitat is a grassy swale flowing between two residential properties. Both properties mowed their lawn right to the stream bank and there is therefore little riparian vegetation. Instream macrophytes cover more than 95% of the stream surface area and are dominated by grasses. Substrate throughout the reach consists of clay and left and right banks are both stable.	Substrate is dominated by clay. Both left and right banks are stable.	There is very little riparian vegetation, whereas instream vegetation covers most of the reach. Both riparian vegetation and instream vegetation consist of only grasses.	The intermittent nature of this stream is a barrier to fish movement. The surrounding residential land use and lack of riparian area may be a source of pollution.
	14 - downstream	Seasonal / Permanent	High/Medium	Run % of area: 100 Mean wetted depth (m): 0.1 Mean wetted width (m): 0.60 Mean bankfull width (m): 2.3 Mean bankfull depth (m): 0.6	This downstream reach flows within agricultural land and consists of a run throughout its reach. Instream cover is good with approximately 40% of the surface area of the stream covered by emergent cattails and another 30% by overhanging riparian vegetation. Organic debris also provides instream cover to about 10% of the stream. 90-100% of the stream is shaded by vegetation that stands more than 1m above the water surface. Incidental fish sighting confirms that this reach is used as direct fish habitat. To classify reach as seasonal or permanent, multiple season electrofishing surveys would need to be completed.	Substrate throughout the reach is dominated by clay. Both left and right banks are slightly unstable.	Overhanging riparian vegetation covers approximately 30% of the streams surface area and consists mainly of grasses. Instream vegetation, mainly cattails, covers an additional 40% of the stream surface area.	The surrounding agriculture land use may be a source of pollution.
	15 – upstream	Permanent	High	Run % of area: 70 Mean wetted depth (m): 0.32 Mean wetted width (m): 15.0 Mean bankfull width (m): 18.7 Mean bankfull depth (m): 0.60 Pool % of area: 30 Mean wetted depth (m): 0.50 Mean wetted width (m): 12.6 Mean bankfull width (m): 13.7 Mean bankfull depth (m): 0.74	This permanent river is contained within a valley west of Trafalgar road. The upstream reach consists of both pool and run habitat, with a weir approximately 27 m upstream of the Britannia Rd bridge. There is a side channel that also flows around the weir to the east. Instream cover is good, consisting of boulders, cobble, woody and organic debris. Vegetation provides cover to approximately 10% of the stream consisting of submergent and emergent macrophytes and riparian terrestrial vegetation. Approximately 1-30% of the stream is shaded by vegetation that stands more than 1 m above the water surface.	Substrate within the run habitat consists mainly of gravel and cobble. Substrate within the pool consists mainly of boulders and silt. The left upstream bank is stable, whereas the right upstream bank is slightly unstable with few undercut banks.	Overhanging riparian vegetation covers approximately 5% of the surface area of the stream. Instream vegetation consists of submergent macrophytes and emergent arrowhead, providing cover to an additional 5% of the stream.	The weir provides a barrier to fish migration; however the side channel provides passage to upstream reaches. Surrounding transportation corridors, agriculture and upstream golf courses are possible pollution sources.

Subwatershed	Crossing #	Drainage Classification	Fisheries Constraint Level	Station Characteristics	Habitat Description	Substrate Composition and Bank Stability	Instream/Riparian Vegetation	Fish Barriers and other disturbances
	15 – upstream (side channel)	Permanent	High	<u>Riffle (upstream)</u> % of area: 10 Mean wetted depth (m): 0.24 Mean wetted width (m): 2.6 Mean bankfull width (m): N/A Mean bankfull depth (m): 0.59 <u>Pool</u> % of area: 20 Mean wetted depth (m): 0.51 Mean wetted width (m): 5.5 Mean bankfull width (m): 6.2 Mean bankfull depth (m): 0.74 <u>Riffle (downstream)</u> % of area: 15 Mean wetted depth (m): 0.2 Mean wetted width (m): 4.1 Mean bankfull width (m): 6.0 Mean bankfull depth (m): 0.56 <u>Run</u> % of area: 55 Mean wetted depth (m): 0.28 Mean wetted width (m): 5.0 Mean bankfull width (m): 6.1 Mean bankfull depth (m): 0.53	This side channel connects the river above and below the weir and provides a mechanism for fish passage. Although there is no instream vegetation, instream cover is relatively good consisting of undercut banks, boulders, cobble and both woody and organic debris. Substrate consists of gravel, sand, silt and boulders throughout the reach. The side channel is almost completely shaded with trees and other vegetation more than 1 m above the surface of the water covering most of the streams surface area.	<u>Substrate</u> Upstream riffle: Gravel and sand Pool: Sand and Silt Downstream Riffle: Boulders and sand Run: Gravel and silt Left bank is stable. Right bank is slightly unstable with undercut banks occurring over approximately 10% of the stream.	There is no instream vegetation within the side channel. Overhanging riparian vegetation covers approximately 10% of the streams surface area.	There are no obstructions to fish movement in the side channel. Surrounding transportation corridors, agriculture and upstream golf courses are possible pollution sources.

Subwatershed	Crossing #	Drainage Classification	Fisheries Constraint Level	Station Characteristics	Habitat Description	Substrate Composition and Bank Stability	Instream/Riparian Vegetation	Fish Barriers and other disturbances
	15 – downstream	Permanent	High	<u>Run</u> % of area: 50 Mean wetted depth (m): 0.25 Mean wetted width (m): 15 Mean bankfull width (m): 16.5 Mean bankfull depth (m): 0.58 <u>Flat</u> % of area: 30 Mean wetted depth (m): 0.17 Mean wetted width (m): 7.2 Mean bankfull width (m): 8.65 Mean bankfull depth (m): 0.79 <u>Riffle</u> % of area: 20 Mean wetted depth (m): 0.19 Mean wetted width (m): 5.75 Mean bankfull width (m): 6.6 Mean bankfull depth (m): 0.65	The downstream reach of crossing 15 contains run, flat and riffle habitat. Instream cover is good, consisting of undercut banks, cobble, woody and organic debris as well as instream and overhanging vegetation. Instream vegetation consists of emergent vegetation and cover approximately 10% of the reach. Overhanging riparian vegetation covers approximately 20% of the reach. 1-30% of the stream is shaded with trees and other vegetation standing more than 1 m above the surface of the water.	The run and flat habitat is dominated by gravel and sand. Within the riffle habitat the dominate substrate is cobble and gravel. Both left and right banks are slightly unstable both containing areas with undercut banks.	Instream vegetation consists of arrowhead and rush sp. and covers approximately 10% of the streams surface area. Overhanging riparian vegetation covers approximately 20% of the streams surface area and consists of grasses and shrubs.	There are no obstructions to fish movement within the downstream reach. Surrounding transportation corridors, agriculture and upstream golf courses are possible pollution sources.
East-Lisgar	16 - upstream	NOT FISH HABITAT	Low					
	16 – downstream	Simple Contributing	Low	<u>Run</u> % of area: 100 Mean wetted depth (m): 0.09 Mean wetted width (m): 0.40 Mean bankfull width (m): 0.9 Mean bankfull depth (m): 0.5	This simple contributing habitat is a grassy swale flowing between two residential properties. Both properties mowed their lawn right to the stream bank and there is therefore little riparian vegetation. Instream macrophytes cover most of the stream surface area and are dominated by grasses. Substrate throughout the reach consists of silt and left and right banks are both stable. This reach has no shore cover.	Substrate consists of silt throughout the reach. Both left and right banks are stable.	Instream and riparian vegetation consists of mowed grass.	The intermittent nature of this stream is a barrier to fish movement. The surrounding residential land use and lack of riparian area may be a source of pollution.

Subwatershed	Crossing #	Drainage Classification	Fisheries Constraint Level	Station Characteristics	Habitat Description	Substrate Composition and Bank Stability	Instream/Riparian Vegetation	Fish Barriers and other disturbances
	17 – upstream	Seasonal / Complex Contributing	Medium	Run % of area: 100 Mean wetted depth (m): 0.07 Mean wetted width (m): 6.2 Mean bankfull width (m): 8.4 Mean bankfull depth (m): 0.36	The upstream reach flows between two agricultural fields and consists of run habitat throughout the detailed section. Instream and riparian vegetation provide instream cover to 100% of the stream and consists mainly of cattails. Riparian vegetation is dominated by grasses. Substrate consists of clay and silt throughout the reach and both left and right banks are stable. 60-90% of the reach is shaded by vegetation standing greater than 1 m from the surface of the water. No fish during sampling suggests that this reach is not permanent fish habitat. However, to classify reach as seasonal or contributing, multiple season electrofishing surveys would need to be completed.	Substrate consists of clay and silt throughout the reach. Both left and right banks are stable.	Instream and riparian vegetation cover 100% of the stream, dominated mostly by cattails. Riparian vegetation consists mainly of grasses.	The intermittent nature of this stream is a barrier to fish movement.
	17 – downstream	Seasonal / Complex Contributing	Medium	Run % of area: 100 Mean wetted depth (m): 0.17 Mean wetted width (m): 1.90 Mean bankfull width (m): 5.4 Mean bankfull depth (m): 0.47	The downstream reach flows through an open meadow and consists of run habitat throughout the detailed section. There is a small riparian area, approximately 5 m on each bank, and on the left bank the grass is mowed up to the edge of the riparian area. Instream and riparian vegetation provide instream cover to approximately 70% of the stream and consists only of grasses. Organic debris provides an additional 5% of instream cover. Substrate consists of clay and silt throughout the reach and both banks are stable. 30-60% of the reach is shaded by vegetation standing greater than 1 m from the surface of the water. No fish during sampling suggests that this reach is not permanent fish habitat. However, to classify reach as seasonal or contributing, multiple season electrofishing surveys would need to be completed.	Substrate consists of clay and silt throughout the reach. Both left and right banks are stable.	Instream and riparian grasses provide cover to approximately 70% of the downstream reach.	The intermittent nature of this stream is a barrier to fish movement.

Subwatershed	Crossing #	Drainage Classification	Fisheries Constraint Level	Station Characteristics	Habitat Description	Substrate Composition and Bank Stability	Instream/Riparian Vegetation	Fish Barriers and other disturbances
	18 – upstream	Seasonal	Medium	<u>Run</u> % of area: 70 Mean wetted depth (m): 0.04 Mean wetted width (m): 1.6 Mean bankfull width (m): 5.6 Mean bankfull depth (m): 0.62 <u>Pool</u> % of area: 30 Mean wetted depth (m): 0.08 Mean wetted width (m): 5.45 Mean bankfull width (m): 11.25 Mean bankfull depth (m): 0.91	This reach runs directly beside the off ramp to the 407. Instream and riparian vegetation provide cover to approximately 20% of the reach, consisting mainly of cattails and grasses. Instream cobble provides cover to a further 10%. Substrate consists of clay and silt throughout the reach and both banks are stable. 1-30% of the reach was shaded by vegetation standing greater than 1 m from the surface of the water. Brook Stickleback and pumpkinseed caught during sampling indicated that this reach is direct fish habitat. However, dry conditions downstream suggest that this stream is seasonal fish habitat.	Substrate consists of clay and silt throughout the reach. Both left and right banks are stable.	Instream and riparian vegetation provide cover to approximately 20% of the stream and consist of cattails and grasses. There are no submergent or floating vegetation.	The intermittent nature of this stream is a barrier to fish movement.
	18 - downstream	Seasonal	Medium	<u>Pool</u> % of area: 35 Mean wetted depth (m): 0.28 Mean wetted width (m): 6.9 Mean bankfull width (m): 9.6 Mean bankfull depth (m): 0.83 <u>Run</u> % of area: 55 Mean wetted depth (m): 0.07 Mean wetted width (m): 4.0 Mean bankfull width (m): 8.2 Mean bankfull depth (m): 0.88 <u>Pool</u> % of area: 10 Mean wetted depth (m): 0.09 Mean wetted width (m): 5.0 Mean bankfull width (m): 7.8 Mean bankfull depth (m): 0.56	This reach runs through a utility corridor and parallel to Highway 407. Instream and riparian provide cover to approximately 60% of the surface area of the stream, consisting mainly of cattail and duckweed. Instream cover is also provided by boulders, cobble and woody / organic debris. Substrate consists of muck, cobble, silt and gravel. 60-90% of the reach is shaded by vegetation standing greater than 1 m from the surface of the water. One Lepomis sp. and one juvenile largemouth bass we spotted but not captured, indicating that the reach is direct fish habitat. However, dry conditions downstream suggest that this stream is seasonal fish habitat.	Substrate consists of muck and cobble in the pool directly downstream of the culvert, and gravel and silt in the run and pool further downstream. Both left and right banks are stable.	Instream vegetation provides in-stream cover to approximately 50% of the reach and consists mainly of emergent cattail, but also floating duckweed. Riparian vegetation provides cover to approximately 10% of the reach, consisting mainly of grasses.	The intermittent nature of this stream is a barrier to fish movement. Highway 407 running directly to the east is a possible source of pollution.

Table 3.6: Fish collection records held by Conservation Halton (2013) and the results of fish collections performed by LGL Limited (2007; 2008), C. Portt and Associates (2008) and Aquafor Beech Limited (2011).

Watercourse Classification		**Crossing Number**																
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
		S	S	u/s: NFH d/s: SC	u/s: NFH d/s: SC	S	S	P	NFH	u/s: SC d/s: S	NFH	S	u/s: NFH d/s: SC	NFH	u/s: SC d/s: S / P	P	u/s: NFH d/s: SC	S / C	S
Species	**Common Name**																		
Ameiurus nebulosus	Brown Bullhead															X[CH]			
Ambloplites rupestris	Rock Bass							X[CH]								X[CH]			
Catostomus commersonii	White Sucker							X[CH]								X[CH]			
Cottus bairdii	Mottled Sculpin							X[CH]											
Culaea inconstans	Brook Stickleback	X[LGL]				X[LGL;CH]						X[CH]				X[CH]			X[ABL]
Cyprinid sp.															*X[ABL]				
Esox lucius	Northern Pike															X[CH]			
Etheostoma caeruleum	Rainbow Darter							X[CH]								X[CH]			
Etheostoma flabellare	Fantail Darter							X[CH]								X[CH]			
Etheostoma nigrum	Johnny Darter							X[CH]								X[CH]			
Hypentelium nigricans	Northern Hog Sucker							X[CH]								X[CH]			
Lepomis gibbosus	Pumpkinseed						X[CH]	X[CH]								X[CH]			X[ABL]
Lepomis macrochirus	Bluegill Sunfish															X[CH]			
Luxilus cornutus	Common Shiner							X[CH]											
Micropterus dolomieu	Smallmouth Bass							X[CH]								X[CH]			
Micropterus salmoides	Largemouth Bass															X[CH]			*X[ABL]
Moxostoma erythrurum	Golden Redhorse															X[CH]			
Nocomis micropogon	River Chub							X[CH]								X[CH]			
Notemigonus crysoleucas	Golden Shiner															X[CH]			
Notropis photogenis	Silver Shiner							X[CH]								X[CH]			
Notropis rubellus	Rosyface Shiner							X[CH]								X[CH]			
Noturus flavus	Stonecat							X[CH]								X[CH]			
Oncorhynchus mykiss	Rainbow Trout							X[CH]								X[CH]			
Oncorhynchus tshawytscha	Chinook Salmon							X[CH]								X[CH]			
Osmerus mordax	Rainbow Smelt							X[CH]											
Perca flavescens	Yellow Perch							X[CH]											
Petromyzon marinus	Sea Lamprey															X[CH]			

		Crossing Number																	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	Watercourse Classification	S	S	u/s: NFH d/s: SC	u/s: NFH d/s: SC	S	S	P	NFH	u/s: SC d/s: S	NFH	S	u/s: NFH d/s: SC	NFH	u/s: SC d/s: S / P	P	u/s: NFH d/s: SC	S / C	S
Species	**Common Name**																		
Pimephales notatus	Bluntnose Minnow							X[CH]								X[CH]			
Pimephales promelas	Fathead Minnow						X[LGL;CH]	X[CH]		X[CPA;LGL]						X[CH]			
Pomoxis nigromaculatus	Black Crappie															X[CH]			
Rhinichthys atratulus	Blacknose Dace							X[CH]								X[CH]			
Rhinichthys cataractae	Longnose Dace							X[CH]		X[CH]						X[CH]			
Salmo trutta	Brown Trout							X[CH]											
Semotilus atromaculatus	Creek Chub		X[LGL]					X[CH]								X[CH]			

X – Species present at road crossing.
LGL – Electrofishing collections conducted by LGL Limited in 2007 and 2008.
CPA – Electrofishing collections conducted by C. Portt and Associates in 2008.
ABL – Electrofishing collections conducted by Aquafor Beech Limited in 2011.
CH – Conservation Halton Fish Community Database
* incidental observations

Watercourse Classification
P - Permanent
S – Seasonal
C – Contributing (Complex or Simple)
SC – Simple Contributing
NFH – Not Fish Habitat

Aquafor Beech Limited did not receive landowner permission to assess fish habitat or population structure upstream or downstream of crossing 9. Immediately downstream of Britannia Road at crossing 9 there exists an online pond that will be affected by the widening of Britannia Road. The watercourse at crossing 9 and continuing downstream is classified as seasonal fish habitat, meaning that direct fish habitat exists within this reach on a seasonal basis. In the opinion of Aquafor Beech Limited, removal of this online pond would help improve direct fish habitat by reducing in-stream temperatures and creating riverine habitat within the vicinity of the pond. Approximately two kilometres downstream, the watercourse at crossing 9 confluences with the Main Branch of Sixteen Mile Creek, which contains cool/coldwater species such as rainbow trout, chinook salmon and rainbow dater. Reducing the temperature of the water flowing into the Main Branch of Sixteen Mile Creek would improve habitat conditions for these species.

Removal of this pond would require landowner permission. If landowner permission to remove the pond is not granted, an alternative solution would be to improve habitat by taking the pond off-line and relocating it outside the construction footprint of the proposed road widening.

3.3 Significant Species

3.3.1 Significant Plant Communities

The Natural Heritage Information Centre (NHIC) database notes one plant community as S3S4 (vulnerable – apparently secure): dry-fresh hickory deciduous forest type (FOD2-3). According to the Halton Region Environmental Impact Assessment Guidelines (2005) this community is considered a significant woodland within Halton Region because it is greater than 4 ha, and located outside the Urban Area but below the Escarpment Brow. Furthermore, the woodlands found on the slopes of the Main branches of Sixteen Mile Creek are connected to a woodland system that is greater than 10 ha, therefore qualifying as Provincially Significant Woodlands.

3.3.2 Significant Flora Species

Provincially Significant Flora

No provincially significant species were documented during the field surveys.

The Natural Heritage Information Centre (NHIC) database notes five provincially significant plant species documented from the general area: Carey's sedge (*Carex careyana*), northern hawthorn (*Crataegus dissona*), Schreber's wood aster (*Eurtbia schreberi*), Virginia lungwort (*Mertensia virginica*), and large round-leaved orchid (*Platanthera macrophylla*). These are

ranked S2 (imperiled), S3 (vulnerable), S2S3, S3, and S2 respectively using the provincial standards for rarity[1]. These species were not observed within the study area during field studies.

In reply to the request for information the MNR reported no records for flora Species at Risk within the study area.

Regionally Significant and Uncommon Flora

Main Branch of Sixteen Mile Creek

The survey of the Main Branch of Sixteen Mile Creek found four species ranked as uncommon and two ranked as rare. The four uncommon species include shinning willow (*Salix lucida*), great ragweed (*Ambrosia trifida*), smooth goldenrod (*Solidago gigantea*), and hairy aster (*Symphyotrichum pilosum*); these species are ranked S5 in the province. The two species ranked as rare include common juniper (*Juniperus communis*) and river wild-rye (*Elymus riparius*); these species are ranked as S5 and S4? respectively within the province. All of the regionally significant floral species were located within the Cultural Meadow (CUM) community.

East Branch of Sixteen Mile Creek

The survey of the east branch of Sixteen Mile Creek found four species ranked as uncommon (HU) and two ranked as rare (HR) based on the Halton Natural Areas Inventory (2006) species ranks for rarity. The four uncommon species include speckled alder (*Alnus incana* spp. *rugosa*), shinning willow (*Salix lucida*), ditch-stonecrop (*Penthorum sedoides*), and cow parsnip (*Heracleum lanatum*); these species are all ranked as S5 (secure - common, widespread, and abundant within the province). The two species ranked as rare include hard-stemmed bulrush (*Scirpus acutus*) and American bur-reed (*Sparganium americanum*); these species are ranked as S4? (apparently secure within the province) and S5 respectively. All of the regionally significant floral species were located within the Cultural Meadow (CUM) community.

Western Woodland

The survey of the Western Woodland yielded no rare (HR) species and six uncommon (HU) species based on the Halton Natural Areas Inventory (2006). The six uncommon species include hairy wood sedge (*Carex hirtifolia*), blunt broom sedge (*Carex tribuloides*), fleshy hawthorn

[1] S1 – Critically Imperiled – Critically imperilled in the 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 province.
S2 – Imperilled – Imperiled in the province because of rarity due to a very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the province.
S3 – Vulnerable – Vulnerable in the 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.

(*Crataegus succulenta*), jumpseed (*Polygonum virginianum*), arrow-leaved aster (*Symphyotrichum urophyllum*) and Le Conte's violet (*Viola affinis*). The blunt broom sedge was found as a dense patch within one of the dry vernal pools in the northern half of the study area. Fleshy hawthorn was observed near the border of one of the Grey Dogwood Cultural Thicket polygons, and may occur in more than one location within the woodland. Jumpseed was found throughout the woodland, while the remaining species were found only as single (or a small clump of) stems.

3.3.3 Significant Fauna Species

Federally and Provincially Significant Bird Species

Bobolink

Bobolink, listed as threatened provincially with COSSARO and federally with COSEWIC was recorded at four point count locations during the breeding bird surveys. There were two pairs recorded as probable breeders, one individual observed entering the field, and one individual carrying food. Bobolink is a ground-nesting grassland species that nests and forages in native tall-grass prairies, agricultural fields such as hayfields consisting of timothy (*Phleum pratense*), clover (*Trifolium* sp.), and other broadleaved plants, pasture, and a variety of other grassland habitats (COSEWIC, 2010). Bobolink has been listed as threatened due to the trending decline in population mainly due to habitat loss. Although hayfields provide suitable habitat for breeding, the continual decline of this species has been attributed in large part to early cutting of these fields (COSEWIC, 2010).

Barn Swallow

Barn Swallow, listed as threatened provincially with COSSARO and federally with COSEWIC was observed foraging for insects during both surveys in 2011 and nesting within the culvert (Crossing #5) adjacent to the Western Woodland. Historically, Barn Swallow nesting habitat consisted primarily of natural features such as caves, holes, crevices and ledges associated with rocky cliff faces. However, since European settlement the species has largely shifted to anthropogenic structures that provide either a horizontal nesting surface (e.g. a ledge) or a vertical face, usually with an overhang that provides shelter. Barn Swallow nests are frequently located in and around open barns, garages, bridges, road culverts or on structures such as posts, light fixtures and ledges over windows and doors. Foraging habitat consists of a variety of open areas, including grassy fields, pastures, farmland, the shorelines of lakes and rivers, wetlands, cleared rights-of-way and forest clearings (COSEWIC 2011a). The reasons for the decline of the barn swallow are not well understood, but one reason for the possible decline is the removal of nesting sites, such as old barns (COSEWIC, 2011b). Many of the open areas of the study area have the potential to function as Barn Swallow foraging habitat.

Eastern Wood-pewee

Eastern Wood-pewee (*Contopus virens*), a federal species of 'Special Concern', was assigned 'Possible' breeding status within the woodland, as a result of a singing male frequenting the width of the Northern part of the woodlot. This species breeds in deciduous and mixed woods, and also a preference nesting sites adjacent to open areas (e.g. agricultural fields, etc.) (McLaren, 2007). It is not area-sensitive and is generally considered tolerant of adjacent urban development although may be found less frequently (McLaren, 2007).

Western Chorus Frog

Western chorus frogs were heard during the first two surveys at monitoring station 11, adjacent to the Western Woodland. As described in Section 3.3.6, this species has experienced a consistent population decline in the Great Lakes Basin since 1995 (Tozer, 2013) and is federally listed as Threatened by COSEWIC. COSSARO has designated this species as Not-at-Risk. Chorus frogs require both breeding ponds devoid of fish predators and adjacent terrestrial habitat such as moist woods or meadows to feed and overwinter.

Regionally Significant Bird Species

Five species classified as uncommon in the Halton Natural Areas Inventory (2006) were recorded during the field surveys, they include, willow flycatcher, horned lark, northern rough-winged swallow, northern mockingbird, and vesper sparrow. Two additional species, blue-winged teal and red-bellied woodpecker, were incidentally recorded by K. Barrett of Conservation Halton in the Eastern Woodland and Western Woodland, respectively.

Area Sensitive Bird Species

Three birds recorded during the surveys are considered area sensitive species, they include:

- hairy woodpecker;
- savannah sparrow (also classified as Special Concern by COSEWIC); and
- bobolink, (also classified as Threatened by both COSEWIC and COSSARO).

Hairy woodpecker are mildly area sensitive forest nesting birds that require relatively large woodlands (>10ha) for breeding, particularly in areas where forest cover is less than 15% (Sandilands, 2005). There was one individual observed during the survey. Savannah sparrow and bobolink are both grassland nesting species that require large areas for nesting (Farina, 2006). Savannah sparrow was observed at 19 of the 22 survey locations with a breeding status of probable at three point count locations.

3.3.4 Historic Records of Provincially Significant Fauna

The NHIC has documented three provincially significant fauna species from the vicinity of the study area, they include: northern long-eared bat, eastern milksnake, and Jefferson X blue-spotted salamander. The most recent record for northern long-eared bat was in the year 1920 suggesting either this species is no longer present within this area or surveys for this species have not been conducted. The records for eastern milksnake and Jefferson X blue-spotted salamander are 1990 and 2002 respectively.

The Jefferson X blue-spotted salamander is ranked as S2 (imperilled) in the province. These salamanders require vernal ponds for breeding. Vernal ponds suitable for breeding are most often found in and around woodlands where the salamanders forage and overwinter (Jefferson Salamander Recovery Team, 2009). A vernal pond is located at the base of the western valley slope of the East Branch of Sixteen Mile Creek, approximately 100 m north of Britannia Rd which is described in Section 3.1.1 in the description of the Dry-fresh sugar maple – ironwood deciduous forest (FOD 5-4) community. It may be possible that this vernal pond is suitable for amphibian breeding. There may also be vernal ponds located within the larger woodlands located along Britannia Rd. Surveys for salamanders and vernal pools were not completed as part of this study, per direction received from the MNR.

Eastern milksnake, an S3 species considered special concern federally and provincially, inhabits old fields and open woodlands. There is suitable habitat for eastern milksnake along Britannia Road. Eastern milksnake are often found along hedgerows, specifically in rock piles and around larger rocks/boulders scattered in the hedgerows. These habitats provide suitable cover for egg laying, hibernation and thermoregulation (COSEWIC, 2002).

3.3.5 Significant Aquatic Species

The Silver Shiner (*Notropis photogenis*) is now designated threatened in the province of Ontario by the Committee on the Status of Species at Risk in Ontario (COSSARO). It was upgraded from Special Concern in June, 2011. Silver Shiner is present in the East Branch of Sixteen Mile Creek and was caught near the Britannia Road crossing in 2011 by Conservation Halton staff. If construction activities within or adjacent to the East Branch of Sixteen Mile Creek have the potential to impact Silver Shiner habitat, the proponent may have to complete an Information Gathering Form (IGF) and obtain a permit under Section 17(2)(c) of the Ontario Endangered Species Act before proceeding with construction activities. This is to be confirmed with the MNR during detailed design.

Silver Shiner is currently under assessment and could be added to Schedule 1 of the federal Species at Risk Act (SARA) as early as March 2014. If this is the case, a permit may be required under that legislation for crossings 7 and 15.

3.3.6 Significant Woodland Assessments

As part of the requirements of the EA, the Western Woodland and Eastern Woodland were assessed following criteria found in Part III (Land Stewardship Policies) of Halton Region's Official Plan (Region of Halton, 2006) and Halton Region's Environmental Impact Statement Guidelines (Region of Halton, 2005).

The Regional Official Plan (2006, p. 141) defines woodlands as follows:

> *Woodland means land with at least: 1000 trees of any size per ha, or 750 trees over 5 cm in diameter per ha, or 500 trees over 12 cm in diameter per ha, or 250 trees over 20 cm in diameter per ha but does not include an active cultivated fruit or nut orchard, a Christmas tree plantation, a plantation certified by the Region, a tree nursery, or a narrow linear strip of trees that defines a laneway or a boundary between fields. For the purpose of this definition, all measurements of the trees are to be taken at 1.37 m from the ground and trees in regenerating fields must have achieved that height to be counted.*

A "tree" is defined as (p. 139):

> *Tree means any species of woody perennial plant, including its root system, which has reached or can reach a height of at least 4.5m above ground at physiological maturity.*

The Regional Municipality of Halton's Tree By-Law no. 121.05 (Region of Halton, 2006) provides further guidance with regards to the delineation of woodland boundaries:

> *The boundary of a Woodland shall be defined by the ecological limit of the Woodland and not by property boundaries. Where the potential Woodland is dissected by a road or path not wider than 20m or by a natural feature such a s a creek, the boundary of the Woodland shall be deemed to cross the road, path or natural feature, but the area of the Woodland shall be calculated exclusive of the area of the road, path, or natural feature.*

In keeping with the definitions above, the boundaries of the Western Woodland are limited to the FOD9-4 community and do not include the adjacent the CUT1-4 complex (see Figure 3.1). The Eastern Woodland is defined by the FOD7-2 and does not include the MAM inclusion (see Figure 3.2). In order to be considered significant as defined in the Official Plan (p. 138) and EIS Guidelines (2005), a woodland must meet one or more of the following four criteria:

(1) the Woodland contains forest patches over 99 years old,
(2) the patch size of the Woodland is 2 ha. or larger if is located in the Urban Area, or 4 ha or larger if it is located outside the Urban Area but below the Escarpment Brow, or 10 ha or larger if it is located outside the Urban Area but above the Escarpment Brow,
(3) the Woodland has an interior core area of 4 ha or larger, measured 100 m from the edge, or

(4) the Woodland is wholly or partially within 50m of a major creek or certain headwater creek or within 150m of the Escarpment Brow."

Under the Regional Official Plan (2006) woodlands in the urban area with an area of 0.5 ha or more, or woodlands in the rural areas with an area of 4.0 ha or above, are candidates for assessment using the criteria listed above. The Eastern Woodland has an approximate area of 6.14 hectares, and thus meets the patch size criteria for regional significance as it is located in the Rural Area. The Western Woodland is approximately 4.66ha, and as such also meets the patch size criteria.

The woodlands do not meet any of the other three criteria: there are no forest patches over 99 years old, the woodlands contains no interior core habitat, and no major creeks flow through them. Thus, for both the Eastern and Western Woodland, significance under the Regional Official Plan is based on size alone.

3.3.7 Significant Wildlife Habitat

During the 2013 site visits a survey for potential significant wildlife habitat was conducted. Significant Wildlife Habitat is defined in the Significant Wildlife Habitat Technical Guide (SWHTG) (2000) as habitat that is "*ecologically important in terms of features, functions, representation or amount, and contributing to the quality and diversity of an identifiable geographic area or Natural Heritage System. Criteria for determining significance may be recommended by the Province, but municipal approaches that achieve the same objective may also be used*." Examples of significant wildlife habitat include areas where there are seasonal concentrations of wildlife, rare vegetation communities, specialized wildlife habitat, wildlife movement corridors, and habitat of species of conservation concern.

The Western Woodland is a good candidate for consideration as significant wildlife habitat. Amphibian monitoring station 11 – which corresponds to the northern reaches of the MAM2 community adjacent to the woodland – contains breeding Western Chorus Frog (see Section 2.2.1.4). This species has experienced a consistent population decline in the Great Lakes Basin since 1995 (Tozer, 2013), leading COSEWIC to designate the Great Lakes – St. Lawrence population as Threatened. As a result Western Chorus Frog should be considered a "species of conservation concern", and the breeding pond itself may be considered "specialized habitat for wildlife" as a woodland breeding pond. Furthermore, Eastern Wood-Pewee (a federally threatened species) is a possible breeder in the woodland, and as such should also be considered a "species of conservation concern".

Additional potential significant wildlife habitat identified during field surveys includes areas of grass land adjacent to Britannia Road that provide habitat for the area-sensitive bird species recorded. The valley systems associated with the East and Main Branches of Sixteen Mile Creek

that serve as wildlife movement corridors are also considered potential significant wildlife habitat. Also any habitat that provides breeding habitat for a rare species is potential significant wildlife habitat according to Table Q-3 of the SWHTG (2000) - *Criteria for Identification of Species/Habitats of Conservation Concern*.

4.0 IMPACT ANALYSIS

The impact analysis reviewed direct and indirect impacts to the ecological features and functions as a result from the road widening of Britannia Road. Impacts resulting from construction and long term impacts are also considered in the analysis. Direct impacts are mainly associated with the limits of the new proposed property line which contains the proposed road alignment (Figure 1-3: APPENDIX 1). The proposed property line is generally located ≤10 m from the edge of the existing road. The proposed road alignment shifts away from more sensitive natural heritage features (*e.g.* Regionally Significant Woodlands) or residential properties where possible. In the case of the community of Omagh, the proposed alignment of the road is diverted around the community to the south and does not follow the existing alignment of Britannia Road through this community.

4.1 Terrestrial Resources

4.1.1 Direct Impacts

4.1.1.1 Flora and Vegetation Communities

Impacts to Vegetation Communities along Britannia Road

The majority of the area to be affected by the road widening includes areas of active agriculture - primarily row crops with some hay and pasture fields. As noted above the proposed road alignment shifts away from and mitigates impacts within more sensitive natural heritage features such as woodlands and wetlands. Some impacts may occur at the location of the Main and East Branches of Sixteen Mile Creek which contain valley systems comprised of forested slopes and cultural meadow. A summary detailing the impacts associated with widening Britannia Road at the Main and East Branches of Sixteen Mile Creek, accompanied by the preferred widening option (i.e. north vs. south), is provided below.

Main Branch of Sixteen Mile Creek

Along the Main Branch of Sixteen Mile Creek the road alignment appears to shift slightly south on the east side of the Creek. Therefore, it appears as there will be more vegetation removed from the forested slope on the south side of the road compared with the north side of the road. At the eastern extent of the main branch crossing, a dry-fresh sugar maple deciduous forest (north side) and dry-fresh hickory deciduous forest (south side) have developed upon the valley slope. The hickory deciduous forest is particularly noteworthy as it is provincially rare (S3S4). An extensive cultural meadow has emerged on the terrace between the valley toe and the creek on both sides of Britannia Road. Scattered trees and shrubs throughout the meadow signify

succession towards a future forest community. A silver maple swamp meanders along the west bank of the creek north of Britannia Road. The western valley slope is occupied by a dry-fresh sugar maple deciduous forest (north side) with the cultural meadow extending to the south. It is expected that the vegetation within ≤10 m meters of the edge of Britannia road will be removed from this woodland for the road widening. The native mean Coefficient of Conservatism (CC) value ranges from 2.73 (cultural meadow) to 3.79 (silver maple swamp), indicating that these communities are dominated by species fairly tolerant of human disturbance.

Within 100 metres of Britannia Road on the north side, there are five (5) regionally uncommon and rare species present. Shining willow (*Salix lucida*), great ragweed (*Ambrosia trifida*), smooth goldenrod (*Solidago gigantea*) and hairy aster (*Symphyotrichum pilosum*) are uncommon, while river wild-rye (*Elymus riparius*) is rare. The rare juniper (*Juniperus communis*) is the only regionally significant species within 100 metres of Britannia Road on the south side. Most of these species are well beyond the estimated ≤10 m metre zone of vegetation removal (as outlined in the Environmental Study Report). Juniper is the closest significant species to the road at roughly 20 metres.

Based on the terrestrial communities and regionally significant species present, the preferred widening of Britannia Road should be exclusive to the north side; however, it is not expected that a ≤10 m construction footprint will have significant impacts to the edge of the vegetation community south of Britannia Road. A shift to the north will protect the provincially rare hickory deciduous forest and common juniper individual to the south of the present road alignment. Furthermore, the silver maple swamp north of Britannia Road is about 75 metres from the current ROW and is not expected to be impacted by any road expansion on the north side. Regardless of the selected road orientation, a detailed vegetation survey should be completed during detailed design to map the precise location of all regionally significant species so that all efforts can be made to avoid these individuals during construction.

Impacts to Silver Shiner habitat within the main branch of Sixteen Mile Creek may result from bridge construction. However, at this time the exact location of regulated Silver Shiner habitat is not known. At the detailed design phase, consultation with the MNR will aid in determining potential impacts and, if necessary, mitigation measures.

East Branch of Sixteen Mile Creek

Along the East Branch of Sixteen Mile Creek the forested communities are within 5-10 m from the edge of the road. Therefore the road widening would require the removal of approximately 3-8 m of vegetation. Traveling from the east, a cultural thicket (north side) exists along the valley slope about 50 metres from Britannia road while another dry-fresh hickory deciduous forest occupies the south valley slope. Consistent with the main branch crossing, a cultural meadow has developed upon the creek terrace. Along the western valley slope, a dry-fresh sugar

maple-ironwood deciduous forest has developed on the north side, and a dry-fresh white ash deciduous forest has developed on the south side.

All of the regionally significant species at this crossing are north of Britannia Road. There are four (4) uncommon species within 100 metres of the road: speckled alder (*Alnus incana* ssp. *rugosa*), shining willow (*Salix lucida*), ditch stonecrop (*Penthorum sedoides*), and cow parsnip (*Heracleum lanatum*). Two rare species present include hard-stemmed bulrush (*Scirpus acutus*) and American bur-reed (*Sparganium americanum*).

Unlike the main branch crossing, the preferred road expansion for the east branch crossing from a terrestrial ecology standpoint is on the south side; however, it is not expected that the removal of 3-8 m of vegetation will have significant impacts to the edge of the vegetation community north of Britannia Road. The provincially rare hickory deciduous forest along the eastern valley slope to the south is offset from the present Britannia Road alignment by about 20 metres, and is not expected to experience direct impacts from road expansion to the south. Along the western valley slope, fewer trees would have to be removed from southerly expansion (into the white ash deciduous forest) than a northerly expansion (into the sugar maple-ironwood deciduous forest). In addition, there are no regionally significant plants to the south of the road. Regardless of the selected road orientation, a detailed vegetation survey should be completed during detailed design to map the precise location of all regionally significant species so that all efforts can be made to avoid these individuals during construction.

Western and Eastern Woodlands

The preferred road alignment and accompanying sidewalk adjacent to the Western Woodland would generate a minor encroachment (i.e. a few metres) into the western corner of the woodland and marsh boundaries, and would therefore require minimal vegetation removal consisting of invasive tree species. The limits of construction on the south side of Britannia near the Western woodland have been reduced to the extent possible whilst still maintaining road safety, and follow the staked dripline of the woodland with the exception of one area on the westernmost edge. Said area contains exotic Manitoba maple (*Acer negundo*) trees; the staked dripline of the western corner of the woodland is exaggerated northward as a result of the substantial northward lean of the maples. Impacts to exotic invasive species such as the Manitoba maples in the Western woodland are not ecologically negative. Replacement of these trees with native species would result in a net benefit to the area. Furthermore, given that a sidewalk is planned along the Britannia Road boundaries of both woodlands, human encroachment (trampling, litter, etc.) and subsequent degradation is quite likely without measures aimed at mitigation (see Section 5.1.2). The total area of the meadow marsh will also be reduced as a result of the increased road footprint. It should also be highlighted that amphibian monitoring station 11 which harbours breeding western chorus frogs is located on the western fringe of the Western Woodland, and eastern wood-pewee was found to be a possible

breeder. The road footprint will directly impact marsh habitat that does not contain direct breeding habitat for western chorus frog; areas of standing water suitable for breeding are present south of the proposed road alignment. Mitigation to account for the encroachment of the road footprint into wetland habitat is discussed in Section 5.1.2. As noted previously, eastern wood-pewee is generally tolerant of disturbance and development. Accordingly, the small amount of woodland edge removed as a result of road construction is not anticipated to have a significant effect on this species.

The preferred road alignment maintains the existing edge of the Eastern Woodland, and as such does not engender a reduction in overall area. Select root damage is foreseeable for mature trees growing on the woodland edge along the ditch in order to construct the sidewalk. A limited number of select individual trees will likely need to be removed.

4.1.1.2 Tree Survey

A total of 221 trees were surveyed within the new proposed property line (APPENDIX 11). There are four trees along the proposed alignment of Britannia Road that appear to be entirely outside of the new ROW (including both trunk and dripline). These trees include numbers 267, 289, 290 and 325. There are a further sixteen trees whose trunks are outside of the proposed ROW, but whose dripline extend into the new ROW (See APPENDIX 11). In regard to the road alignment at Omagh, the proposed diversion to the south would protect an additional 31 trees currently located along the current alignment of Britannia Road. A tree survey was not completed for all areas associated with the re-aligned options around Omagh because landowner permission was not granted to enter private lands.

Of the 221 trees surveyed, a total of 170 are located within the proposed ROW and will have to be removed. Aquafor Beech Limited recommends retaining the four trees (267, 289, 290 and 325) located outside the proposed ROW, as well as the 31 trees located along the current alignment of Britannia Road through Omagh. As for the 16 trees with trunks located outside the proposed ROW but with driplines extending into the ROW, Aquafor Beech Limited recommends that a Certified Arborist assess the retention status of these trees during the detail design phase, once the design drawings and method of utility installation has been finalized. All trees removed (170 plus those recommended for removal by a Certified Arborist) will be replaced at a ratio of 3:1 within the ROW, and will be concentrated near natural features (i.e. watercourses, wetlands, woodlands) wherever possible.

It should be noted that the locations of the trees are considered accurate to ± 5 m as determined with the use of a hand held GPS unit. Section 5.1.1 provides recommended measures for tree preservation and protection as part of detailed design for trees within and adjacent to the construction footprint.

4.1.1.3 Wetlands

The wetland community (meadow marsh) located north of Britannia Road between Eighth Line and the Eastern Woodland west of Highway 407 abuts the current alignment of the road. The construction footprint of the proposed road alignment will result in no more than 10 m of the southern edge of the wetland being removed from the current ROW (Figure 3: APPENDIX 1). The removal of no more than 10 m of wetland from the edge of this community is not expected to have a significant impact to the ecological function of the wetland.

The construction footprint of the proposed road alignment will also remove a portion of the meadow marsh community south of Britannia Road at crossings 2 and 3. At crossing 2 the proposed road alignment will result in no more than 7 m of wetland being removed and at crossing 3 no more than 5 m. In addition, note that the construction of an overpass over the CN Rail line located in between crossings 1 and 2 will result in an additional 11 m of wetland loss at crossing 2. The removal of approximately 7 m and 5 m from crossings 2 and 3 respectively is not expected to have a significant impact on the ecological function of these wetlands.

Opportunities for wetland area compensation within the ROW are not recommended as the proximity to the road will likely be detrimental to the health of the wetland and the wildlife that use it (e.g. salt impacts, attracting wildlife to roads, etc.). In an effort to minimize salt impacts to existing wetlands, it is recommended that native salt-tolerant woody vegetation be planted within the ROW in areas potentially affected by salt spray.

4.1.1.4 Amphibians

As a result of road mortality and noise disturbance (indirect impact), increasing traffic volumes have been shown to cause declines in amphibian population density (Fahrig et al., 1995). Wherever possible the new Britannia Road alignment should avoid encroaching upon amphibian breeding ponds, particularly the western monitoring station 11. Mitigation measures to account for the encroachment of the road footprint into wetland habitat are discussed in Section 5.1.2.

4.1.1.5 Significant Species and Habitat

Significant Flora

The impact analysis has determined there are no species of flora designated as Provincially Significant that will be impacted by the proposed development. In regard to the regionally significant flora species noted in section 3.3.2, all eleven are located within the cultural meadow communities of the East and Main Branches of Sixteen Mile Creek. Two of the eleven species, hard-stemmed bulrush and American bur-reed, are not located within the new proposed property line and therefore will not be directly impacted. The road widening is not expected to be a

significant impact to the habitat of the other nine regionally significant species nor their populations within these communities.

Significant Woodlands

Proposed improvements to Britannia Road will encroach approximately 10m into the dry-fresh hickory deciduous forest (FOD2-3) associated with the Main and East Branches of Sixteen Mile creek, which is considered Regionally Significant. However, the reduction of the woodland edge is not expected to have a significant impact on the ecological function of the woodlands due to their size and shape. Specifically, these woodlands do not contain any interior forest (habitat that is at least 100 m from the edge of the woodland) that could be negatively affected by the creation of a new edge, and their status as regionally significant woodlands will not change. Section 5.1.1 provides recommended measures for tree preservation and protection where trees are in close proximity to the construction footprint of the road widening.

Direct impacts to the Western and Eastern Woodlands were discussed in Section 4.1.1.1.

Provincially Significant Fauna

The breeding bird surveys recorded bobolink breeding in the hay fields along Britannia Road at survey points 9, 11, 12 and 14 with probable or confirmed breeding evidence at points 9, 12 and 14 (Figure 1-3: APPENDIX 1). At all four of these locations, lands adjacent to the existing roadway consist of agricultural fields (Figure 1 and 3: APPENDIX 1). Although Bobolink requires large areas of grasslands or agricultural fields such as hayfields and lightly grazed pastures for breeding and foraging, Conservation Halton has advised that the Ministry of Natural Resources will likely target natural meadows rather than hay fields for Bobolink habitat (APPENDIX 7).

Within the study area, Bobolink was recorded at locations adjacent to agricultural fields only. The road widening will remove no more than 10 m from the edge of these hay fields. Given the large size of these hayfields and the area of surrounding open habitat, it is not expected that there will be a significant impact to the amount of suitable habitat for bobolink. However, construction and road work may still require and Information Gathering Form (IGF) and a permit under Section 17(2)(c) of the Endangered Species Act (2007) to "damage or destroy" habitat for Bobolink. Implications of the Endangered Species Act (2007) are discussed further in Section 4.3.

Although bobolink was recorded adjacent to agricultural fields only, the MNR may target natural meadows rather than hayfields for bobolink habitat. There are five (5) locations containing natural meadow within the study area:

1) Meadow Marsh (MAM) community south of crossing #2 and #3 (Figure 1: APPENDIX 1);
2) Cultural Meadow (CUM) community to the north and south of crossing #7 (Figure 1: APPENDIX 1);
3) Cultural Meadow (CUM) community to the north and south of crossing #15 (Figure 3: APPENDIX 1);
4) Cultural Meadow (CUM) community south of Britannia Road between crossings #16 and #17 (Figure 3: APPENDIX 1); and
5) Cultural Meadow (CUM) and Meadow Marsh (MAM) communities north of Britannia Road between Eighth Line and the CP Railway at the eastern end of the study area (Figure 3: APPENDIX 1).

No Bobolinks were recorded within the vicinity of these natural meadows. Potential impacts to these communities as a result of road widening include:

1) Meadow Marsh (MAM) community south of crossing #2 and #3: The road widening will remove approximately 7 m of meadow marsh community at crossing #2 and no more than 5 m at crossing #3. As this community extends south along the length of the watercourse at these crossings, the removal of about 7 m along the edge of these communities is not expected to be a significant impact to the amount of suitable habitat for bobolink.

2) Cultural Meadow (CUM) community to the north and south of crossing #7: As the bridge at this crossing will span 2 times the bankfull channel width, it is not expected that road widening will have a significant impact on this community or to the amount of suitable habitat for bobolink.

3) Cultural Meadow (CUM) community to the north and south of crossing #15: As the bridge at this crossing will span 2 times the bankfull channel width, it is not expected that road widening will have a significant impact on this community or to the amount of suitable habitat for bobolink.

4) Cultural Meadow (CUM) community south of Britannia Road between crossings #16 and #17: The road widening will remove no more than 5 m of cultural meadow community along the northern edge adjacent to Britannia Road. Given the large size of this community and the area of surrounding open habitat, it is not expected that the removal

of 5 m of cultural meadow community will be a significant impact to the amount of suitable habitat for bobolink

5) Cultural Meadow (CUM) and Meadow Marsh (MAM) communities north of Britannia Road between Eighth Line and the CP Railway at the eastern end of the study area: Road widening will not impact the cultural meadow on the north-east corner of Eighth Line and Britannia Road, nor the cultural meadow community north of Britannia Road adjacent to the woodlot. There are two meadow marsh communities in this area. The construction footprint of the proposed road alignment will result in no more than 10 m of the wetland being removed from the community immediately adjacent to Britannia Road. The meadow marsh community within the woodlot will not be impacted. The removal of no more than 10 m of wetland from the edge of this community is not expected to have a significant impact to the ecological function of this wetland.

The breeding bird surveys also recorded Barn Swallow at points 6-10, 12 and 19 (Figure 1-3: APPENDIX 1), but with no evidence of breeding. Breeding Barn Swallows, with nests, were observed at the concrete box culvert at Crossing #5 during a field visit to the Western Woodland in May 2013. Suitable foraging habitat (i.e. open fields) is present north and south of Crossing #5. As stated in Section 3.3.3, Barn Swallow nests are frequently located in and around open barns, garages, bridges, road culverts or on structures such as posts, light fixtures and ledges over windows and doors. Foraging habitat consists of a variety of open areas, including grassy fields, pastures, farmland, the shorelines of lakes and rivers, wetlands, cleared rights-of-way and forest clearings.

Given the large size of hayfields and the area of surrounding open habitat, it is not expected that removing no more than 10 m for Britannia Road widening will have a significant impact to the amount of suitable foraging habitat for Barn Swallow. Referring specifically to breeding habitat, anthropogenic structures with the potential to function as Barn Swallow nesting habitat present within the study area outside of Omagh are limited to culverts. Both Alternative 5B and 5C (see Section 4.5.2.1), the northern and southern bypasses through the community of Omagh respectively, may affect barns that have the potential to function as Barn Swallow nesting habitat. Alternative 5b (bypass Omagh to the north) will affect seven barns north-west of the Britannia Road Fourth Line intersection that may have the potential to function as Barn Swallow habitat. Alternative 5c (bypass Omagh to the south) will affect two barns south-east of the Britannia Road Fourth Line intersection that may have the potential to function as Barn Swallow habitat. Landowner permission was not obtained to perform more comprehensive surveys to confirm whether or not these structures function as Barn Swallow breeding habitat. A more comprehensive survey will be required at Detail Design to confirm whether these barns, and culverts within the study area, are functioning as Barn Swallow nesting habitat. If so, construction and road work will require a permit under Section 17(2)(c) of the Endangered Species Act (2007) to "damage or destroy" habitat for Barn Swallow.

Furthermore, any work associated with the proposed expansion of Britannia Road that would involve disturbance to the culvert running under Britannia Road, just to the west of the woodland at Crossing #5, could potentially disturb nesting Barn Swallows if the nest was active at the time of work. The nests of this species not only receive protection from the Migratory Bird Convention Act (1994), but as a provincial and federal species at risk, Barn Swallow also receives Habitat Protection under the Endangered Species Act (ESA) 2007. Removal or alteration of the culvert itself would result in a change to the suitable nesting habitat of this species, and therefore may require creation of new habitat under the ESA and Ontario-Regulation 176/13. An increase in the volume of road traffic as a result of the proposed road expansion would also increase mortality of Barn Swallows, which often collide with vehicles when they are found nesting or foraging close to roads. This is an existing impact that would be further exacerbated with an increase in the volume of road traffic.

Encroachment into the Western Woodland from the proposed road expansion would reduce the amount of available habitat for Eastern Wood-pewee, a federal Species-at-Risk (listed as Special Concern). It was notable that the singing male was heard calling from the width of the woodlot (East to West), but was entirely confined to the North end, within approximately 50m of Britannia Road West. As stated above, it is the opinion of Aquafor Beech Limited that the small amount of woodland edge removed as a result of road construction is not anticipated to have a significant effect on this species.

Significant Wildlife Habitat

The areas identified as potential significant wildlife habitat include the woodlands containing area sensitive species, grasslands and hay fields containing area sensitive species or species at risk in Ontario (*e.g.* Bobolink), wetlands associated with Crossing 5 south of Britannia Road (i.e. Western Chorus Frog habitat), and animal movement corridors in the valley systems of the Main and East Branches of Sixteen Mile Creek. The woodlands containing area sensitive species are going to be avoided by shifting the proposed road alignment away from the woodland. Therefore, there would be no direct impact to the habitat of area sensitive species in these woodlands. The valley corridors will still allow the same level of movement of wildlife and therefore the road widening would not be considered a negative impact. The reduction in the size of the hay fields containing bobolink and natural meadows that may contain suitable habitat will not reduce the area requirements for suitable breeding habitat of bobolink given the currently large size of these fields and surrounding open area. Therefore, there will not be a significant negative impact to the significant wildlife habitat associated with grasslands and hayfields where Bobolink were recorded as breeding.

Impacts to the Western Woodland and adjacent amphibian monitoring station 11 – both of which are considered potential Significant Wildlife Habitat – were addressed above.

4.1.2 Indirect Impacts

Indirect impacts associated with construction include road widening adjacent to woodlands and trees in hedgerows. There is the potential for damage to the tree roots which may negatively impact the health of the trees. Preservation and protection measures are recommended in Section 5.1.1.

Transportation corridor improvements that increase the speed and volume of traffic can potentially lead to an increase in wildlife mortality. However, given the agricultural nature of the majority of the study area, this potential should be minimal. The majority of wildlife crossings most likely occur within the valley systems of the Main and East Branches of Sixteen Mile Creek, allowing wildlife to avoid traffic by crossing at the bridges beneath. Wildlife mortality due to an increase in vehicular traffic can also be mitigated by the addition of Wildlife Crossing Structures, discussed further in Section 5.3. During the two days of tree surveys observations of wildlife mortality from cars was recorded. Six species were recorded, all racoons. One of the observations was recorded close to Tremaine Road, where a woodland is located approximately 125 m north of Britannia Road. Three observations were recorded close to the bridge crossing of the Main Branch of Sixteen Mile Creek. Two observations were recorded adjacent to significant woodland close to Highway 407. Given the increase in volume of traffic and the wider road crossing, an increase in mortality of wildlife may occur.

There is also evidence that an increase in road traffic can reduce populations of woodland and grassland breeding birds (Reijnen *et al.* 1997). The reduction in density of bird populations is related to a reduced habitat quality, primarily as a result of traffic noise (Reijnen *et al.* 1997). As a result of both road mortality and noise disturbance, increasing traffic volumes have also been shown to cause declines in amphibian population density (Fahrig et al., 1995). As a result of the road widening and increase in traffic noise, there may be a negative impact to the breeding success of the grassland and woodland birds and amphibians in the habitats adjacent to Britannia Road.

4.1.3 Construction-related Impacts

During construction there is the potential for erosion of exposed soil during rainfall events or periods of snow melt. Eroded sediment has the potential to move into the minor streams and the Main and West Branches of Sixteen Mile creek. An increase in sediment to a watercourse can impact fish habitat. A Sediment and Erosion Control plan that includes erosion control measures and monitoring for mitigating impacts will be developed as part of detailed design.

The removal of vegetation, specifically trees during the breeding bird season may have an impact on nesting species. Tree removal should be timed to avoid impacts to birds during the breeding

bird season, generally from early-May to mid-July. Similarly, construction activity adjacent to the hay fields can impact the breeding success of these species including any nesting bobolink. Construction activities proposed adjacent to the hay fields where bobolink are confirmed breeding or the natural meadows that contain potential breeding habitat should be planned to avoid the breeding season.

4.2 Aquatic Resources

Potential direct and indirect impacts to the aquatic resources in the study area associated with the widening of Britannia road include:

- Construction during periods of sensitivity (e.g. spawning) to the resident fish community.
- Downstream sedimentation originating from the work area during and following construction may result in a reduction of quality instream habitat, increased turbidity and a reduction in productivity as benthic organisms and their habitats are buried.
- The addition of deleterious substances from the work areas into the watercourses as a result of construction activities.
- The removal of vegetation and riparian habitat that may occur as a result of construction and grading requirements could lead to eroded banks, reduced stream shading, a reduction in water quality and reduced quality of in-stream habitat.
- Increased road volume may lead to an increase in deleterious substances (i.e. salt, oil) entering the watercourse as a result of surface runoff.
- Increased culvert length potentially increases the amount of inhabitable habitat for fish while creating larger obstructions to fish migration.

The proposed work will require ROW replacements to the two existing span bridges over both the main and east branches of Sixteen Mile Creek as well as culvert replacements at each of the 16 other watercourse crossings within the study area to accommodate the proposed 47 m ROW. The possibility of the proposed works at each watercourse resulting in a HADD (Harmful Alteration, Disruption or Destruction of fish habitat) will have to be determined in detail design, in consultation with Conservation Halton (CH) and/or the department of Fisheries and Oceans (DFO). Conservation Halton has a Level 2 Agreement with the DFO, meaning that Conservation Halton can issue a Letter of Advice authorizing works if they believe impacts to fish and fish habitat can be mitigated. If impacts to fish and fish habitat cannot be fully mitigated during construction activities, the project will be forwarded to the DFO for further review and an authorization under the *Fisheries Act* may be required.

4.2.1 Significant Species

Silver Shiner habitat is present within the East Branch of Sixteen Mile Creek. The impact to Silver Shiner habitat as a result of road widening activities is discussed in Section 4.2. Construction and road work activities may require the completion of an Information Gathering Form (IGF) and a permit under section 17(2)(c) of the Endangered Species Act (2007) to impact the habitat of Silver Shiner if works cannot be fully mitigated. The need for these permits will be at the discretion of the Ministry of Natural Resources (MNR) and will be determined at detail design.

4.3 Endangered Species Act Protection

The Endangered Species Act (2007) protects individuals and the habitat of species listed on the Species at Risk in Ontario (SARO) list as endangered or threatened. The Endangered Species Act (2007) includes two definitions of habitat: general habitat and regulated habitat. Only one of these definitions applies at any given time (MNR 2010).

General habitat is defined as an area on which the species depends, directly or indirectly, to carry on its life processes, including reproduction, rearing, hibernation, migration or feeding. This includes places within the area that are used by members of the species as dens, nests, hibernacula or other residences.

Regulated habitat is defined by a species-specific habitat regulation. The regulation is a legal description of the species habitat and is intended to provide greater certainty of what is meant by habitat. The regulation may define habitat by describing its features (e.g., a creek, cliff, or beach) or its geographic boundaries. The description may include areas where the species is found but, unlike the general habitat of a species, regulated habitat may include areas that are currently unoccupied by the species such as areas where the species formerly existed or areas where there is the potential to reintroduce the species (MNR 2012).

Section 10.1 of the Endangered Species Act (2007) states that no person shall damage or destroy the habitat of an endangered or threatened species. The Act's general habitat definition applies automatically when a species is added to or the species status is amended on the Species at Risk in Ontario (SARO) List after June 30, 2008. Section 11 of the Endangered Species Act (2007) requires that a recovery strategy be prepared for each species designated endangered or threatened to identifying steps to protect and promote their recovery. Once a recovery strategy has been completed, a species-specific habitat regulation is developed. Once the species-specific habitat regulation is created it replaces the general habitat definition (MNR 2012).

Bobolink, Barn Swallow and Silver Shiner were designated threatened species under the Endangered Species Act (2007) after June 30, 2008. Accordingly, the habitat of all three species is now protected under the Act based on its general definition of habitat, although temporary exemptions under Ontario Regulation 242/08 permit agricultural operations and certain development activities to damage or destroy Bobolink habitat.

Where development is proposed in an area that contains a listed species and/or its habitat, the proponent must address requirements of the Endangered Species Act (2007) related to permits, regulations, and agreements. With suitable stewardship, protection, or rehabilitation, development may be permitted. Lands within the study area have the potential to function as both Bobolink and Barn Swallow habitat based on the general definition of habitat. There are also Silver Shiners present within the East Branch of Sixteen Mile Creek. Construction and road work activities may require an Information Gathering Form (IGF) be filled out and a permit under section 17(2)(c) of the Endangered Species Act (2007) to impact the habitat of Bobolink, Barn Swallow and/or Silver Shiner. The need for these permits will be at the discretion of the Ministry of Natural Resources (MNR) and will be determined during detail design. Once the scope of work has been determined, Aquafor Beech Limited recommends contacting the MNR as soon as possible during the detail design process to determine the need for an IGF and/or permit under the Endangered Species Act.

4.4 Utility Relocation

All utility relocation will occur within the proposed ROW, and therefore have negligible potential to adversely affect natural heritage features within the study area. Any utility relocation that occurs as a result of construction should not be placed within significant flora or fauna habitat. Utility relocation should avoid significant woodlands, valleylands, wetlands and wildlife habitat where possible, as well as fish habitat that includes a 15 m buffer on both sides of a watercourse.

4.5 Summary of Impacts

4.5.1 East and West of Omagh

The EA Study has considered five transportation corridor improvement alternatives for Britannia Road, including a “do nothing” alternative and four widening alternatives. The widening alternatives varied according to the location. These were: widen to the north of the existing right-of-way, widen to the south, widen about the centerline, or a combination of the above. A separate screening exercise selected the later alternative that consists of widening to either the north,

south or about the centerline, depending on the location along the corridor. The selected alternative is referred to as Alternative 5.

4.5.1.1 Terrestrial Impacts

The impact assessment has determined that there will be limited direct impacts to the trees and vegetation communities located within the new proposed property line of Britannia Road. The impacts are not expected to significantly impact the ecological features or functions associated with these communities. The impact assessment also determined that there will not be a significant direct impact to significant wildlife habitat, the Western and Eastern Woodland (regionally significant woodlands) or fauna as a result of the road widening. The limits of construction on the south side of Britannia near the Western woodland follow the staked dripline of the woodland, with the exception of one area on the westernmost edge. Said area consists of the exotic Manitoba maple (*Acer negundo*) trees. The staked dripline of the Manitoba maples is exaggerated northward as a result of the substantial northward lean of the maples. Impacts to exotic invasive species such as the Manitoba maples in the Western woodland are not ecologically negative. Replacement of these trees would result in a net benefit to the area.

The anticipated indirect impacts are mainly due to the increase in width of the road and an expected increase in traffic volume. There is a potential for indirect impacts to wildlife through an increase in road mortality.

Of the 221 trees surveyed, a total of 170 are located within the proposed ROW and will have to be removed. Aquafor Beech Limited recommends retaining the four trees (267, 289, 290 and 325) located outside the proposed ROW, as well as the 31 trees located along the current alignment of Britannia Road through Omagh. As for the 16 trees with trunks located outside the proposed ROW but with driplines extending into the ROW, Aquafor Beech Limited recommends that a Certified Arborist assess the retention status of these trees during the detail design phase, once the design drawings and method of utility installation has been finalized.

4.5.1.2 Aquatic Impacts

Potential aquatic impacts associated with proposed improvements to Britannia Road are almost exclusively related to impacts incurred during construction. Standard construction mitigation procedures should be utilized to reduce the impact of construction on watercourses within the study area (see Section 5.2). As many of the watercourses within the study area represent seasonal or contributing fish habitat, significant impacts to aquatic habitat can be avoided by replacing culverts during dry conditions and while the watercourses are dry. In the case of permanent streams, mitigation measures should be utilized to minimize significant impacts to aquatic habitat (Section 5.2).

4.5.2 Within the Community of Omagh

The preferred alternative (Alternative 5) also consists of three different options through the community of Omagh (Figure 2a, 2b and 2c: APPENDIX 1):

1) Alternative 5A – Widen about the centerline through the community of Omagh;
2) Alternative 5B – North Bypass through the community of Omagh;
3) Alternative 5C – South Bypass through the community of Omagh.

Alternative 5C was selected as the preferred alternative. The impacts to the ecological features and functions associated with each Omagh alternative are summarized for both terrestrial and aquatic resources below.

4.5.2.1 Terrestrial Resources

Alternative 5A – Widen about the Centerline

Terrestrial impacts associated with widening about the centerline of the current ROW are mainly due to removal of trees within the proposed ROW. Other impacts are associated with the removal of up to 10 m from the edge of hay fields and natural meadows, possibly impacting Bobolink breeding habitat (see Section 4.1.1.5)

Omagh North and South Bypass (Alternatives 5B and 5C respectively)

Creating a bypass to the north or south would involve the removal of additional agricultural fields when compared to Alternative 5A. These fields may function as potential Bobolink breeding habitat. However, given the large size of these hayfields and the area of surrounding open habitat, there will not be a significant impact to the amount of suitable habitat for Bobolink (see Section 4.1.1.5). A bypass to the north or south may also impact existing barns located within the proposed ROW (Figure 2b and 2c: APPENDIX 1). These barns may function as potential Barn Swallow breeding habitat (see Section 4.1.1.5). A more comprehensive survey will be required at Detail Design to confirm whether these barns are functioning as Barn Swallow nesting habitat.

The proposed diversion to the north or south (Alternative 5b and 5c) would protect an additional 31 trees when compared to Alternative 5A. However a tree survey was not completed for all areas associated with Alternatives 5B and 5C because land owner permission was not granted to enter private lands.

4.5.2.2 Aquatic Resources

Alternative 5A – Widen about the Centerline

Widening about the centerline within the community of Omagh will require replacement of the current culvert structure at the corner of Britannia Road and 4th Line, producing similar potential impacts to aquatic resources as other crossings within the study area (Section 4.2).

Omagh North and South Bypass (Alternatives 5B and 5C respectively)

Creating an Omagh bypass to the north or south would require the creation of new watercourse crossings to the south. The increase in in-stream works will introduce a greater potential for aquatic resource impacts, as outlined in Section 4.2. However, Omagh Tributary is classified as warmwater, seasonal fish habitat, and if proper mitigation measures are utilized during construction (see Section 4.1.1.5), negative impacts to fish or fish habitat should be minimized for all three alternatives (5A, 5B and 5C). If possible, in-stream construction should be completed during the summer months when the Omagh Tributary will likely be dry and aquatic habitat impacts can be reduced.

Shifting the road alignment to the north or south to bypass Omagh may also require channel adjustment or realignment at crossing 11 due to the channel planform at these locations (Refer to Section 5.0 of the Fluvial Geomorphology Study). From an aquatic habitat perspective, this is necessary to limit the amount of aquatic habitat lost within the culvert while creating a smaller obstruction to fish movement.

The possible impacts to the existing terrestrial and aquatic resources resulting from each design alternative are presented in Table 4.1. From a natural heritage perspective, Alternative 5A (widen about the centerline) is the preferred option.

Table 4.1: Summary of possible impacts to existing terrestrial and aquatic resources resulting from each design alternative.

Location	Alternative	Impacts to Terrestrial Resources	Impacts to Aquatic Resources	Preference
East and West of Omagh	**5** - Minimize Impacts, follow existing ROW	Potential impacts to terrestrial natural heritage features are not anticipated to be significant. Anticipated potential impacts include the following: • Proposed road alignment shifts away from more sensitive natural heritage features o Limited impacts to significant wildlife habitat (i.e. Western woodland) have been lessened through design augmentation to the extent possible (i.e. reduction in construction footprint). • Some impacts to flora and vegetation communities at East and Main Branch of Sixteen Mile Creek as a result of road widening • Impacts to roadside trees (e.g. removals, damage, etc.) • ≥ 10m of wetland removed in meadow marsh community • Salt and light impacts as a result of increased traffic • Possible increase in wildlife road mortality • Impacts to Bobolink include removal of no more than 10 m of edge habitat • Barn Swallow breeding habitat: o No removal of anthropogenic building structures o Replacement of occupied culvert at Crossing 5 can be mitigated	The fish habitat within the study area is a combination of not fish habitat, seasonal, contributing and permanent fish habitat. The only crossings classified as permanent fish habitat include the Main and East branches of Sixteen Mile Creek. Potential impacts to aquatic habitat will mainly be a result of construction activities. General construction mitigation measures (Section 5.2) should limit potential impacts of road widening to aquatic habitat. The greatest potential for impacts are to the two permanent watercourses and include: • Removal of vegetation from riparian areas; • Downstream sedimentation, and; • Addition of deleterious substances into the watercourse Impacts to seasonal and contributing habitat can be limited by replacing crossings when the watercourses are dry. In this case, potential impacts will be limited to the removal of vegetation from riparian areas.	Chosen Alternative
Within Omagh	**5A** – Widen about the centerline	• Removal of more than 50 trees along the existing ROW • Impacts to Bobolink include removal of no more than 10 m from edge of hay fields • No removal of anthropogenic structures: no impacts to Barn Swallow breeding habitat	• Removal of vegetation from riparian areas; • Downstream sedimentation, and; • Addition of deleterious substances into the watercourse	Most Preferred
	5B – North Bypass	• Alternative 5b passes through existing agricultural fields - Additional removal of potential Bobolink breeding habitat when compared to Alternative 5A • Removal of barns seven within the proposed ROW that may function as potential Barn Swallow breeding habitat • Removal of approximately seven trees adjacent to fourth line (Figure 2b: APPENDIX 1)	• Removal of vegetation from riparian areas; • Downstream sedimentation, and; • Additional impacts associated with constructing new crossings to the north and repairing existing crossings.	Lest Preferred
	5C – South Bypass	• South bypass will protect and additional 30 trees when compared to Alternative 5a and 5b (see Figure 2c: APPENDIX 1) • Alternative 5c passes through existing agricultural fields - Additional removal of potential Bobolink breeding habitat when compared to Alternative 5A • Removal of two barns that may function as potential Barn Swallow breeding habitat	• Removal of vegetation from riparian areas; • Downstream sedimentation, and; • Additional impacts associated with constructing new crossings to the north and repairing existing crossings.	Neutral

5.0 MITIGATION AND MONITORING

5.1 Terrestrial Resources

Recommended mitigation measures to be implemented during the road work include:

1. Erosion control fencing installed adjacent to watercourses to prevent erosion and silt deposition into a watercourse.
2. All tree removals should be undertaken outside of the breeding bird season (early-May to mid-July).
3. Construction adjacent to hayfields is not to be conducted during the breeding bird season (early-May to mid-July).
4. Implementation of the Tree Preservation and Protection Measures recommended in Sections 4.1.1.2 and 5.1.1.

Recommended monitoring to be implemented during and following the road widening work include:

1. A qualified environmental inspector to conduct regular monitoring during road construction to ensure mitigation measures are implemented.
2. A qualified arborist to monitor construction activities associated with roadside tree protection and in areas adjacent to the significant woodlands and forested slopes associated with the Main and East Branches of Sixteen Mile Creek (see section 5.1.1).

5.1.1 Tree Preservation and Protection

The proposed road widening will result in the removal of trees in the new proposed property line of Britannia Road. There may be an opportunity to retain and preserve trees outside of the proposed property line. Tree preservation and protection measures should be addressed in detail design. The following tree protection measures should be implemented:

1. As part of the preservation of all trees in the significant woodlands and the forested slopes of the Main and East Branch of Sixteen Mile Creek, Type II erosion control fencing should be installed between the trees and the construction activity. Where possible the fencing should be placed one metre outside the drip line (canopy edge) to ensure tree root systems are fully protected from construction activities and soil compaction from machinery. This fencing should be installed prior to any grading or site clearing. The fencing should remain in place until all site work has been completed.

2. Proper root pruning should be undertaken by a certified arborist if roots of retained trees are exposed by construction activities. Exposed roots should be covered with soil or mulch to the extent possible as soon as possible following damage in order to prevent further damage and desiccation.

3. Within the woodlands there should be no:
    a. dumping, stockpiling or storage of any materials;
    b. parking or storage of any machinery or equipment;
    c. disposal of waste, garbage, brush or stumps or any burning of materials or disposal of ashes; or
    d. the use of any machinery without prior approval and written consent by the Region.

4. Any accidental damage to vegetation that is to be retained should be brought to the Regions attention and examined by an arborist to recommend the appropriate treatment (*e.g.*, pruning or sealing).

In addition, trees on Regionally-owned lands should be replaced as per the prescriptions of the Halton Region Tree-Canopy Replacement Policy (Regional Report No. LPS31-08), at a minimum.

5.1.2 Significant Woodlands

As described in Section 3.3.6, both the Western and Eastern Woodlands are considered significant following criteria found in Part III (Land Stewardship Policies) of Halton Region's Official Plan (Region of Halton, 2006) and Halton Region's Environmental Impact Statement Guidelines (Region of Halton, 2005). Given that a sidewalk is planned along the Britannia Road boundaries of both woodlands, human encroachment (trampling, litter, etc.) and subsequent degradation of these woodlands is likely without measures aimed at mitigation. At present, there is already a significant amount of litter which has accumulated within the northern edge of the Western Woodland. In order to protect these sensitive features, Aquafor Beech recommends that permanent chain-link fencing be installed along the northern boundary of the Western Woodland and southern boundary of the Eastern Woodland to reduce pressures associated with human encroachment.

Furthermore, edge effects resulting from encroachment into the Western Woodland should be mitigated through an edge management plan determined at the detailed design stage. Per consultation with Conservation Halton, it is not recommended that area loss as a result of encroachments into the marsh at the western edge of the Western Woodland be mitigated through habitat creation in ROW. As part of the Boyne Subwatershed Study (presently ongoing), a 60m wide north-south corridor has been identified along the Creek. It is anticipated that future restoration efforts along the Creek will result in increased habitat for flora and fauna using

wetlands in the vicinity. In the short term, it is recommended that a dense screen of salt-tolerant evergreen vegetation be planted along the interface between the marsh and the road edge in order to mitigate increased salt spray and light encroachment into the wetland.

5.2 Aquatic Resources

Recommended mitigation measures to be implemented during the road work include:

1. In-stream works should be minimized as much as possible and constrained to periods that are least sensitive to the resident fish community. The fish community within the study area is generally that of a warmwater system, and therefore an in-water construction timing window of July 1st to March 31st should be implemented (AMEC 2011a). However, due to the presence of Rainbow Trout and Chinook Salmon in the Main and East Branches of Sixteen Mile Creek, Aquafor Beech Limited recommends that a cool/coldwater in-stream construction timing window of July 1st to September 15th (AMEC 2011a) be imposed for crossings 7 and 15 to ensure that disturbed areas are given adequate time to naturally stabilize prior to the end of the growing season, thereby helping to prevent the migration of sediment into the watercourse during the spring freshet. As the East Branch of Sixteen Mile Creek is also occupied Silver Shiner habitat, the MNR may apply the cool/cold water fisheries timing window to crossings 10-14 and 16-18 following an assessment of the work required and the distance upstream of the confluence with the East Branch of Sixteen Mile Creek. This is to be discussed with the MNR during detail design.

2. Many of the tributary crossings within the study area represent seasonal or contributing fish habitat and were dry during assessment. Consistent with recommendations in the Conceptual Fisheries Compensation Plan (CFCP) for the Boyne Survey Area (AMEC 2011a), all work within each watercourse of the study area should be undertaken during the typical dry season to avoid impacts to downstream aquatic habitat. In the case of permanent streams, all in-stream work should be completed in the dry by providing temporary conveyance measures to isolate channel flow from the construction area to the greatest extent possible (AMEC 2011a). The water should then be drained from the work area only after a qualified fisheries biologist has removed any fish trapped within the isolated work area and placed them in suitable habitat downstream. All efforts should be made to avoid in-stream work.

3. When the watercourse is considered direct fish habitat (i.e. permanent or seasonal habitat) downstream of the crossing location, fish passage must be assured in crossing construction.

4. Standard construction mitigation procedures should be utilized. Consistent with recommendations in the CFCP (AMEC 2011a), construction within a watercourse will

require the preparation of a Sediment and Erosion control plan for each watercourse crossing, in accordance with Town of Milton and Conservation Halton Guidelines.

5. Construction access lanes and staging areas will be chosen appropriately during detail design when final design drawings/construction plans have been completed. Access lanes and staging areas will avoid riparian areas where possible. Where it is not possible to avoid damaging riparian areas, these areas will be re-planted upon completion of construction activities to resemble a pre-construction state. All vehicle and machine fuelling and maintenance will be carried out a minimum of 30 m from any watercourse to prevent the entry of deleterious substances (e.g. fuel, lubricant, oil) into the watercourse.

6. All culverts should be open-bottomed to preserve the natural creek substrate and avoid disturbing the stream bed. These structures pose the least risk to both terrestrial and aquatic species.

7. Stormwater management within the study area should attempt to replicate pre-construction flows within each watercourse.

Recommended monitoring to be implemented during and following the road widening work include:

1. Monitoring and maintenance should be conducted during construction to ensure that:
    a. Mitigating measures (e.g. Sediment and Erosion Control measures) are providing the expected protection continuously throughout the construction period;
    b. Additional mitigating measures are provided if required to address any unanticipated impacts which arise during construction;

2. Monitoring should include periodic site visits and inspections throughout the course of the work. In the event that the mitigation measures are not providing the anticipated amount of protection, all operations should be suspended until the cause is identified and corrected.

5.3 Wildlife Crossing Structures

Transportation corridor improvements that increase the speed and volume of traffic can potentially lead to an increase in wildlife mortality. Road crossing design for natural heritage corridors should encompass aquatic biology, stream morphology, hydrology and hydraulics, plus terrestrial connectivity (AMEC 2011a,b) in an attempt to minimize wildlife mortality. The Functional Stormwater and Environmental Management Strategy (FSEMS) for the Boyne Survey Secondary Plan Area (AMEC 2011) identifies Enhanced Wildlife Crossing locations where existing and proposed roads will cross the Natural Heritage System. These crossings are intended to be designed and equipped to provide safe passage for mammals, amphibians and reptiles by providing flood-free access to the crossing, terrestrial benches to permit wildlife movement under low flow to bank-full conditions and planting, fencing, wing-walls or curbs to direct wildlife movements into the culvert or span bridge (AMEC 2011a,b). The detailed design of road crossings will need to accommodate the 100 year erosion rate, satisfy hydraulic criteria for freeboard and depth of overtopping during the regional storm event and consider wildlife passage for small mammals, amphibians and reptiles (AMEC 2011a). A site-specific study (SIS) (if required) must address opportunities for enhanced wildlife passage at each crossing location and recommend typical crossing profiles based on preliminary design level of detail (AMEC 2011b). Aquafor Beech Limited supports this recommendation.

In addition, it is recommended that the construction design of the overpass associated with the CN Rail line west of Bronte Road (between Aquatic crossings 1 and 2) consider incorporation of terrestrial wildlife crossing opportunities. Specifically, wildlife passage should be accommodated on the east side of the railway in order to be compatible with the Boyne Natural Heritage System (K. Barrett, CH, email communication Aug-Sept 2014). Design specifics will be determined during the detailed design phase.

Figure 5.1: Savannah Sparrow, an area sensitive open country species, was previously recorded at Breeding Bird Stations 1 & 2, near the proposed CN Rail overpass. (Photo credit: Wikipedia)

An additional design consideration for the CN rail overpasss includes using locally native meadow species to revegetate the slopes of the overpass to mitigate habitat loss of the area sensitive Savannah Sparrow (*Passerculus sandwichensis*, Figure 5.1), which was recorded in the adjacent meadow during breeding bird surveys (APPENDIX 9).

The FSEMS (2011) recommends Enhanced Wildlife Crossings at crossings 1, 2, 5, 6, 7 and 11 (Figures 1 and 2a: APPENDIX 1). Aquafor Beech Limited reviewed lands outside of the FSEMS study area (i.e. east of fourth line to the 407) to assess the need for wildlife crossing structures. In general, lands adjacent to Britannia Road consist of agricultural fields. Accordingly, in the opinion of Aquafor Beech Limited, there is limited potential for wildlife movement across Britannia Road. However, crossings 15, 17 and 18 are associated with habitat that, in the opinion of Aquafor Beech Limited, may function as wildlife crossing locations. Crossing 18 is a dual-cell culvert that has already been constructed and will not be altered as part of the proposed Britannia Road widening. Therefore, in addition to the Enhanced Wildlife Crossing locations reported in AMEC (2011b), Aquafor Beech Limited further recommends Enhanced Wildlife Crossings be placed at crossings 15 and 17.

Table 5.1 shows the proposed culvert sizes for the above mentioned crossings. Consistent with recommendations within the Conceptual Fisheries Compensation Plan (CFCP) for the Boyne Survey Area (AMEC 2011a), Aquafor Beech Limited has proposed that the minimum span opening for these crossings be at least twice the proposed bankfull width in order to maintain natural channel form. Therefore, the minimum available freeboard within each culvert for wildlife crossing will be half the bankfull width on either side of the channel (Table 5.1). Protective cover should be used within each freeboard and consist of strategically placed rock and gravel, as well as plantings where appropriate (AMEC 2011a).

It should be noted that the culvert at crossing 6 was recently replaced in the summer of 2012 and the current structure (twin 2.4 metre concrete box culverts) does not meet the 2x bankfull requirement. The criteria used in the design of this new structure was based on the current configuration of Britannia Road as a rural arterial roadway and did not require to span a distance equal to twice the bankfull width. Therefore, this existing structure does not meet the environmental criteria applied to the improved roadway design. Halton Region may opt to simply extend the current structure using the current opening size rather than replace the new structure. Further evaluation would need to demonstrate that the extended structure does not negatively impact flood levels and provides a sufficient amount of freeboard for wildlife crossing. At this early planning state, it is recommended that the culver at crossing 6 be replaced to provide an opening of at least 9.8 metres to provide sufficient opportunity for wildlife crossing of Britannia Road.

Table 5.1: Minimum available freeboard for Enhanced Wildlife Crossings

Enhanced Wildlife Crossing	Culvert Size	Maximum Bankfull Width	Minimum Freeboard Available (x2)
1	4.8	2.4	1.2
2	7.4	3.7	1.85
5	7.6	3.8	1.9
6	9.8	4.9	2.45
7	27.2	13.6	6.8
11	14	7.0	3.5
15	32	16.0	8
17	13.8	6.9	3.45
CN Rail*	n/a	n/a	n/a

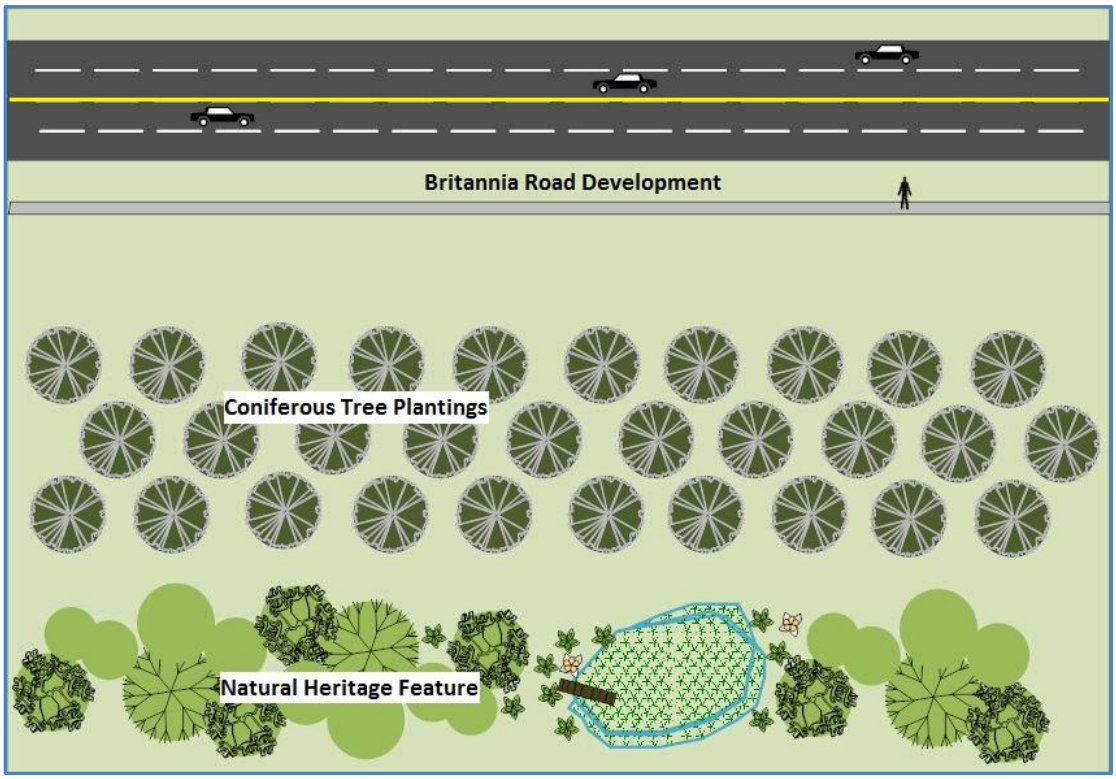
* The CN Rail crossing will consist of an open-air overpass. Accordingly, freeboard is not applicable in this case.

6.0 COMPREHENSIVE COMMITMENTS

Aquafor Beech Limited recommends that the following commitments be carried forward to detailed design:

6.1 Terrestrial Resources

- All recommended mitigation and monitoring measures as described in Sections 4.1.1.2 and 5.0
- Additional spring/summer vegetation inventory within the limits of disturbance to ensure that no species of conservation concern will be impacted by future works. This should include determining the precise location of all regionally significant species within the zone of impact within the Main and East Branches of Sixteen Mile Creek so that all efforts can be made to avoid these individuals during construction.
- Tree Preservation and Protection Measures.
- A Certified Arborist to assess the retention status of the 16 trees with trunks located outside the proposed ROW but with driplines extending into the proposed ROW during detailed design. All trees removed will be replaced at a ratio of 3:1.
- Vegetation removals as a result of encroachments into the provincially rare FOD2-3 forest communities should be mitigated through compensation plantings within the ROW.
- Design and installation of a multi-row salt-tolerant evergreen vegetation screen planted along the interface between the new road edge and the wetland (i.e. marsh) adjacent to the Western Woodland (see conceptual diagram below). These plantings will:
    - Increase forest cover and aid in compensating for tree removals within the project footprint;
    - Mitigate the effects of salt spray and traffic-related light and noise; and
    - Mitigate possible future tree cover loss as a result of the Emerald Ash Borer (*Agrilus planipennis*).



- Assess need for completion of an Information Gathering Form (IGF) and application under Section 17(2)(c) of the ESA for destruction of Bobolink habitat with the Ministry of Natural Resources (MNR). To be completed early in the detailed design phase.
- Survey barns, culverts, and other suitable nesting structures, as applicable, and complete IGF at southern bypass within the Community of Omagh for possible Barn Swallow breeding. Complete 17(2)(c) permit if necessary for destruction of Barn Swallow breeding habitat.
- It is recommended the existing concrete box culvert at Crossing #5 be replaced with a wider and longer concrete box culvert during a time when Barn Swallows are not using the nests (i.e. when the birds have migrated south). Consultation/registration with the MNR should take place at detailed design, at which point the specifics of culvert replacement will be determined.
- Choose appropriate construction access lanes and staging areas based on final design drawings/construction plans that will avoid riparian areas and have minimal impacts on terrestrial resources.
- Incorporate Enhanced Wildlife Crossing structures to the design of crossings 1, 2, 5, 6, 7, 11, 15 and 17; as well as the CN Rail overpass; following recommendations in Section 5.3.
- Revegetate the CN rail overpass slopes with locally native meadow species in order to mitigate habitat loss for the area-sensitive Savannah Sparrow.

6.2 Aquatic Resources

- All recommended mitigation and monitoring measures as described in Section 5.0
- Assess need for completion of an Information Gathering Form (IGF) and application under Section 17(2)(c) of the ESA for destruction of silver shiner habitat within the East Branch of Sixteen Mile Creek with the MNR. To be completed early in the detailed design phase.
- Complete a Sediment and Erosion Control Plan for each watercourse crossing.
- Consult with CH and DFO for the possibility of creating a HADD during construction activities at watercourse crossings. If impacts to fish and fish habitat cannot be fully mitigated during construction, authorization under *Fisheries Act* may be required.
- Consider opportunities for creating or enhancing some riparian plantings adjacent to intermittent, ephemeral, and permanently flowing watercourses within the ROW that adheres to the Tree-Canopy Replacement Policy on Regionally Owned Lands, as outlined in Regional Report No. LPS31-08.
- Following an assessment of the work required and the distance upstream of the confluence, confirm cold water fisheries timing window for work on tributaries draining to the East Branch of Sixteen Mile Creek with the MNR.
- All culverts should be open-bottomed and utilize natural substrate.

7.0 CONCLUSION

The proposed road alignment, as shown in Figures 1-3 (APPENDIX 1), has been assessed in the context of ecological features and functions adjacent to Britannia Road. Generally, the road widening will result in the removal of ≤10 m of vegetation/habitat on the north and south side of Britannia Road. The proposed road alignment has been shifted to avoid significant woodlands thereby minimizing direct impacts to these features. It is concluded that the proposed road widening will not have a significant negative impact to the ecological features or functions of the natural heritage features adjacent to Britannia Road provided that the mitigation and monitoring measures outlined in Section 5.0 are followed as part of the road work. Furthermore, efforts to improve wildlife passage using Enhanced Wildlife Crossings at the specified road crossings and rail crossings (Section 5.3) should be considered to mitigate the potential for wildlife mortality through these corridors.

8.0 REFERENCES

AMEC Earth and Environmental (AMEC). 2010. Sixteen Mile Creek Areas 2 and 7 Subwatershed Update Study.

AMEC Earth and Environmental (AMEC). 2011a. Draft Milton Urban Expansion Conceptual Fisheries Compensation Plan: Boyne Survey Area. "Milton Phase 3".

AMEC Earth and Environmental (AMEC). 2011b. Draft Functional Stormwater and Environmental Management Strategy: Boyne Survey Secondary Plan Area.

Barrett, Kim c/o Conservation Halton. "Britannia Road EA - Proposed Rail Overpass." Message to A. Baron. 9 Sept. 2014. E-mail. Response to email sent by A. Baron on August 18 2014.

Bird Studies Canada. 2013. Marsh Monitoring Program: Amphibian Surveys Overview. http://www.bsc-eoc.org/volunteer/glmmp/index.jsp?targetpg=glmmpfrog&lang=EN

C. Portt and Associates. 2005 and 2008. Fish Collection Data.

Conservation Halton. 2013. Fish Collection Records

COSEWIC. 2002. COSEWIC assessment and status report on the milksnake *Lampropeltis triangulum* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 29 pp.

COSEWIC. 2010. COSEWIC assessment and status report on the Bobolink *Dolichonyx oryzivorus* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 42 pp. (www. sararegistry.gc.ca/status/status_e.cfm).

COSEWIC. 2011a. COSEWIC assessment and status report on the Barn Swallow *Hirundo rustica* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. ix + 37 pp. (www.sararegistry.gc.ca/status/status_e.cfm)

COSEWIC. 2011b. Wildlife Species Search, Barn Swallow, *Hirundo rustica*. http://www.cosewic.gc.ca/eng/sct1/searchdetail_e.cfm?id=1147&StartRow=41&boxStatus=All&boxTaxonomic=All&location=1&change=All&board=All&commonName=&scienceName=&returnFlag=0&Page=5, accessed September 2011.

Credit Valley Conservation (CVC) and Toronto and Region Conservation Authority (TRCA). 2009. Evaluation, Classification and Management of Headwater Drainage Features: Interim Guidelines.

Fahrig L, Pedlar JH, Pope SE, Taylor PD and Wegner JF. 1995. Effect of road traffic on amphibian density. Biological Conservation 73 (1995): pp. 177-182.

Farina, A. 2006. Principles and methods in landscape ecology: toward a science of landscape. Volume 3 of Landscape series. Chapman and Hall. London, UK., 412 pp.

Halton Natural Areas Inventory 2006: Volume 2 Species Checklists.

Halton Region. 2005. Halton Region Environmental Assessment Guidelines. Prepared by Halton Region Planning and Public Works Department, Planning and Transportation Services Division, Oakville ON. 14 pp.

Jefferson Salamander Recovery Team. 2009. Draft Recovery Strategy for the Jefferson Salamander (*Ambystoma jeffersonianum*) in Ontario. Ontario Recovery Strategy Series. Prepared for the Ontario Ministry of Natural Resources, Peterborough, Ontario. vi + 27 pp.

Lee, H.T., Bakowsky, W.D., Riley, J., Bowles, J., Puddister, M., Uhlig, P., and McMurray, F.S. 1998. Ecological land classification of southern Ontario: First approximation and its application. Ontario Ministry of Natural Resources, Southcentral Science Section, Science Development and Transfer Branch. SCSS Field Guide FG-02.

LGL Limited. 2007 and 2008. Fish Sampling Data.

McLaren, M.A. 2007. Eastern Wood-pewee, pp. 340-341 in Cadman, M.D., D.A. Sutherland, G.G. Beck, D. Lepage, and A.R. Couturier, eds. Atlas of the Breeding Birds of Ontario, 2001-2005. Bird Studies Canada, Environment Canada, Ontario Field Ornithologists, Ontario Ministry of Natural Resources, and Ontario Nature, Toronto, xxii + 706 pp.

Ministry of Municipal Affairs and Housing. 2005. Provincial Policy Statement.

Ministry of Transportation (MTO). 2009. Environmental Guide for Fish and Fish Habitat.

North-South Environmental Inc. (NSE). 2011. City of Mississauga Natural Areas Survey 2010 Update. 111 pp.

Ontario Ministry of Natural Resources [OMNR]. 2002. Ontario Wetland Evaluation System (OWES). Southern Manual. 3rd Edition. Published 1993, revised December, 2002.

Regional Municipality of Halton, Planning and Public Works Department. 2005. Environmental Impact Statement Guidelines.

Regional Municipality of Halton. 2006. Regional Official Plan.

Reijnen, R., R. Foppen, and G. Veenbaas. 1997. Disturbance by traffic of breeding birds: evaluation of the effect and considerations in planning and managing road corridors. Biodiversity and Conservation. 6(4): 567-581.

Sandilands, A.P. 2005. Birds of Ontario**:** habitat requirements, limiting factors, and status. Volume 1 of Nonpasserines: Waterfowl Through Cranes. UBC Press, 366 pp.

Tozer, D. C. 2013. The Great Lakes Marsh Monitoring Program 1995-2012: 18 years of surveying birds and frogs as indicators of ecosystem health. Published by Bird Studies Canada. 10 pp.

Wikipedia. Savannah Sparrow photo: http://en.wikipedia.org/wiki/Savannah_sparrow#mediaviewer/File:Passerculus-sandwichensis-001.jpg

Submitted to:
The Regional Municipality of Halton

BRITANNIA ROAD TRANSPORTATION CORRIDOR IMPROVEMENTS: TREMAINE ROAD TO HIGHWAY 407 CLASS EA STUDY

APPENDICES – TERRESTRIAL AND AQUATIC RESOURCES

A Report Submitted by:
Aquafor Beech Limited

In association with

North-South Environmental Inc.
and
Aboud & Associates

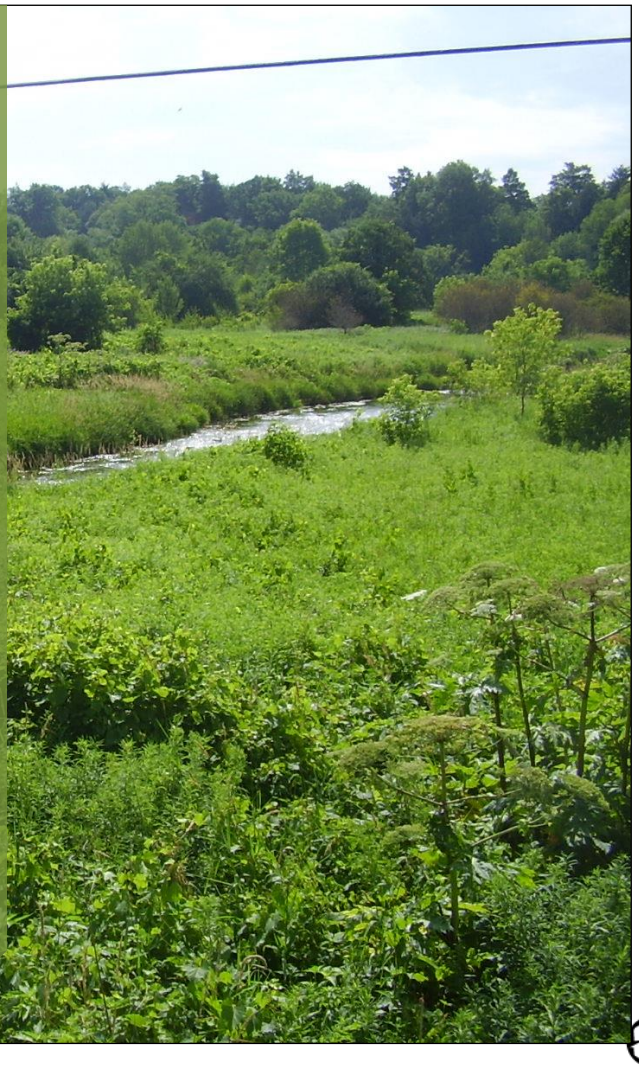
September 8, 2014

Contact:

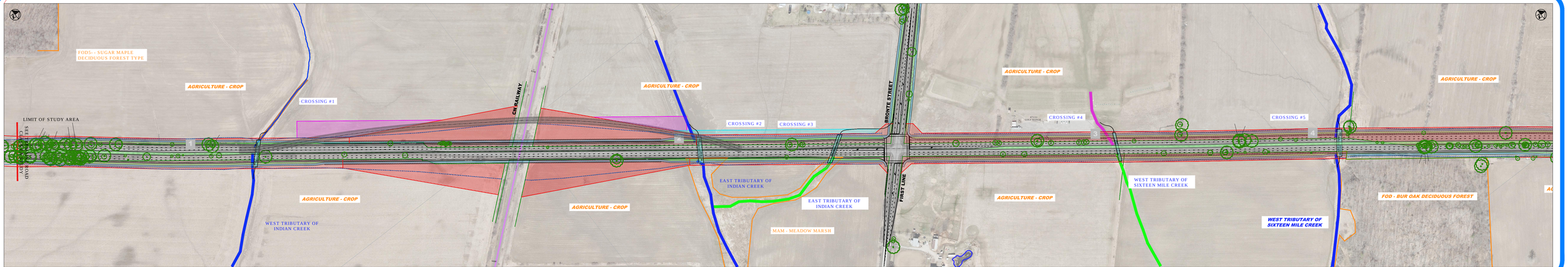
Greg Frew, M.Sc., P.Eng

Aquafor Beech Ltd.
frew.g@aquaforbeech.com
2600 Skymark Ave.

Suite 202, Building 6
Mississauga, ON, L4W 5B2
T. 905-629-0099 x 276



APPENDIX 1: FIGURES



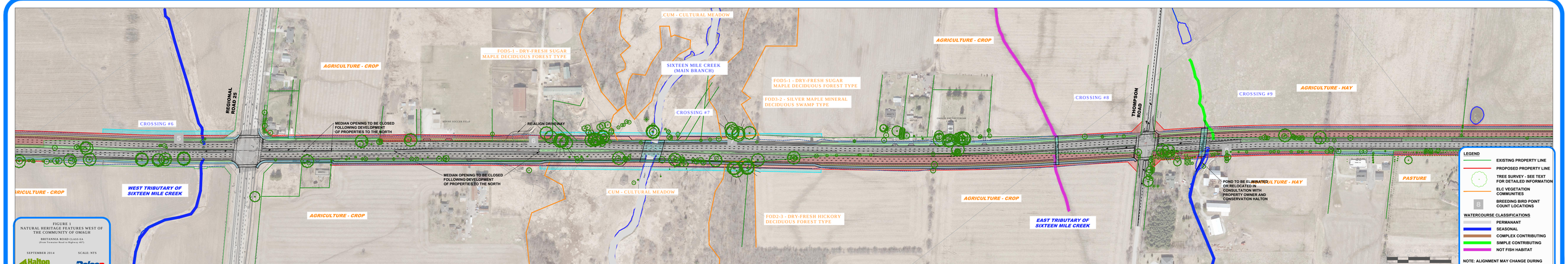


FIGURE 1
NATURAL HERITAGE FEATURES WEST OF THE COMMUNITY OF OMAGH

BRITANNIA ROAD CLASS EA
(From Trafalgar Road to Highway 407)

SEPTEMBER 2014 SCALE: NTS

Halton Region

Delcan

LEGEND

- EXISTING PROPERTY LINE
- PROPOSED PROPERTY LINE
- TREE SURVEY - SEE TEXT FOR DETAILED INFORMATION
- ELC VEGETATION COMMUNITIES
- BREEDING BIRD POINT COUNT LOCATIONS

WATERCOURSE CLASSIFICATIONS

- PERMANANT
- SEASONAL
- COMPLEX CONTRIBUTING
- SIMPLE CONTRIBUTING
- NOT FISH HABITAT

NOTE: ALIGNMENT MAY CHANGE DURING DETAILED DESIGN PHASE

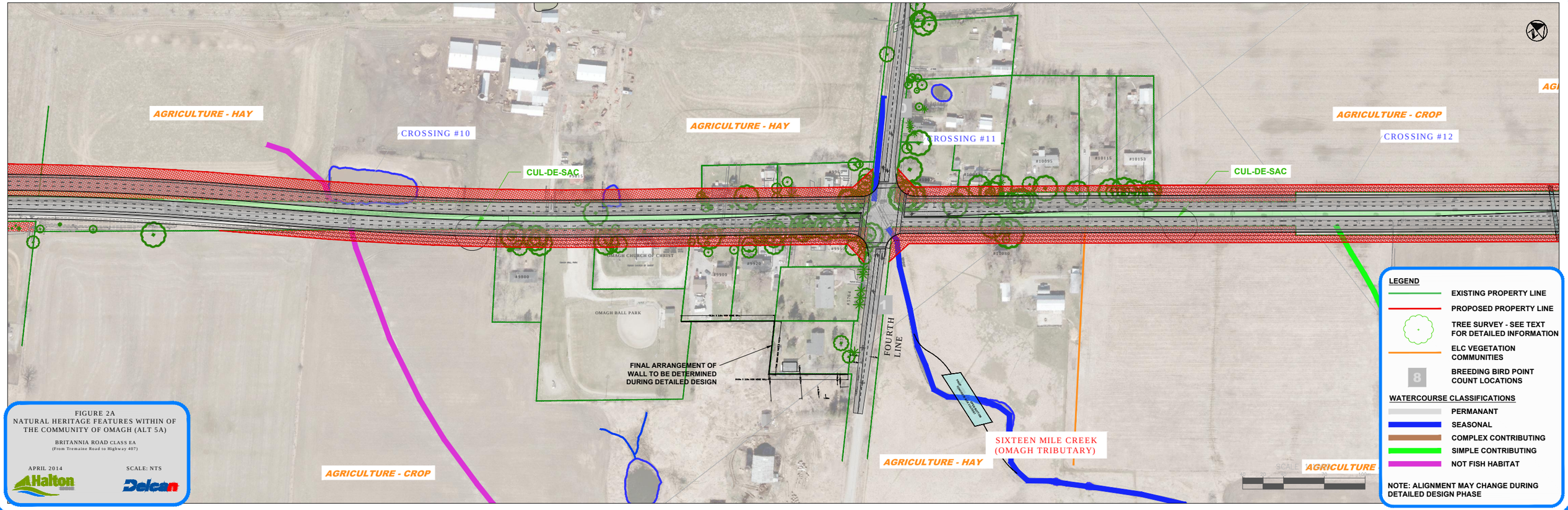


FIGURE 2A
NATURAL HERITAGE FEATURES WITHIN OF THE COMMUNITY OF OMAGH (ALT 5A)

BRITANNIA ROAD CLASS EA
(From Tremaine Road to Highway 407)

APRIL 2014 SCALE: NTS

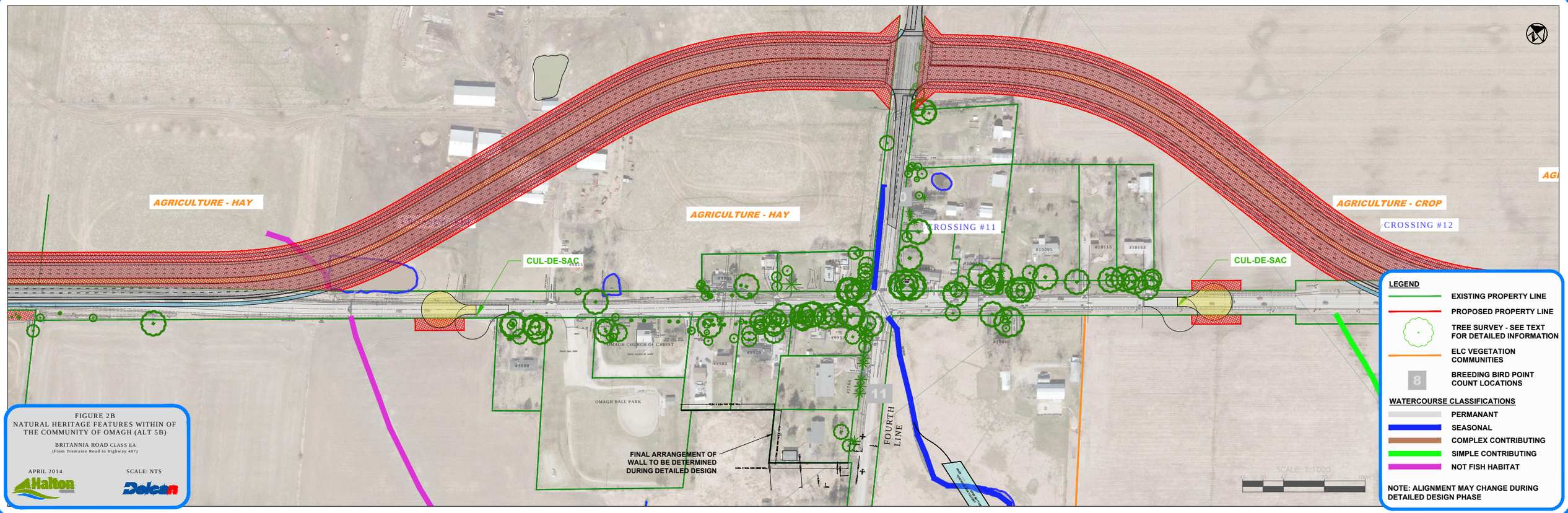


FIGURE 2B
NATURAL HERITAGE FEATURES WITHIN OF THE COMMUNITY OF OMAGH (ALT 5B)

BRITANNIA ROAD CLASS EA
(From Tremaine Road to Highway 407)

APRIL 2014 SCALE: NTS

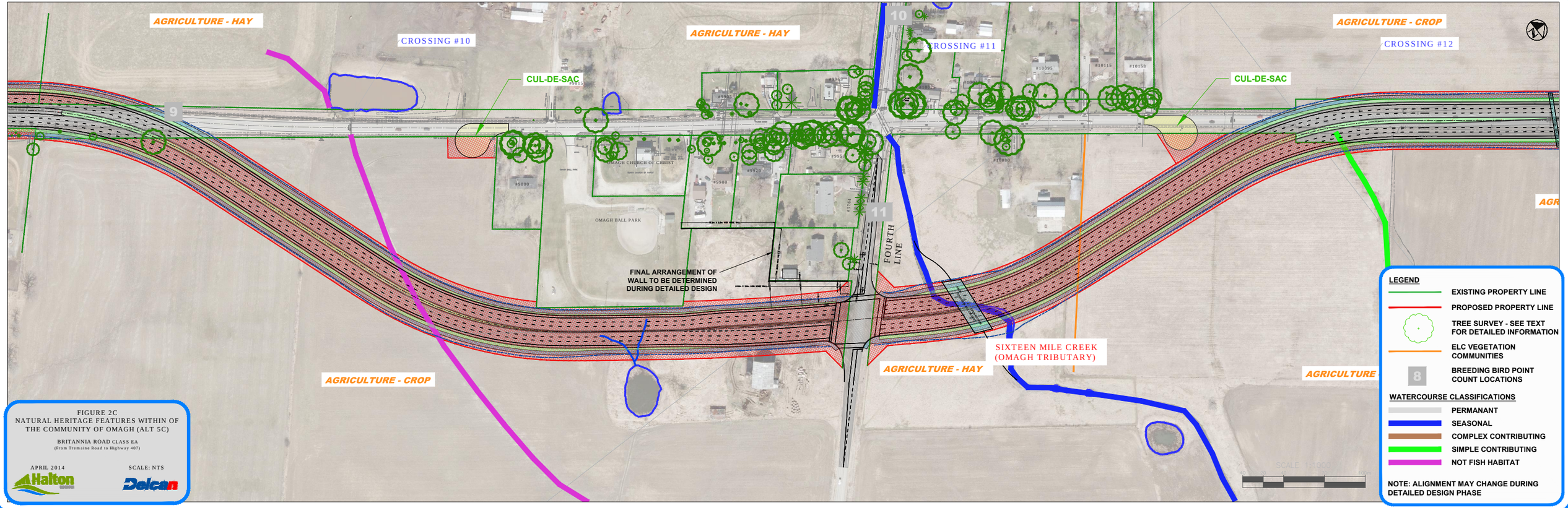


FIGURE 2C
NATURAL HERITAGE FEATURES WITHIN OF THE COMMUNITY OF OMAGH (ALT 5C)

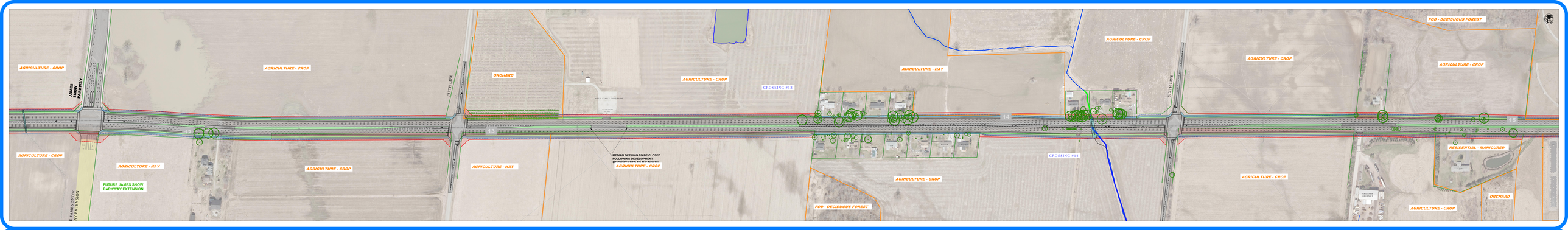
BRITANNIA ROAD CLASS EA
(From Tremaine Road to Highway 407)

APRIL 2014

SCALE: NTS

Halton

Delcan



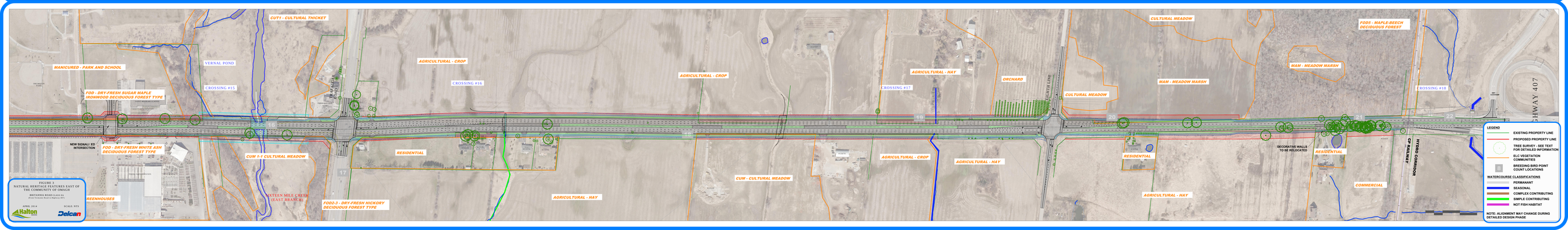


FIGURE 1
NATURAL HERITAGE FEATURES EAST OF THE COMMUNITY OF OMAGH
BRITANNIA ROAD CLASS EA
(From Tremaine Road to Highway 407)

APRIL 2014 SCALE: NTS

Halton Region
Delcan

APPENDIX 2: TREE INVENTORY DATA COLLECTION

Appendix 2: Tree Inventory Data Collection

Tree Species:
Common name & scientific binomial (genus, species)

Tree Size:
Diameter at breast height (DBH)

Trunk Integrity:

r	root damage or decay
st	split stem/weak crotch
br	butt rot
l	excessive lean (e.g. 30° to 45°)
h	upper stem holes/decay
w	wound (bark damage, large pruning cuts)
f	fungus (conks)
ib	insect borers
b	burl
wh	woodpecker holes
s	seam or cracks
c	cankers

Crown Structure:

bt	broken top
bl	broken or severed primary limbs
p	pollarded (severe and improper pruning)
ab	adventitious branching (clusters of new shoots on main trunk)

Crown Vigour:

dl	moderate dead wood (e.g. 11 to 35% secondary branches mostly)
d	significant crown dieback (e.g. >35% dead wood in primary limbs)
u	undersized leaves
fc	foliar chlorosis/yellowing
fn	foliar necrosis/browning
id	insect defoliators (species if known)
di	disease (species if known)

Tree Vigour Classes:

Class 1 Excellent Condition, No Risk Trees

Sound, thrifty, full crowned trees of natural shape with no dead limbs in the top of the crown and no significant evidence of decline.

Class 2 Good Condition, Low Risk Trees

Full to medium crowned trees of natural shape with a live crown ratio≥40% that exhibit no more than minor dead wood (e.g. up to 10% secondary branches only and mainly in the lower crown) and no more than one moderate trunk defect or indicator of decline.

Class 3 Fair Condition, Medium Risk Trees

Full to small crowned trees with a live crown ratio≥25% that exhibit no more than moderate dead wood (e.g. 11 to 35% secondary branches mostly) and no more than two moderate trunk defects or indicators of decline.

Class 4 Poor Condition, High Risk Trees

Medium to very small crowned trees (e.g. live crown ratio < 25%) that exhibit one or more of the following conditions.

a) Trees with significant foliage of poor colour and less than normal size.
b) Trees with significant crown dieback (e.g. > 35% dead wood in primary limbs).
c) Trees with major trunk defects or decay (e.g. one extensive problem, or 3 or more distinct but moderate decline indicators).

Class 5 Very Poor Condition, Very High Risk Trees

Dying trees with very little live crown.

APPENDIX 3: FLORA – SIXTEEN MILE CREEK EAST BRANCH

Appendix 3. Flora identified during Ecological Land Classification of East Branch of Sixteen Mile Creek.

			Rarity Status					Vegetation Community				
	Scientific Name	**Common Name**	**G Rank**	**S Rank**	**COSEWIC**	**MNR**	**Halton NAI**	**FOD 5-4**	**FOD 2-3**	**FOD 4-2**	**CUM 1-1**	**CUT 1-1**
	Equisetaceae											
	Equisetum arvense L.	Field Horsetail	G5	S5				x				
	Pinaceae											
	Pinus strobus L.	White Pine	G5	S5				x				
*	Pinus sylvestris L.	Scotch Pine	GNR	SNA				x				
	Ranunculaceae											
	Anemone canadensis L.	Canada Anemone	G5	S5				x				
	Ulmaceae											
	Ulmus americana L.	American Elm	G5?	S5				x	x	x	x	x
	Juglandaceae											
	Carya cordiformis (Wangenh.) K. Koch	Bitternut Hickory	G5	S5					x	x		
	Carya ovata (Miller) K. Koch	Shagbark Hickory	G5	S5				x	x			
	Juglans nigra L.	Black Walnut	G5	S4						x	x	x
	Fagaceae											
	Quercus macrocarpa Michx.	Bur Oak	G5	S5				x	x	x		
	Quercus rubra L.	Red Oak	G5	S5				x				
	Betulaceae											

			Rarity Status					Vegetation Community				
	Scientific Name	**Common Name**	**G Rank**	**S Rank**	**COSEWIC**	**MNR**	**Halton NAI**	**FOD 5-4**	**FOD 2-3**	**FOD 4-2**	**CUM 1-1**	**CUT 1-1**
	Alnus incana (L.) Moench spp. rugosa (Du Roi) Clausen	Speckled Alder	G5	S5			HU				x	
	Ostrya virginiana (Miller) K. Koch	Hop Hornbeam	G5	S5				x				
	Polygonaceae											
*	Polygonum persicaria L.	Lady's Thumb	G3G5	SNA							x	
*	Rumex crispus L.	Curly Dock	GNR	SNA							x	
	Tiliaceae											
	Tilia americana L.	American Basswood	G5	S5						x		
	Cucurbitaceae											
	Echinocystis lobata (Michx.) Torr. & A. Gray	Wild Cucumber	G5	S5							x	
	Salicaceae											
	Populus balsamifera L. ssp. balsamifera	Balsam Poplar	G5	S5				x				
	Populus tremuloides Michx.	Trembling Aspen	G5	S5				x				
	Salix lucida Muhlenb.	Shining Willow	G5	S5			HU				x	x
*	Salix x rubens Schrank	Hybrid Willow	GNA	SNA				x		x	x	x
	Saxifragaceae											
	Penthorum sedoides L.	Ditch-stonecrop	G5	S5			HU				x	
	Rosaceae											

			Rarity Status					Vegetation Community				
Scientific Name		**Common Name**	**G Rank**	**S Rank**	**COSEWIC**	**MNR**	**Halton NAI**	**FOD 5-4**	**FOD 2-3**	**FOD 4-2**	**CUM 1-1**	**CUT 1-1**
?	Crataegus sp.	Hawthorn	GNR	S?				x	x	x	x	x
	Fragaria virginiana Miller ssp. virginiana	Virginia Strawberry	G5	SU				x	x	x		
?	Geum sp.	Geum	GNR	S?				x	x		x	x
*	Malus pumila Miller	Common Crabapple	G5	SNA							x	x
	Prunus virginiana L.	Choke Cherry	G5	S5					x			
	Rubus idaeus L. ssp. melanolasius (Dieck) Focke	Red Raspberry	G5T5	S5				x		x	x	
	Fabaceae											
	Amphicarpaea bracteata (L.) Fern.	American Hog-peanut	G5	S5				x			x	
*	Lotus corniculatus L.	Birds-foot Trefoil	GNR	SNA							x	x
*	Melilotus alba Medik.	White Sweet Clover	G5	SNA							x	x
*	Robinia pseudo-acacia L.	Black Locust	G5	SNA						x		
*	Vicia cracca L.	Tufted Vetch	GNR	SNA							x	
	Onagraceae											
	Circaea lutetiana L. ssp. canadensis (L.) Aschers. & Magnusson	Enchanter's Nightshade	G5	S5				x	x			
	Oenothera biennis L.	Common Evening-primrose	G5	S5			H?				x	
	Cornaceae											

			Rarity Status					Vegetation Community				
Scientific Name		**Common Name**	**G Rank**	**S Rank**	**COSEWIC**	**MNR**	**Halton NAI**	**FOD 5-4**	**FOD 2-3**	**FOD 4-2**	**CUM 1-1**	**CUT 1-1**
	Cornus foemina Miller ssp. racemosa (Lam.) J.S. Wilson	Grey Dogwood	G5	S5				x			x	
	Rhamnaceae											
*	Rhamnus cathartica L.	European Buckthorn	GNR	SNA				x	x	x	x	
	Vitaceae											
	Vitis riparia Michx.	Riverbank Grape	G5	S5				x		x	x	
	Aceraceae											
	Acer negundo L.	Manitoba Maple	G5	S5					x	x	x	x
	Acer rubrum L.	Red Maple	G5	S5				x				
	Acer saccharum Marshall ssp. saccharum	Sugar Maple	G5T5	S5				x		x		
	Acer x freemanii E. Murr.	Hybrid Soft Maple	GNA	SNR							x	
	Anacardiaceae											
	Rhus rydbergii Small ex Rydb.	Western Poison-ivy	G5	S5				x	x	x		
	Rhus typhina L.	Staghorn Sumac	G5	S5				x				
	Geraniaceae											
*	Geranium robertianum L.	Herb-robert	G5	SNA					x	x		
	Balsaminaceae											
	Impatiens capensis Meerb.	Spotted Jewel-weed	G5	S5						x		

			Rarity Status					Vegetation Community				
Scientific Name		**Common Name**	**G Rank**	**S Rank**	**COSEWIC**	**MNR**	**Halton NAI**	**FOD 5-4**	**FOD 2-3**	**FOD 4-2**	**CUM 1-1**	**CUT 1-1**
	Apiaceae											
*	Daucus carota L.	Wild Carrot	GNR	SNA							x	x
	Heracleum lanatum Michx.	Cow-parsnip	G5	S5			HU				x	
*	Pastinaca sativa L.	Wild Parsnip	GNR	SNA							x	
	Asclepiadaceae											
	Asclepias incarnata L.	Swamp Milkweed	G5	S5							x	
	Asclepias syriaca L.	Common Milkweed	G5	S5							x	x
	Solanaceae											
*	Solanum dulcamara L.	Climbing Nightshade	GNR	SNA							x	
	Lamiaceae											
*	Leonurus cardiaca L.	Motherwort	GNR	SNA					x			
	Oleaceae											
	Fraxinus americana L.	White Ash	G5	S5				x	x	x	x	x
	Fraxinus pennsylvanica Marshall	Green Ash	G5	S5						x		
	Scrophulariaceae											
*	Linaria vulgaris Miller	Butter-and-eggs	GNR	SNA								x
	Caprifoliaceae											
?	Lonicera sp.	Honeysuckle	GNR	S?				x				

			Rarity Status					Vegetation Community				
	Scientific Name	Common Name	G Rank	S Rank	COSEWIC	MNR	Halton NAI	FOD 5-4	FOD 2-3	FOD 4-2	CUM 1-1	CUT 1-1
	Viburnum lentago L.	Nannyberry	G5	S5							x	x
	Viburnum trilobum Marshall	Highbush Cranberry	G5T5	S5				x				
	Dipsacaceae											
*	Dipsacus fullonum L. ssp. sylvestris (Hudson) Clapham	Wild Teasel	GNR	SNA							x	x
	Asteraceae											
	Ambrosia artemisiifolia L.	Annual Ragweed	G5	S5							x	x
*	Arctium minus (Hill) Bernh.	Common Burdock	GNA	SNA				x	x			
	Bidens cernua L.	Nodding Beggar-ticks	G5	S5							x	
	Bidens frondosa L.	Devil's Beggar-ticks	G5	S5							x	
*	Cirsium arvense (L.) Scop.	Canada Thistle	GNR	SNA							x	
	Eupatorium maculatum L. ssp. maculatum	Spotted Joe-pye-weed	G5TNR	S5							x	
	Eurybia macrophylla (L.) Cass in Cuvier	Large-leaved Aster	G5	S5				x				
	Euthamia graminifolia (L.) Nutt.	Flat-top Fragrant-golden-rod	G5	S5				x			x	x
*	Inula helenium L.	Elecampane	GNR	SNA							x	x
	Solidago caesia L.	Bluestem Goldenrod	G5	S5				x				
	Solidago canadensis var. canadensis	Canada Goldenrod	G5T5	S5				x	x	x	x	x

			Rarity Status					Vegetation Community				
Scientific Name		**Common Name**	**G Rank**	**S Rank**	**COSEWIC**	**MNR**	**Halton NAI**	**FOD 5-4**	**FOD 2-3**	**FOD 4-2**	**CUM 1-1**	**CUT 1-1**
*	Sonchus arvensis L. ssp. arvensis	Field Sow-thistle	GNRTNR	SNA							x	x
	Symphyotrichum cordifolium (L.) Nesom	Heart-leaved Aster	G5	S5							x	
	Symphyotrichum ericoides (L.) Nesom var. ericoides	White Heath Aster	G5T5	S5							x	x
	Symphyotrichum lanceolatum (Willd.) Nesom ssp. lanceolatum	Panicled Aster	G5T5	S5				x			x	x
	Symphyotrichum lateriflorum (L.) Löve & Löve var. lateriflorum	One-sided Aster	G5T5	S5				x	x		x	
	Symphyotrichum novae-angliae (L.) Nesom	New England Aster	G5	S5				x			x	x
	Symphyotrichum x amethystinum (Nutt.) Nesom	Amethyst Aster	GNA	S3?				x				
	Alismataceae											
	Alisma plantago-aquatica L.	Broad-leaved Water-plantain	G5	SNA							x	
	Cyperaceae											
	Carex pensylvanica Lam.	Pennsylvania Sedge	G5	S5				x				
?	Carex sp.	Sedge	GNR	S?					x		x	
	Carex vulpinoidea Michx.	Fox Sedge	G5	S5							x	

			Rarity Status					Vegetation Community				
	Scientific Name	**Common Name**	**G Rank**	**S Rank**	**COSEWIC**	**MNR**	**Halton NAI**	**FOD 5-4**	**FOD 2-3**	**FOD 4-2**	**CUM 1-1**	**CUT 1-1**
	Scirpus acutus Muhlenb. ex Bigelow	Hard-stemmed Bulrush	G5	S5			HR				x	
	Scirpus validus L.	Softstem Bulrush	GNR	S5							x	
	Poaceae											
*	Bromus inermis Leyss. ssp. inermis	Smooth Brome	G5TNR	SNA							x	x
*	Echinochloa crusgalli (L.) P. Beauv.	Barnyard Grass	GNR	SNA							x	
*	Elymus repens (L.) Gould	Quack Grass	GNR	SNA							x	
	Phalaris arundinacea L.	Reed Canary Grass	G5	S5							x	
	Poa pratensis L. ssp. pratensis	Kentucky Bluegrass	G5T5	S5							x	
	Sparganiaceae											
	Sparganium americanum Nutt.	American Bur-reed	G5	S4?			HR				x	
	Typhaceae											
	Typha latifolia L.	Broad-leaf Cattail	G5	S5							x	
	Liliaceae											
	Maianthemum racemosum (L.) Link ssp. racemosum	False Solomon's Seal	G5	S5				x				
	Iridaceae											
	Iris versicolor L.	Blueflag	G5	S5						x		

APPENDIX 4: FLORA – SIXTEEN MILE CREEK MAIN BRANCH

Appendix 4. Ecological Land Classification of the Main Branch of Sixteen Mile Creek.

			Rarity Status					Vegetation Community			
Scientific Name		**Common Name**	**G Rank**	**S Rank**	**COSEWIC**	**MNR**	**Halton NAI**	**SWD 3-2**	**CUM 1-1**	**FOD 5-1**	**FOD 2-3**
	Equisetaceae										
	Equisetum arvense L.	Field Horsetail	G5	S5				x		x	
	Pinaceae										
*	Picea abies (L.) Karsten	Norway Spruce	G5	SNA					x		
	Pinus strobus L.	White Pine	G5	S5					x		
	Cupressaceae										
	Juniperus communis L.	Ground Juniper	G5	S5			HR		x		
	Ranunculaceae										
	Anemone canadensis L.	Canada Anemone	G5	S5					x		
	Thalictrum dioicum L.	Early Meadow-rue	G5	S5					x	x	x
	Ulmaceae										
	Ulmus americana L.	American Elm	G5?	S5					x	x	
	Urtica dioica L. ssp. gracilis (Aiton) Selander	American Stinging Nettle	G5T5	S5					x	x	
	Juglandaceae										
	Carya cordiformis (Wangenh.) K. Koch	Bitternut Hickory	G5	S5						x	x
	Carya ovata (Miller) K. Koch	Shagbark Hickory	G5	S5							x

			Rarity Status					Vegetation Community			
Scientific Name		**Common Name**	**G Rank**	**S Rank**	**COSEWIC**	**MNR**	**Halton NAI**	**SWD 3-2**	**CUM 1-1**	**FOD 5-1**	**FOD 2-3**
	Juglans nigra L.	Black Walnut	G5	S4				x	x	x	
	Fagaceae										
	Fagus grandifolia Ehrh.	American Beech	G5	S4						x	
	Quercus macrocarpa Michx.	Bur Oak	G5	S5					x	x	x
	Quercus rubra L.	Red Oak	G5	S5						x	x
	Betulaceae										
	Carpinus caroliniana Walter ssp. virginiana (Marshall) Furlow	Blue Beech	G5	S5						x	
	Ostrya virginiana (Miller) K. Koch	Hop Hornbeam	G5	S5						x	x
	Caryophyllaceae										
*	Saponaria officinalis L.	Bouncing-bet	GNR	SNA					x		
	Polygonaceae										
*	Polygonum persicaria L.	Lady's Thumb	G3G5	SNA					x		
*	Rumex crispus L.	Curly Dock	GNR	SNA					x		
	Tiliaceae										
	Tilia americana L.	American Basswood	G5	S5				x		x	x
	Violaceae										
?	Viola sp.	Violet	GNR	S?				x			
	Cucurbitaceae										

			Rarity Status					Vegetation Community			
Scientific Name		**Common Name**	**G Rank**	**S Rank**	**COSEWIC**	**MNR**	**Halton NAI**	**SWD 3-2**	**CUM 1-1**	**FOD 5-1**	**FOD 2-3**
	Echinocystis lobata (Michx.) Torr. & A. Gray	Wild Cucumber	G5	S5					x		
	Salicaceae										
	Populus tremuloides Michx.	Trembling Aspen	G5	S5					x	x	x
	Salix lucida Muhlenb.	Shining Willow	G5	S5			HU		x		
*	Salix x rubens Schrank	Hybrid Willow	GNA	SNA					x	x	
	Brassicaceae										
*	Alliaria petiolata (M. Bieb.) Cavara & Grande	Garlic Mustard	GNR	SNA						x	
*	Barbarea vulgaris R. Br.	Yellow Rocket	GNR	SNA						x	
*	Hesperis matronalis L.	Dame's Rocket	G4G5	SNA						x	x
	Grossulariaceae										
?	Ribes sp.	Gooseberry	GNR	S?						x	x
	Rosaceae										
?	Crataegus sp.	Hawthorn	GNR	S?						x	
	Fragaria virginiana Miller ssp. virginiana	Virginia Strawberry	G5	SU						x	x
?	Geum sp.	Geum	GNR	S?						x	x
*	Malus pumila Miller	Common Crabapple	G5	SNA						x	x
	Prunus serotina Ehrh.	Black Cherry	G5	S5						x	x

			Rarity Status					Vegetation Community			
Scientific Name		**Common Name**	**G Rank**	**S Rank**	**COSEWIC**	**MNR**	**Halton NAI**	**SWD 3-2**	**CUM 1-1**	**FOD 5-1**	**FOD 2-3**
	Prunus virginiana L.	Choke Cherry	G5	S5						x	
	Rubus allegheniensis Porter	Allegheny Blackberry	G5	S5					x		
	Rubus idaeus L. ssp. melanolasius (Dieck) Focke	Red Raspberry	G5T5	S5					x	x	x
	Fabaceae										
	Amphicarpaea bracteata (L.) Fern.	American Hog-peanut	G5	S5				x			
*	Vicia cracca L.	Tufted Vetch	GNR	SNA					x	x	x
	Lythraceae										
*	Lythrum salicaria L.	Purple Loosestrife	G5	SNA					x		
	Onagraceae										
	Circaea lutetiana L. ssp. canadensis (L.) Aschers. & Magnusson	Enchanter's Nightshade	G5	S5						x	x
	Oenothera biennis L.	Common Evening-primrose	G5	S5			H?		x		
	Cornaceae										
	Cornus foemina Miller ssp. racemosa (Lam.) J.S. Wilson	Grey Dogwood	G5	S5					x		
	Rhamnaceae										
*	Rhamnus cathartica L.	European Buckthorn	GNR	SNA						x	x
	Vitaceae										

			Rarity Status					Vegetation Community			
Scientific Name		**Common Name**	**G Rank**	**S Rank**	**COSEWIC**	**MNR**	**Halton NAI**	**SWD 3-2**	**CUM 1-1**	**FOD 5-1**	**FOD 2-3**
	Parthenocissus vitacea (Knerr) Hitchc.	Inserted Virginia Creeper	G5	S5			H?	x	x	x	x
	Vitis riparia Michx.	Riverbank Grape	G5	S5				x	x	x	
	Aceraceae										
	Acer negundo L.	Manitoba Maple	G5	S5				x			
	Acer saccharum Marshall ssp. saccharum	Sugar Maple	G5T5	S5						x	x
	Acer x freemanii E. Murr.	Hybrid Soft Maple	GNA	SNR				x			
	Anacardiaceae										
	Rhus rydbergii Small ex Rydb.	Western Poison-ivy	G5	S5						x	x
	Geraniaceae										
	Geranium maculatum L.	Wild Crane's-bill	G5	S5				x		x	
*	Geranium robertianum L.	Herb-robert	G5	SNA						x	x
	Balsaminaceae										
	Impatiens capensis Meerb.	Spotted Jewel-weed	G5	S5					x	x	
*	Impatiens glandulifera Royle	Policeman's Helmet	GNR	SNA					x		
	Apiaceae										
	Cicuta maculata L.	Spotted Water-hemlock	G5	S5				x			
*	Daucus carota L.	Wild Carrot	GNR	SNA					x		

			Rarity Status					Vegetation Community			
Scientific Name		**Common Name**	**G Rank**	**S Rank**	**COSEWIC**	**MNR**	**Halton NAI**	**SWD 3-2**	**CUM 1-1**	**FOD 5-1**	**FOD 2-3**
*	Heracleum mantegazzianum Sommier & Levier	Giant Hogweed	GNR	SNA				x	x		
	Apocynaceae										
	Apocynum androsaemifolium L.	Spreading Dogbane	G5	S5						x	x
	Asclepiadaceae										
	Asclepias syriaca L.	Common Milkweed	G5	S5					x		
	Solanaceae										
*	Solanum dulcamara L.	Climbing Nightshade	GNR	SNA					x		
	Boraginaceae										
*	Echium vulgare L.	Common Viper's-bugloss	GNR	SNA					x		
	Lamiaceae										
*	Leonurus cardiaca L.	Motherwort	GNR	SNA						x	x
	Mentha arvensis L.	Field Mint	G5	S5					x		
	Oleaceae										
	Fraxinus americana L.	White Ash	G5	S5						x	
	Fraxinus pennsylvanica Marshall	Green Ash	G5	S5					x		
	Scrophulariaceae										
	Chelone glabra L.	Turtlehead	G5	S5				x			
	Caprifoliaceae										

			Rarity Status					Vegetation Community			
Scientific Name		**Common Name**	**G Rank**	**S Rank**	**COSEWIC**	**MNR**	**Halton NAI**	**SWD 3-2**	**CUM 1-1**	**FOD 5-1**	**FOD 2-3**
?	Lonicera sp.	Honeysuckle	GNR	S?					x		
	Sambucus canadensis L.	Common Elderberry	G5T5	S5				x			
*	Viburnum opulus L.	Guelder Rose	G5	SNA					x		
	Viburnum trilobum Marshall	Highbush Cranberry	G5T5	S5					x	x	
	Dipsacaceae										
*	Dipsacus fullonum L. ssp. sylvestris (Hudson) Clapham	Wild Teasel	GNR	SNA					x		
	Asteraceae										
	Achillea millefolium L. ssp. lanulosa (Nutt.) Piper	Woolly Yarrow	G5T5	S5					x		
	Ambrosia trifida L.	Great Ragweed	G5	S5			HU		x		
*	Arctium minus (Hill) Bernh.	Common Burdock	GNA	SNA				x		x	x
	Bidens cernua L.	Nodding Beggar-ticks	G5	S5					x		
	Bidens frondosa L.	Devil's Beggar-ticks	G5	S5					x		
?	Bidens sp.	Beggar-ticks	GNR	S?				x			
*	Cirsium arvense (L.) Scop.	Canada Thistle	GNR	SNA					x		
	Eupatorium maculatum L. ssp. maculatum	Spotted Joe-pye-weed	G5TNR	S5				x	x		
	Euthamia graminifolia (L.) Nutt.	Flat-top Fragrant-golden-rod	G5	S5				x	x		
	Helianthus tuberosus L.	Jerusalem Artichoke	G5	S5					x		

			Rarity Status					Vegetation Community			
Scientific Name		**Common Name**	**G Rank**	**S Rank**	**COSEWIC**	**MNR**	**Halton NAI**	**SWD 3-2**	**CUM 1-1**	**FOD 5-1**	**FOD 2-3**
*	Inula helenium L.	Elecampane	GNR	SNA					x		
	Rudbeckia hirta L.	Black-eyed Susan	G5	S5					x		
	Solidago caesia L.	Bluestem Goldenrod	G5	S5						x	
	Solidago canadensis var. canadensis	Canada Goldenrod	G5T5	S5				x	x	x	x
	Solidago flexicaulis L.	Broad-leaved Goldenrod	G5	S5						x	x
	Solidago gigantea Aiton	Smooth Goldenrod	G5	S5			HU		x		
	Symphyotrichum ericoides	White Heath Aster	G5T5	S5					x		
	Symphyotrichum lanceolatum (Willd.) Nesom ssp. lanceolatum	Panicled Aster	G5T5	S5					x		
	Symphyotrichum lateriflorum (L.) Löve & Löve var. lateriflorum	One-sided Aster	G5T5	S5					x		x
	Symphyotrichum novae-angliae (L.) Nesom	New England Aster	G5	S5				x	x		
	Symphyotrichum pilosum (Willd.) Nesom var. pilosum	Hairy Aster	G5T5	S5			HU		x		
	Araceae										
	Arisaema triphyllum (L.) Schott	Jack-in-the-pulpit	G5	S5						x	x
	Cyperaceae										
	Carex lupulina Muhlenb. ex Willd.	Hop Sedge	G5	S5						x	
	Carex pensylvanica Lam.	Pennsylvania Sedge	G5	S5						x	x

			Rarity Status					Vegetation Community			
Scientific Name		**Common Name**	**G Rank**	**S Rank**	**COSEWIC**	**MNR**	**Halton NAI**	**SWD 3-2**	**CUM 1-1**	**FOD 5-1**	**FOD 2-3**
?	Carex sp.	Sedge	GNR	S?						x	x
	Poaceae										
*	Agrostis gigantea Roth	Red-top	G4G5	SNA					x		
	Elymus riparius Wiegand	River Wild-rye	G5	S4?			HR		x		
	Glyceria striata (Lam.) A. Hitchc.	Fowl Manna-grass	G5T5	S4S5					x		
	Phalaris arundinacea L.	Reed Canary Grass	G5	S5					x		
	Iridaceae										
	Iris versicolor L.	Blueflag	G5	S5					x		

APPENDIX 5: FLORA – WESTERN AND EASTERN WOODLANDS

Taxonomy			Rarity Status				Vegetation Community			
Family	**Scientific Name**	**Common Name**	**CC**	**CW**	**S-Rank**	**Halton NAI**	**Western Woodland (FOD9-4)**	**Western Woodland (CUT1-4)**	**Western Woodland (MAM2)**	**Eastern Woodland (FOD7-2)**
ACERACEAE	Acer negundo	Manitoba Maple	0	-2	S5		X			
ACERACEAE	Acer rubrum	Red Maple	4	0	S5		X			
ACERACEAE	Acer saccharum ssp. nigrum	Black Maple	7	3	S4?		X			X
ACERACEAE	Acer saccharum ssp. saccharum	Sugar Maple	4	3	S5		X			
ACERACEAE	Acer X freemanii	Freeman's Maple	n/a	n/a	S5					X
ANACARDIACEAE	Rhus radicans ssp. negundo	Climbing Poison-ivy	5	-1	S5		X			X
APIACEAE	Daucus carota	Wild Carrot	0	5	SE5			X		
ARACEAE	Arisaema triphyllum ssp. triphyllum	Jack-in-the-pulpit	5	-2	S5		X			X
ARALIACEAE	Aralia nudicaulis	Wild Sarsaparilla	4	3	S5		X			
ASCLEPIADACEAE	Asclepias syriaca	Common Milkweed	0	5	S5			X		
ASTERACEAE	Achillea millefolium ssp. millefolium	Common Yarrow	0	3	SE			X		
ASTERACEAE	Arctium minus ssp. minus	Common Burdock	0	5	SE5		X			
ASTERACEAE	Erigeron annuus	Daisy Fleabane	0	1	S5			X		
ASTERACEAE	Hieracium caespitosum ssp. caespitosum	Field Hawkweed	0	5	SE5			X		
ASTERACEAE	Solidago altissima var. altissima	Tall Goldenrod	1	3	S5		X	X		
ASTERACEAE	Solidago caesia	Blue-stem Goldenrod	5	3	S5		X			X
ASTERACEAE	Solidago flexicaulis	Zig-zag Goldenrod	6	3	S5					X
ASTERACEAE	Symphyotrichum lanceolatum (syn. Aster lanceolatus ssp. lanceolatus)	Panicled Aster	3	-3	S5			X		
ASTERACEAE	Symphyotrichum novae-angliae (syn. Aster novae-angliae)	New England Aster	2	-3	S5			X		
ASTERACEAE	Symphyotrichum urophyllum (syn. Aster urophyllus)	Arrow-leaved Aster	6	5	S4	HU				
ASTERACEAE	Taraxacum officinale	Common Dandelion	0	3	SE5		X			
BALSAMINACEAE	Impatiens capensis	Spotted Touch-me-not	4	-3	S5		X			
BERBERIDACEAE	Berberis thunbergii	Japanese Barberry	0	4	SE5		X			
BERBERIDACEAE	Podophyllum peltatum	Mayapple	5	3	S5		X			
BETULACEAE	Carpinus caroliniana	Blue Beech	6	0	S5		X			X
BETULACEAE	Ostrya virginiana	Hop Hornbeam	4	4	S5		X			X
BRASSICACEAE	Alliaria petiolata	Garlic Mustard	0	0	SE5		X			
CAPRIFOLIACEAE	Lonicera morrowii	Morrow's Honeysuckle	0	5	SE3		X			
CAPRIFOLIACEAE	Lonicera tatarica	Tartarian Honeysuckle	0	3	SE5		X			X
CAPRIFOLIACEAE	Viburnum lentago	Nannyberry	4	-1	S5					X
CAPRIFOLIACEAE	Viburnum opulus	European Highbush Cranberry	0	0	SE4			X		X
CAPRIFOLIACEAE	Viburnum rafinesquianum	Downy Arrow-wood	7	5	S5		X			
CARYOPHYLLACEAE	Cerastium fontanum	Common Mouse-ear Chickweed	0	3	SE5			X		
CARYOPHYLLACEAE	Stellaria longifolia	Long-leaved Chickweed	2	-4	S5			X		
CELASTRACEAE	Euonymus obovata	Running Strawberry-bush	6	5	S5		X			X
CORNACEAE	Cornus foemina ssp. racemosa	Grey Dogwood	2	-2	S5		X	X		X
CYPERACEAE	Carex gracillima	Graceful Sedge	4	3	S5		X			
CYPERACEAE	Carex hirtifolia	Hairy Wood Sedge	5	5	S5	HU	X			
CYPERACEAE	Carex intumescens	Bladder Sedge	6	-4	S5		X			X
CYPERACEAE	Carex lupulina	Common Hop Sedge	6	-5	S5		X			
CYPERACEAE	Carex pensylvanica	Pennsylvania Sedge	5	5	S5		X			
CYPERACEAE	Carex radiata	Radiate Sedge	4	5	S5		X			X
CYPERACEAE	Carex rosea	Stellate Sedge	5	5	S5		X			X
CYPERACEAE	Carex tribuloides	Blunt Broom Sedge	5	-4	S4S5	HU	X			
DIPSACACEAE	Dipsacus fullonum ssp. sylvestris	Common Teasel	0	5	SE5			X		
DRYOPTERIDACEAE	Onoclea sensibilis	Sensitive Fern	4	-3	S5					X

FABACEAE	Vicia cracca	Cow Vetch	0	5	SE5			X		
FAGACEAE	Fagus grandifolia	American Beech	6	3	S5		X			X
FAGACEAE	Quercus alba	White Oak	6	3	S5		X			
FAGACEAE	Quercus macrocarpa	Bur Oak	5	1	S5		X	X		
FAGACEAE	Quercus rubra	Red Oak	6	3	S5		X			X
GERANIACEAE	Geranium maculatum	Spotted Crane's-bill	6	3	S5		X			
GERANIACEAE	Geranium robertianum	Herb Robert	0	5	SE5		X			
GROSSULARIACEAE	Ribes cynosbati	Prickly Gooseberry	4	5	S5		X			
GROSSULARIACEAE	Ribes sp.	Gooseberry/Currant	n/a	n/a	n/a					X
HAMAMELIDACEAE	Hamamelis virginiana	Witch-hazel	6	3	S5					X
HYDROPHYLLACEAE	Hydrophyllum virginianum	Virginia Water-leaf	6	-2	S5		X			X
JUGLANDACEAE	Carya cordiformis	Bitternut Hickory	6	0	S5		X			X
JUGLANDACEAE	Carya ovata	Shagbark Hickory	6	3	S5		X			X
JUNCACEAE	Juncus tenuis	Path Rush	0	0	S5				X	
LAMIACEAE	Glechoma hederacea	Ground Ivy	0	3	SE5			X		
LAMIACEAE	Lycopus americanus	Cut-leaved Water-horehound	4	-5	S5			X		
LAMIACEAE	Prunella vulgaris ssp. vulgaris	Selfheal	0	0	SE3					
LILIACEAE	Maianthemum racemosum ssp. racemosum	False Solomon's Seal	4	3	S5		X			
LILIACEAE	Trillium grandiflorum	White Trillium	5	5	S5		X			
OLEACEAE	Fraxinus pennsylvanica	Red Ash	3	-3	S5		X			X
ONAGRACEAE	Circaea lutetiana ssp. canadensis	Canada Enchanter's Nightshade	3	3	S5		X			X
ORCHIDACEAE	Epipactis helleborine	Helleborine	0	5	SE5		X			
OXALIDACEAE	Oxalis stricta	Upright Yellow Wood-sorrel	0	3	S5		X			
PAPAVERACEAE	Sanguinaria canadensis	Bloodroot	5	4	S5		X			
PINACEAE	Pinus strobus	Eastern White Pine	4	3	S5		X			
POACEAE	Agrostis gigantea	Redtop Grass	0	0	SE5			X		
POACEAE	Alopecurus pratensis	Meadow Foxtail	0	-3	SE5		X	X	X	
POACEAE	Bromus inermis ssp. inermis	Smooth Brome	0	5	SE5			X		
POACEAE	Dactylis glomerata	Orchard Grass	0	3	SE5		X			
POACEAE	Glyceria striata	Fowl Manna Grass	3	-5	S5		X			X
POACEAE	Leersia virginica	White Grass	6	-3	S4		X			
POACEAE	Phalaris arundinacea	Reed Canary Grass	0	-4	S5		X			
POACEAE	Poa compressa	Canada Blue Grass	0	2	S5		X			
POACEAE	Poa pratensis ssp. pratensis	Kentucky Blue Grass	0	1	S5			X		
POLYGONACEAE	Polygonum virginianum	Jumpseed	6	0	S4	HU	X			
POLYGONACEAE	Rumex crispus	Curly Dock	0	-1	SE5				X	
RANUNCULACEAE	Actaea rubra	Red Baneberry	5	5	S5		X			X
RANUNCULACEAE	Ranunculus acris	Tall Buttercup	0	-2	SE5		X	X		X
RANUNCULACEAE	Ranunculus sceleratus var. sceleratus	Cursed Crowfoot	2	-5	S5				X	
RHAMNACEAE	Rhamnus cathartica	Common Buckthorn	0	3	SE5		X	X		
ROSACEAE	Agrimonia gryposepala	Tall Agrimony	2	2	S5		X			
ROSACEAE	Amerlanchier interior (Amelanchier laevis X Amelanchier sanguinea)	Inland Serviceberry	n/a	n/a	SU			X		
ROSACEAE	Crataegus monogyna	One-seeded Hawthorn	0	5	SE5					X
ROSACEAE	Crataegus punctata	Dotted Hawthorn	4	5	S5		X			
ROSACEAE	Crataegus sp.	Hawthorn species	n/a	n/a	n/a		X	X		
ROSACEAE	Crataegus succulenta	Fleshy Hawthorn	4	5	S4S5	HU				
ROSACEAE	Fragaria virginiana ssp. virginiana	Common Strawberry	2	1	S5		X			
ROSACEAE	Geum aleppicum	Yellow Avens	2	-1	S5		X			X
ROSACEAE	Geum canadense	White Avens	3	0	S5		X			X
ROSACEAE	Geum fragarioides (syn. Waldsteinia fragarioides)	Barren Strawberry	5	5	S5		X			
ROSACEAE	Geum laciniatum	Rough Avens	4	-3	S4			X		

ROSACEAE	Malus pumila	Common Apple	0	5	SE5					X
ROSACEAE	Potentilla recta	Rough-fruited Cinquefoil	0	5	SE5			X		
ROSACEAE	Prunus serotina	Black Cherry	3	3	S5		X			
ROSACEAE	Prunus virginiana	Choke Cherry	2	1	S5		X	X		X
ROSACEAE	Rosa multiflora	Multiflora Rose	0	3	SE4					X
ROSACEAE	Rubus idaeus ssp. melanolasius	Wild Red Raspberry	0	-2	S5		X	X		X
ROSACEAE	Rubus occidentalis	Black Raspberry	2	5	S5		X			
RUBIACEAE	Galium triflorum	Fragrant Bedstraw	4	2	S5			X		
SALICACEAE	Populus tremuloides	Trembling Aspen	2	0	S5		X			X
SCROPHULARIACEAE	Veronica officinalis	Common Speedwell	0	5	SE5		X			
SCROPHULARIACEAE	Veronica serpyllifolia ssp. serpyllifolia	Thyme-leaved Speedwell	0	-3	S5					
SOLANACEAE	Solanum dulcamara	Bittersweet Nightshade	0	0	SE5		X			X
TILIACEAE	Tilia americana	Basswood	4	3	S5		X			
TYPHACEAE	Typha angustifolia	Narrow-leaved Cattail	3	-5	S5					
TYPHACEAE	Typha latifolia	Broad-leaved Cattail	3	-5	S5				X	
ULMACEAE	Ulmus americana	White Elm	3	-2	S5		X	X		X
URTICACEAE	Laportea canadensis	Wood Nettle	6	-3	S5					X
VIOLACEAE	Viola affinis	Le Conte's Violet	6	-3	S4?	HU	X			
VIOLACEAE	Viola sororia	Common Blue Violet	4	1	S5		X			
VITACEAE	Parthenocissus inserta	Thicket Creeper	3	3	S5		X	X		X
VITACEAE	Vitis riparia	Riverbank Grape	0	-2	S5		X		X	X

APPENDIX 6: ELC FIELDSHEETS

ELC
COMMUNITY DESCRIPTION & CLASSIFICATION

SITE: Western Woodlot ((N))			POLYGON: 1
SURVEYOR(S): Tristan Knight	DATE: June 18/2013	TIME: start / finish	
UTMZ: 17 T	UTME: 0543991	UTMN: 4814887 ±5m	

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	4	Car ovat = Fra penn > Ace sacc = Til amer
2	SUB-CANOPY	3	3	Car ovat = Fra penn > Ace sacc = Til amer
3	UNDERSTOREY	4-5	3	Car ovat = Fra penn > Pru virg
4	GRD. LAYER	6-7	2	Ger macu = All peti > Hyd virg = Cir cana (Infestation)

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:
Car ovat 40 – Fra penn 25 – Til amer 16 – Ace rubr 13	21

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

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

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

SOIL ANALYSIS:

TEXTURE: CL	DEPTH TO MOTTLES / GLEY	g = 16cm	G= Ø
MOISTURE: 6 Very Moist	DEPTH OF ORGANICS: Ø		(cm)
HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK: >50		(cm)

COMMUNITY CLASSIFICATION:

		ELC CODE
COMMUNITY CLASS:	Forest	FO
COMMUNITY SERIES:	Deciduous Forest	FOD
ECOSITE:	Fresh-Moist Oak-Maple-Hickory	FOD9
VEGETATION TYPE:	Fresh-Moist Shagbark Hickory	FOD9-4
✓ INCLUSION	Mineral Meadow Marsh	MAM2
✓ COMPLEX	Grey Dogwood Cult. Thicket	CUT1-4

Notes: Vernal pools throughout mostly in northern half most still moist and some with standing water

ELC
STAND CHARACTERISTICS

SITE:
POLYGON:
DATE:
SURVEYOR(S):

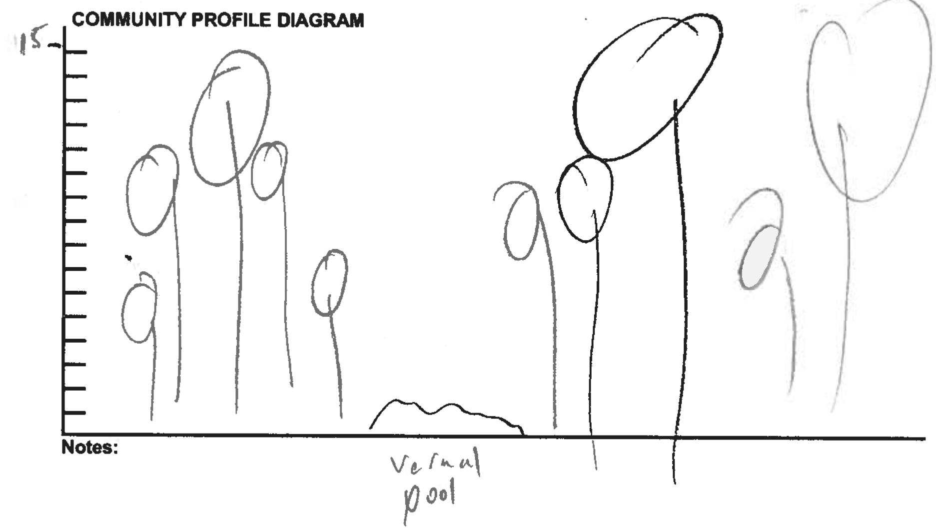
TREE TALLY BY SPECIES:

PRISM FACTOR 2

SPECIES	TALLY 1	TALLY 2	TALLY 3	TALLY 4	TALLY 5	TOTAL	REL. AVG
Car ovat						13	40
Fra penn						8	25
Que macr						1	3
Til amer						5	16
Ace rubr						4	13
Que alba						1	3
TOTAL	8	13	11			32	100
BASAL AREA (BA)	16	26	22			64	21
DEAD						1	

STAND COMPOSITION:

COMMUNITY PROFILE DIAGRAM



Notes:

ELC

SOILS ONTARIO

SITE:
POLYGON:
DATE:
SURVEYOR(S):

	P/A	PP	Dr	Position	Aspect	Slope %	Type	Class	UTM Z	EASTING	NORTHING
1									17	0593999	4814987
2											
3											
4											
5											

±5m

SOIL	1	2	3	4	5
TEXTURE x HORIZON	A Mod B heavy clay				
A TEXTURE	CL (organic)				
COURSE FRAGMENTS					
B TEXTURE	CL				
COURSE FRAGMENTS					
C TEXTURE					
COURSE FRAGMENTS					
EFFECTIVE TEXTURE	CL				
SURFACE STONINESS	0				
SURFACE ROCKINESS	0				
DEPTH TO / OF					
MOTTLES	16cm				
GLEY	—				
BEDROCK	750cm				
WATER TABLE	750cm				
CARBONATES					
DEPTH OF ORGANICS	—				
PORE SIZE DISC #1					
PORE SIZE DISC #2					
MOISTURE REGIME					
SOIL SURVEY MAP					
LEGEND CLASS					

ELC
PLANT SPECIES LIST

SITE:
POLYGON:
DATE:
SURVEYOR(S):

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.
Cor foem			O		
Rha cath		R	A		
Fra pens	D	A	D		
Car ovat	D	A	D		
Que macr	O				
Ace negu		O			
All petl				D	
Fra virg				A	
Sol alti				R	
Arc minu				R	
Vit ripa				O	
Pru virg		A			
ver offi				R	
Cir rena				A	
Geu alep				O	
Eup obov			O		
Til amer	D	A	A		
Len tuber			R		
Rubidieu			A		
Sol caes				O	
Pan comp				R	
Ulm amer	A				
Ost virg	A				
Car cord	R				
Hyd virg				A	
Ger macu				D	
Mai race				O	
Sung Canadensis				O	
Ari triph				O	
Imp capa				O	
Ribe cyno			R		
Ver offi				R	
Car lurt				A	
Rub occi				R	
Pod pelt				R	
Ace nigr	R	R			

SPECIES CODE	LAYER 1	2	3	4	COL.
Ger robe				O	
Geu frag				R	
Vib rafi			R		
Ace rubr	O				
Cra punc			O		
Act rubr				R	
Ceer cana				O	
Agr. gryp				R	
Carp caro			R		
Que rubr	O				
Car grave				O	
Pru sero			R		
Car radi				O	
Dar glau				R	
Car pens				O	
Cra spa					✓
Rib hirt			R		
Sol dulc				O	
Viola spec				R	
Lee virg				R	
Ace Sacch	A				
Que alba	R				
Bly str				O	
Car int				R	
Can sti				R	
Car lup				R	
Car trib				R	✓
Phe arun				R	
Tri gran				O	
Fag gran	R	R			
Fra stro				R	
Car rose				R	
Ara nudi				R	
Ran acr				R	
Pop tremu	R				

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

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: Western Woodlot (complex and inclusion)
POLYGON:
DATE: June 18/2013
SURVEYOR(S): K

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

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

CUT 1-4

SPECIES CODE	LAYER 1	2	3	4	COL.
Cor foem			D		
Lyc amer				R	
Rub id			A		
Rhu typ		O			
Ran acris				R	
Dip dull				R	
Sym novae				R	
Gal tri				O	
Stellaria long				O	
Ulm amer		O	O		
Acer sac				O	
Alo prat				R	
Vit rip				O	
Que mac		R	R		
Eri ann				R	
Far ing				R	
Pan pra				O	
Cla sp.			O		
Vit opul			R		
Ste hed				R	
Asc syr				R	
Ach mil				R	
Bro iner				R	
Dac car				O	
Sym lan				O	
Hie cae				R	
Sol alti				R	
Pot recta				R	
Pru virg				R	
Geu lac				R	✓
Cer fout				R	
Ane virg				R	

SPECIES CODE	LAYER 1	2	3	4	COL.
Jun eff				A	
Typ lat				O	
Alo prat				D	
Ran sce				R	
Run cri				R	
Typ angu				O	

MA

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

ELC
MANAGEMENT / DISTURBANCE

SITE:
POLYGON:
DATE:
SURVEYOR(S):

DISTURBANCE / EXTENT	0	1	2	3	SCORE †
TIME SINCE LOGGING	> 30 YRS	15 - 30 YRS	5 - 15 YRS	0 - 5 YEARS	0
INTENSITY OF LOGGING	NONE	FUEL WOOD	SELECTIVE	DIAMETER LIMIT	0
EXTENT OF LOGGING	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
SUGAR BUSH OPERATIONS	NONE	LIGHT	MODERATE	HEAVY	0
EXTENT OF OPERATIONS	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
GAPS IN FOREST CANOPY	NONE	SMALL	INTERMEDIATE	LARGE	2
EXTENT OF GAPS	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
LIVESTOCK (GRAZING)	NONE	LIGHT	MODERATE	HEAVY	0
EXTENT OF LIVESTOCK	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
ALIEN SPECIES	NONE	OCCASIONAL	ABUNDANT	DOMINANT	2
EXTENT OF ALIEN SPECIES	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
PLANTING (PLANTATION)	NONE	OCCASIONAL	ABUNDANT	DOMINANT	0
EXTENT OF PLANTING	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
TRACKS AND TRAILS	NONE	FAINT TRAILS	WELL MARKED	TRACKS OR	0
EXTENT OF TRACKS/TRAILS	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
DUMPING (RUBBISH)	NONE	LIGHT	MODERATE	HEAVY	2
EXTENT OF DUMPING	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
EARTH DISPLACEMENT	NONE	LIGHT	MODERATE	HEAVY	0
EXTENT OF DISPLACEMENT	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
RECREATIONAL USE	NONE	LIGHT	MODERATE	HEAVY	0
EXTENT OF RECR. USE	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
NOISE	NONE	SLIGHT	MODERATE	INTENSE	4
EXTENT OF NOISE	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
DISEASE/DEATH OF TREES	NONE	LIGHT	MODERATE	HEAVY	1
EXTENT OF DISEASE / DEATH	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
WIND THROW (BLOW DOWN)	NONE	LIGHT	MODERATE	HEAVY	0
EXTENT OF WIND THROW	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
BROWSE (e.g. DEER)	NONE	LIGHT	MODERATE	HEAVY	0
EXTENT OF BROWSE	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
BEAVER ACTIVITY	NONE	LIGHT	MODERATE	HEAVY	0
EXTENT OF BEAVER	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
FLOODING (pools & puddling)	NONE	LIGHT	MODERATE	HEAVY	4
EXTENT OF FLOODING	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
FIRE	NONE	LIGHT	MODERATE	HEAVY	0
EXTENT OF FIRE	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
ICE DAMAGE	NONE	LIGHT	MODERATE	HEAVY	0
EXTENT OF ICE DAMAGE	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
OTHER twinning...	NONE	LIGHT	MODERATE	HEAVY	1
EXTENT	NONE	LOCAL	WIDESPREAD	EXTENSIVE	

† INTENSITY x EXTENT = SCORE

16

heavier along the northern boundary

Ash leaf galls and witches brooms, Corynes Septoria leaf spot (not anthracnose)

shells along northern boundary

ELC
WILDLIFE

SITE:
POLYGON:
DATE:
SURVEYOR(S):
START TIME: END TIME:

TEMP (°C):	CLOUD (10th):	WIND:	PRECIPITATION:
CONDITIONS:			

POTENTIAL WILDLIFE HABITAT:

✓	VERNAL POOLS	✓	SNAGS
	HIBERNACULA	✓	FALLEN LOGS

SPECIES LIST:

TY	SP. CODE	EV	NOTES	#
B	willow flycatcher	SM	South of woodlot	1
B	Robin	SM		1
B	Cardinal	SM		1
B	Flicker	VO	Dogwood/ash	1
B	Cedar Wax	SM		1
B	East. Woodpew	SM	Call notes	1
B	Vesp. Sparrow	SM	Field east woodlot	1
L	Mourning Cloak	OB		1
B	Blue Jay	VO		1
B	Grey Catbird	SM	Dogwood complex	1

TY	SP. CODE	EV	NOTES	#

FAUNAL TYPE CODES (TY):
B = BIRD M = MAMMAL H = HERPETOFAUNA L = LEPIDOPTERA F = FISH O = OTHER

EVIDENCE CODES (EV):

BREEDING BIRD - POSSIBLE:
SH = SUITABLE HABITAT SM = SINGING MALE

BREEDING BIRD - PROBABLE:
T = TERRITORY D = DISPLAY P = PAIR
A = ANXIETY BEHAVIOUR N = NEST BUILDING V = VISITING NEST

BREEDING BIRD - CONFIRMED:
DD = DISTRACTION NU = USED NEST FY = FLEDGED YOUNG
NE = EGGS NY = YOUNG FS = FOOD/FAECAL SACK
AE = NEST ENTRY

OTHER WILDLIFE EVIDENCE:
OB = OBSERVED VO = VOCALIZATION CA = CARCASS
DP = DISTINCTIVE PARTS HO = HOUSE/DEN FY = EGGS OR YOUNG
TK = TRACKS FE = FEEDING EVIDENCE SC = SCAT
SI = OTHER SIGNS (specify)

ELC — COMMUNITY DESCRIPTION & CLASSIFICATION

SITE: Easter Woodlot		POLYGON: 1	
SURVEYOR(S): Tristan Knight	DATE: June 18/20	TIME: start / finish	
UTMZ: 17T	UTME: 599633	UTMN: 4822523	

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
G TERRESTRIAL	G ORGANIC	G LACUSTRINE	G NATURAL	G PLANKTON	G LAKE
G WETLAND	G MINERAL SOIL	G RIVERINE	G CULTURAL	G SUBMERGED	G POND
G AQUATIC	G PARENT MIN.	G BOTTOMLAND		G FLOATING-LVD.	G RIVER
	G ACIDIC BEDRK.	G TERRACE		G GRAMINOID	G STREAM
SITE	G BASIC BEDRK.	G VALLEY SLOPE	**COVER**	G FORB	G MARSH
G OPEN WATER	G CARB. BEDRK.	G TABLELAND	G OPEN	G LICHEN	G SWAMP
G SHALLOW WATER		G ROLL. UPLAND	G SHRUB	G BRYOPHYTE	G FEN
G SURFICIAL DEP.		G CLIFF	G TREED	G DECIDUOUS	G BOG
G BEDROCK		G TALUS		G CONIFEROUS	G BARREN
		G CREVICE / CAVE		G MIXED	G MEADOW
		G ALVAR			G PRAIRIE
		G ROCKLAND			G THICKET
		G BEACH / BAR			G SAVANNAH
		G SAND DUNE			G WOODLAND
		G BLUFF			G FOREST
					G 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	2	4	Fra pen > Carya Ovat > Ost vir
2	SUB-CANOPY	3	3	
3	UNDERSTOREY			
4	GRD. LAYER	6-7	2	Cir can (lutetiana) > Hyd vir

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:	Forest	FO
COMMUNITY SERIES:	Dec. Forest	FOD
ECOSITE:	Fresh-Moist Lowland Dec. For.	FOD7
VEGETATION TYPE:	Fresh-Moist Ash Lowland Dec. For.	FOD7-2
INCLUSION	Meadow Marsh	MAM
COMPLEX	Grey Dogwood Cult. Thicket	CUT

Notes:

ELC — STAND CHARACTERISTICS

SITE:	
POLYGON:	
DATE:	
SURVEYOR(S):	

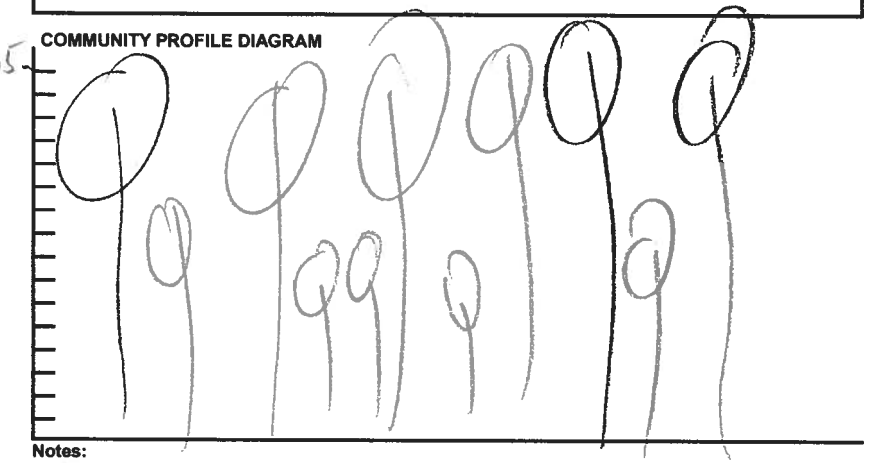
TREE TALLY BY SPECIES: No access.

PRISM FACTOR

SPECIES	TALLY 1	TALLY 2	TALLY 3	TALLY 4	TALLY 5	TOTAL	REL. AVG
TOTAL							100
BASAL AREA (BA)							
DEAD							

STAND COMPOSITION:

COMMUNITY PROFILE DIAGRAM



Notes:

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

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

SOIL	1	2	3	4	5
TEXTURE x HORIZON	No	Access			
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:
	POLYGON:
	DATE:
	SURVEYOR(S):

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	LAYER 2	LAYER 3	LAYER 4	COL.
Que macr	D				
Fra penn	D				
Rhu sp			R		
Vib opul			R		
Ace nigr	R				
Ulm amer	O	O			
Tox radi			O	O	
Ham virg			O		
Vit rip			O	O	
Rham cat				R	
Pru virg			R		
Fag gran	O	O			
Car ovat	A				
Crat mono		O			
Car cord	R				
Que rubr	O				
Vib lent			R		
Par inse			O		
Ros mult			R		
Pop tre	R				
Lin [illegible]			R		
Ost virg	O	O			
Cir can				A	
Mai can			R		
Cor form			O		
Carp caro			R		
Ace X free	O	O			
Ono sens				R	
Car radi/rose				A	
Hyd virg				A	
Act rubr				R	

SPECIES CODE	LAYER 1	LAYER 2	LAYER 3	LAYER 4	COL.
Sol caes				R	
Ari trip				R	
[illegible]					
Euo obov			O		
Sol flex				R	
Rub idae			O		
Lap can				R	
Sol dulc				R	
Ger cam				R	
Gym [illegible]				R	
Car intu				R	
Gly stri				R	

ELC

MANAGEMENT / DISTURBANCE

SITE:
POLYGON:
DATE:
SURVEYOR(S):

DISTURBANCE / EXTENT	0	1	2	3	SCORE †
TIME SINCE LOGGING	> 30 YRS	15 - 30 YRS	5 - 15 YRS	0 - 5 YEARS	2
INTENSITY OF LOGGING	NONE	FUEL WOOD	SELECTIVE	DIAMETER LIMIT	2 (?)
EXTENT OF LOGGING	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
SUGAR BUSH OPERATIONS	NONE	LIGHT	MODERATE	HEAVY	0
EXTENT OF OPERATIONS	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
GAPS IN FOREST CANOPY	NONE	SMALL	INTERMEDIATE	LARGE	1
EXTENT OF GAPS	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
LIVESTOCK (GRAZING)	NONE	LIGHT	MODERATE	HEAVY	0
EXTENT OF LIVESTOCK	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
ALIEN SPECIES	NONE	OCCASIONAL	ABUNDANT	DOMINANT	1
EXTENT OF ALIEN SPECIES	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
PLANTING (PLANTATION)	NONE	OCCASIONAL	ABUNDANT	DOMINANT	1
EXTENT OF PLANTING	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
TRACKS AND TRAILS	NONE	FAINT TRAILS	WELL MARKED	TRACKS OR	0
EXTENT OF TRACKS/TRAILS	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
DUMPING (RUBBISH)	NONE	LIGHT	MODERATE	HEAVY	1
EXTENT OF DUMPING	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
EARTH DISPLACEMENT	NONE	LIGHT	MODERATE	HEAVY	0
EXTENT OF DISPLACEMENT	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
RECREATIONAL USE	NONE	LIGHT	MODERATE	HEAVY	0
EXTENT OF RECR. USE	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
NOISE	NONE	SLIGHT	MODERATE	INTENSE	2
EXTENT OF NOISE	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
DISEASE/DEATH OF TREES	NONE	LIGHT	MODERATE	HEAVY	0
EXTENT OF DISEASE / DEATH	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
WIND THROW (BLOW DOWN)	NONE	LIGHT	MODERATE	HEAVY	0
EXTENT OF WIND THROW	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
BROWSE (e.g. DEER)	NONE	LIGHT	MODERATE	HEAVY	0
EXTENT OF BROWSE	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
BEAVER ACTIVITY	NONE	LIGHT	MODERATE	HEAVY	0
EXTENT OF BEAVER	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
FLOODING (pools & puddling)	NONE	LIGHT	MODERATE	HEAVY	1
EXTENT OF FLOODING	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
FIRE	NONE	LIGHT	MODERATE	HEAVY	0
EXTENT OF FIRE	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
ICE DAMAGE	NONE	LIGHT	MODERATE	HEAVY	0
EXTENT OF ICE DAMAGE	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
OTHER	NONE	LIGHT	MODERATE	HEAVY	0
EXTENT	NONE	LOCAL	WIDESPREAD	EXTENSIVE	

† INTENSITY x EXTENT = SCORE

11

Based on airphoto unsure

Malus pumila

ELC

WILDLIFE

SITE:
POLYGON:
DATE:
SURVEYOR(S):
START TIME: END TIME:

TEMP (°C):	CLOUD (10th):	WIND:	PRECIPITATION:

CONDITIONS:

POTENTIAL WILDLIFE HABITAT:

	VERNAL POOLS		SNAGS
	HIBERNACULA		FALLEN LOGS

SPECIES LIST:

TY	SP. CODE	EV	NOTES	#	TY	SP. CODE	EV	NOTES	#
B	Catbird								

FAUNAL TYPE CODES (TY):
B = BIRD M = MAMMAL H = HERPETOFAUNA L = LEPIDOPTERA F = FISH O = OTHER

EVIDENCE CODES (EV):

BREEDING BIRD - POSSIBLE:
SH = SUITABLE HABITAT SM = SINGING MALE

BREEDING BIRD - PROBABLE:
T = TERRITORY D = DISPLAY P = PAIR
A = ANXIETY BEHAVIOUR N = NEST BUILDING V = VISITING NEST

BREEDING BIRD - CONFIRMED:
DD = DISTRACTION NU = USED NEST FY = FLEDGED YOUNG
NE = EGGS NY = YOUNG FS = FOOD/FAECAL SACK
AE = NEST ENTRY

OTHER WILDLIFE EVIDENCE:
OB = OBSERVED VO = VOCALIZATION CA = CARCASS
DP = DISTINCTIVE PARTS HO = HOUSE/DEN FY = EGGS OR YOUNG
TK = TRACKS FE = FEEDING EVIDENCE SC = SCAT
SI = OTHER SIGNS (specify)

APPENDIX 7: MEETING MINUTES

MEETING MINUTES

Britannia Road Transportation Corridor Improvements

Tremaine Road to Highway 407

Class Environmental Assessment Study

Date: Thursday June 30, 2011

Location: Conservation Halton Main Office

Attendance:

Chris Parent (Aquafor Beech)
Chris Lorenz (Aquafor Beech)
Brent Tegler (North-South Environmental)
Andrew Head (Halton Region)
Alicia Jakaitis (Halton Region)
Stanley Pijl (Delcan)
Samantha Mason (Conservation Halton)
Kim Barrett (Conservation Halton)
Jennifer Lawrence (Conservation Halton)

---

1. Options for Improvements to Britannia Road

Stanley Pijl provided an overview of Delcan's options for improvements to the Britannia Road corridor. Specific elements of relevance to the Natural Heritage component of the EA study include the following:

- Britannia Road is proposed to be widened to four lanes initially; the road is proposed to be further widened to six lanes at some point during 2021-2031.
- The ultimate right-of-way will be 47 m wide; this includes the roadway, sidewalks and shoulder.
- Culverts will generally match the existing road grade.
- Existing culverts will have to be replaced or extended to at least 47 m in length; each culvert will need to be assessed individually to determine whether it is replaced or extended.
- Between First Line and Regional Road 25 the proposed alignment shifts north to avoid impacts to a woodland block that abuts the southern edge of the existing Britannia Road alignment.
- The bridge crossing the Main Branch of 16 Mile Creek will have to be replaced. Widening is currently proposed to occur on both sides of the existing alignment. Kim Barrett indicated that the northern limit of the Sixteen Mile Creek Valley Environmentally Sensitive Area (ESA 16) extends to Britannia Road and that it would be desirable to limit the intrusion of proposed road improvements into the ESA.

- Kim Barrett also indicated that portions of the Boyne Natural Heritage System (NHS) extend into the study area along the north side of Britannia Road. Figure NHS-2A of the draft Functional Servicing and Environmental Management Strategy (FSEMS) for the Boyne Survey shows a number of 'Enhanced Wildlife Crossing Locations' that Conservation Halton recommends be taken into account in the EA. The Region of Halton's Planning Department has a copy of this report for reference.
- Jennifer Lawrence noted that a proposed stormwater management facility associated with future development of the Boyne Survey lands may discharge into the Main Branch of 16 Mile Creek immediately upstream (i.e. north) of Britannia Road.
- The bridge crossing the East Branch of 16 Mile Creek will have to be replaced. Immediately west of this crossing the width of the roadway is proposed to be reduced to minimize impacts on adjacent properties; the reduced roadway width is likely to continue to Trafalgar Road.
- Immediately west of Highway 407 the proposed road alignment shifts south to avoid impacts to a woodland block that abuts the northern edge of the existing Britannia Road alignment.
- There are three options for the future alignment of Britannia Road at Omagh: (i) Option 5A follows the existing alignment through Omagh, (ii) Option 5B involves a bypass to the north of Omagh, and (iii) Option 5C involves a bypass to the south of Omagh. These options will need to be assessed to determine the preferred alternative.
- Jennifer Lawrence noted that a flood damage centre of approximately 12 homes is located in Omagh. The assessment of Options 5A, 5B and 5C should address their implications to this flood damage centre.
- Option 5B and Option 5C both involve watercourse crossings; to achieve a perpendicular crossing, the current configuration of Option 5C would require a realignment of a portion of the Omagh Tributary.
- Options 5B and 5C are not fixed and could be revised to address environmental issues.

2. Work Plan to Address Natural Heritage Component of EA Study

Jennifer Lawrence asked why calling amphibian surveys were not completed in the spring. Chris Parent indicated that existing information is adequate to characterize the amphibian species of the study area; knowledge of potential amphibian habitat (particularly breeding ponds) is sufficient to inform the evaluation of options and assess potential impacts.

Kim Barrett noted the following:

- ELC should be completed to Vegetation Type level at the crossings of the Main Branch and East Branch of 16 Mile Creek; ELC could be completed to more general levels (i.e. Community Series or Ecosite) at other portions of the study area.

- A general characterization of plant species is sufficient but specimen trees should be identified.
- The boundary of the wetland in the woodland block immediately west of Highway 407 should be delineated as soon as possible. Conservation Halton will confirm the staking of the wetland limits.
- The EA Study should consider the need to incorporate wildlife crossings at existing culverts, and recommendations should be made for the installation of additional culverts (or similar wildlife crossing structures) to accommodate wildlife movements where considered necessary.
- A road mortality survey should be completed to identify areas where wildlife road crossing structures may be appropriate.

Brent Tegler agreed that the Project Team would complete the Natural Heritage fieldwork per the above points.

Samantha Mason noted the following:

- Silver Shiner (*Notropis photogenis*) is present in 16 Mile Creek (East Branch). Silver Shiner was caught at or near this bridge in 2011.
- Silver Shiner was recommended for uplisting to "threatened" status in May 2011 by COSEWIC. Accordingly, there is the potential that an authorization under the *Fisheries Act* may be required for the replacement of this bridge and there is also the potential that a permit may be required under the *Species at Risk Act* (SARA). This should be noted in the ESR.
- Conservation Halton would like data loggers to be installed to obtain data on the thermal regimes of all permanently flowing watercourses.
- Conservation Halton would prefer open bottom culverts for all watercourse crossings, particularly coldwater streams and those that receive groundwater inputs.

The Project Team noted the potential presence of Silver Shiner in 16 Mile Creek in the vicinity of Britannia Road. It was agreed that data loggers would be installed to obtain data on the thermal regimes of all permanent flowing watercourses.

3. Access to Private Property

The requirements to access private property were discussed and the following indicated:

- There has been no general mail-out to solicit permission for the Project Team to access private property.

- Brent Tegler noted that to date, most terrestrial fieldwork has been completed from the edge of the road. He noted that access to private property would be required to address elements of the Natural Heritage component of the EA Study, such as the assessment of Option 5B and Option 5C at Omagh.
- Andrew head noted that, if required, Halton Region can provide the Study Team with landowner contact information.
- Jennifer Lawrence noted that permission should be obtained to access private property upstream and downstream of the crossings of the Main Branch and East Branch of 16 Mile Creek.

4. Evaluation Criteria

Chris Parent noted that the project team would like to review evaluation criteria with Conservation Halton staff. It was agreed that the Project Team will prepare and circulate to Conservation Halton draft evaluation criteria for review and comment.

5. Next Steps

Aquafor Beech Limited will prepare and circulate draft meeting minutes.

MEETING MINUTES - Draft

Britannia Road Transportation Corridor Improvements

Tremaine Road to Highway 407

Class Environmental Assessment Study

Date: Friday December 9, 2011

Location: Conservation Halton Main Office

Attendance:

Chris Parent (Aquafor Beech)	Alicia Jakaitis (Halton Region)
Chris Lorenz (Aquafor Beech)	Stanley Pijl (Delcan)
Greg Frew (Aquafor Beech)	Samantha Mason (Conservation Halton)
Andrew Head (Halton Region)	Kim Barrett (Conservation Halton)

Introduction

Chris Parent welcomed those present and indicated that the meeting is intended to provide Conservation Halton staff with a preview of the results of 2011 fieldwork. He noted that data is currently being analyzed and that final results and recommendations will be presented in the Environmental Study Report (ESR).

1. Project Update

- Stanley Pijl provided a brief review of the project.
- Stanley Pijl reviewed the three Omagh alternatives; Delcan will be presenting the south bypass of Omagh as the preferred alternative at the third Public Information Centre (PIC).
- Andrew Head confirmed that the third PIC will take place at the Boyne Community Centre on Wednesday December 14, 2011 from 7-9 pm.
- Stanley Pijl noted that Delcan hopes to have the draft ESR completed by the end of February or the beginning of March, 2012.

2. Response to Conservation Halton letter dated October 19, 2010

- Chris Parent reviewed Aquafor Beech Limited responses to the Conservation Halton letter of October 19, 2010 as summarized in Table 1.
- Chris Parent noted that Aquafor Beech Limited will provide Conservation Halton with a digital copy of Table 1 so that they can provide feedback to Aquafor Beech Limited.

- Kim Barrett will forward Table 1 to Conservation Halton planners so that they can provide input and feedback.
- Chris Parent indicated that the Project Team will assess road improvement alternatives based on the potential impacts of any associated utility relocation on natural heritage features, natural hazard areas and fish habitat, to the extent possible at the EA level of study. Kim Barrett indicated that a high level review would be sufficient.
- Kim Barrett noted that the most recent version of the Functional Stormwater and Environmental Management Strategy (FSEMS) for the Boyne Survey Secondary Plan Area (dated March 2011) is available from Halton Region and should be consulted for information regarding the proposed Natural Heritage System and recommended locations of wildlife crossing structures.
- Chris Parent confirmed that Aquafor Beech Limited and North South Environmental will submit all field data sheets to Conservation Halton.
- Chris Parent noted that all wetlands within the study area have been delineated.
- Samantha Mason asked Stanley Pijl if culverts will be extended across the 47 m width of the new right-of way. Stanley confirmed that all culverts will be 47 m in length.
- Samantha Mason asked if the 47 m culverts will be made with wider openings to facilitate fish passage. Greg Frew responded that wider culverts will be required to convey flows.
- Chris Parent noted that ELC has been completed and that Delcan has been proactive in establishing the proposed alignment of Britannia Road to avoid potential edge impacts to woodlands and wetlands.
- Chris Parent confirmed that Aquafor Beech Limited will address Significant Environmental Areas in the ESR.

3. Britannia Road Hydrology

- Greg Frew noted the following:
    - Peak flows were estimated at each crossing using background information where available, including 2-100 year flows and the regional storm (Hurricane Hazel).
    - Flood levels were assessed at each crossing under existing conditions; many crossings flood at the 50 year, 100 year and regional storm.
    - The existing culverts at each crossing are much smaller than they would be if they were built today.
    - Aquafor Beech Limited recommends an increase in size for many of the culverts. Where an increase in size is recommended, Aquafor Beech Limited also recommends an open-bottom design.

- The hydraulics of the road options at Omagh were reviewed. Greg Frew presented HEC-RAS hydraulic model results which indicate that the existing culverts at Britannia Road and Fourth Line represent a "bottleneck" making some of the nearby homes flood-susceptible. Of the three alternatives, the option to widen the road along the existing ROW represents an opportunity to improve the Britannia Road culvert and reduce flooding. The north option would add another culvert on the stream without improving the existing flooding. The south option would also add another culvert on the stream which may result in a moderate increase in flood levels south of the existing Britannia Road culvert. Therefore, from a strictly hydraulics perspective, maintaining the existing right-of-way is the preferred option, followed by swinging the road north. Swinging the road south would be the least preferred option.

- Samantha Mason asked if improving the Fourth Line culvert could be considered as part of this project. Alicia Jakaitis noted that Fourth Line will likely be upgraded soon and that they may look into culvert improvements at that time.
- Samantha Mason asked Greg Frew if the modeling is updated to reflect changes in storm patterns. Greg responded that the storms used in models are updated occasionally; however Hurricane Hazel (the regional storm event) is 2-fold greater than the 100 year storm, and as such it is unlikely to be surpassed.
- Samantha Mason noted that she would like to get the hydrology data to Conservation Halton engineers as soon as possible.
- Samantha Mason asked Andrew Head if the selection of the south option was based primarily on social factors. Andrew Head replied that it was the most significant factor leading to the identification of the south option as the preferred alternative.

4. Storm Water Management

- Greg Frew advised that, due to the urban road cross-section, SWM methods for the road were limited to end-of-pipe techniques, such as ponds or oil-grit separators.
- Greg Frew noted that future SWM ponds identified in the Boyne Survey FSEMS could potentially treat runoff from Britannia Road. It was noted that a newer version of the Boyne Survey FSEMS is available which illustrates different pond locations adjacent to Britannia Road than the previous version.
- Andrew Head indicated that the Region may attempt to work with future developers and contribute funds if necessary. However, historically, developers are reluctant. Also, the road works are expected to take place before future adjacent development, so the ponds will not be in place when the road is built.
- Samantha Mason asked if oil-grit separators can be used temporarily. Greg responded that this would be the only feasible option because proposed drainage areas from the road ROW alone are insufficient to support a proper SWM pond.

- Greg advised that for those segments of the road that will not drain to future adjacent SWM ponds, oil-grit separators would be recommended for water quality treatment, where grading permits. It is assumed that, if a pond is not possible, no flood (quantity) control will be feasible at these locations.
- Greg Frew indicated that there is no preferred right-of-way alternative for stormwater management because every option would be serviced the same way.
- Samantha Mason asked if road runoff would be accounted for in culvert size. Greg Frew responded that runoff from the roadway that is not controlled through future SWM ponds on the north side of the road could instead be released on the downstream side of the road.

5. Fluvial Geomorphology Summary

- Chris Parent provided a written summary of the results of the fluvial geomorphology field work completed in 2011.

6. Aquatic Ecology Summary

- Chris Parent provided a written summary of the results of aquatic ecology fieldwork completed in 2011 and noted the following:
    - MNR indicated that there was no need to perform fisheries assessments of larger watercourses.
    - John Pisapio has indicated that he will provide background information to Aquafor Beech Limited. This information has yet to be provided.
    - Chris Parent asked Kim Barrett to remind John Pisapio to provide background information to Aquafor Beech Limited at the next Conservation Halton/MNR meeting.
    - Chris Parent indicated that he would forward email correspondence with MNR to Conservation Halton for their information.

7. Terrestrial Ecology Summary

- Chris Parent provided a written summary of the results of terrestrial ecology fieldwork completed in 2011 and noted the following:
    - ELC and tree inventory have been completed.
    - Breeding bird surveys have been completed.
    - MNR has no records of Species at Risk in the immediate study area.
    - North-South Environmental noted a silver maple swamp in the floodplain of the Main Branch of 16 Mile Creek.

- Two wetlands have been delineated. Delcan has accounted for these wetlands in establishing the proposed alignment of the improved Britannia Road.
- Results of botanical surveys:
  - Approximately 20-50 species identified in each vegetation community; of these, 10% - 40% are non-native.
  - No plant species at risk or provincially significant flora identified.
  - The bottom of page 8 of the Terrestrial Ecology Summary lists regionally significant plant species identified.

8. Bobolink, Meadowlark and Barn Swallow

- Chris Parent noted that North-South Environmental documented Bobolink and Barn Swallow in their breeding bird surveys.
- Chris Parent noted that Meadowlark and Barn Swallow were recently designated Threatened by COSEWIC and that both species were assessed by COSSARO at its June 2011 meeting; results have yet to be released.

9. Tree Survey

- Chris Parent noted that the tree survey documents 221 trees; 78% of these are native species.
- Chris Parent will clarify the rankings provided in Table 4 of the Terrestrial Ecology Summary.

10. Comments and Questions

- Alicia Jakaitis asked Aquafor Beech Limited to include in the final product all studies that need to be completed as part of the detailed design so that the developers would be informed.
- Greg Frew indicated that all hydrological and SWM assessments are conceptual at the current level of analysis.

Minutes of Meeting with Conservation Halton

Britannia Road (Regional Road 6) Transportation Corridor Improvements
Tremaine Road (Regional Road 22) To Highway 407

HELD ON:	Tuesday, October 1, 2012 at 1:00 p.m.	
LOCATION:	Conservation Halton, 2596 Britannia Road West	
PRESENT:	Melissa Green-Battiston	Halton Region
	Alicia Jakaitis	Halton Region
	Jennifer Lawrence	Conservation Halton
	Amy Mayes	Conservation Halton
	Samantha Mason	Conservation Halton
	Nick Palomba	Delcan Corporation
	Andrew McGregor	Delcan Corporation (Minutes)
	Roger Phillips	Aquafor Beech
	Chris Lorenz	Aquafor Beech
	Greg Frew	Aquafor Beech

Items Discussed **Action**

1. Introduction - Purpose of Meeting

Halton Region provided an overview of the project and update on Project Manager and Project Team. On behalf of Halton Region, Alicia Jakaitis is the Project Manager and the Consultant Project Manager is Nick Palomba. An update was also provided regarding the acceleration of 6 lanes on Britannia Road from Tremaine Road to Regional Road 25 as per PW 63-11 — Information

Draft copies of the Fluvial Geomorphology, Natural Environment and Storm Water Management (SWM) Appendices were delivered to Conservation Halton (CH) on September 17, 2012 for review and comment prior to draft ESR being finalized.

The purpose of the meeting was to discuss CH comments from February 2012 and the preliminary preferred alternative.

2. Fluvial Geomorphology

Aquafor Beech (AB) provided an overview of the hydraulic modeling and changes between existing and proposed hydraulic performance.

Comments were raised by CH regarding the base modeling parametres and assumptions, specifically that Manning's n was artificially too low.

- In consultation with CH, AB is to update model parametres and review all HEC-RAS models and determine whether any other adjustments need to be recommended. — Aquafor Beech

AB discussed potential increase in flooding at 6 crossings and specifically

flood increases at Crossing 11 (Omagh Tributary). CH confirmed there will be zero tolerance for flood level increases within the Study Area.

- For the Crossing 11 HEC-RAS model AB will run model with preferred Manning's n only over the short reach affected by the proposed road. AB to develop a crossing alternative that does not increase flood levels within the Omagh Community.

- AB to review all flood level increases and adjust design to eliminate any increases.

Comments were raised by CH regarding drainage areas used in the analysis from Britannia Road. AB advised that these areas were from the background AMEC FSEMS report.

- CH to clarify concerns regarding drainage areas. Further discussion will be required if drainage areas are to change given the significant impact on the project wide hydraulic analysis already completed. — Conservation Halton

AB distributed a table detailing all proposed new culvert sizing and criteria at an ultimate 6 lane cross section, 47 metre right-of-way. AB to update table based on updated analysis. — Aquafor Beech

Prior to culvert sizing and criteria being finalize, AB and CH to confirm the following: — Conservation Halton/ Aquafor Beech

- The span of replacement structures is sufficient to be same or wider than existing;
- Where twin cells are proposed for smaller crossings, should the span be determined by the width of one cell or sum of both;
- Clarify what crossings should accommodate wildlife passages.

CH will provide additional comments regarding the following:

- Opening Ratio requirements;
- Provide recommendation regarding culvert alignments of perpendicular with minimal lengthening vs. oblique with minimal realignment.

CH also requested that culvert sizing and criteria also include criteria to promote wildlife passage. The draft ESR will include recommendations for: — Aquafor Beech

- Open bottom culverts.
- Dry "benches" above the low-flow channel for dry weather access

within single-span culverts.

- "Offset" inverts for twin cell culverts such that one is dry during low-flow.

CH stated their preference for native substrate. The draft ESR will include a commitment to review the appropriateness of stone sizing and material in consultation with CH at detailed design.

CH requested supplementary information on sampling methods for channel widths: Methods and results are documented in the Fluvial Geomorphology study, Section 3.2 and Table 2. Sampling results include 2 cross-sections upstream and downstream (where accessible), with the distance of the furthest cross-section samples upstream and downstream documented in the OSAP field reports (Terrestrial and Aquatic Resources Report - Appendix 7).

3. Storm Water Management (SWM)

AB presented the ultimate SWM design which will include outletting to the future development SWM ponds adjacent to Britannia Road within the Boyne Secondary Plan Area. As an interim condition, the Britannia Road run-off will outlet through the use of Oil Grit Separators. Outside of the Boyne Secondary Plan Area, runoff will be treated by a series of permanent Oil Grit Separators.

Comments were raised regarding the potential of creek realignment as part of the development process of the Boyne Secondary Plan between Tremaine Road to James Snow Parkway. The Environmental Study Report will include a section noting that as the FSEMS for Boyne is finalized, Halton Region will work in consultation with CH and the Boyne Land Owners Group to best accommodate the interim and ultimate SWM conditions adjacent to the Boyne Secondary Plan Area. Aquafor Beech

4. Natural Environment

AB provided an overview of the terrestrial and vegetation inventory throughout the corridor. Specifically noting 2 significant woodlots and 2 wetlands.

- AB to provide ELC mapping and species list of Eastern Woodlot Aquafor Beech

(west of 407) and Woodlot west of Highway 25 to Kim Barrett for assessment.

- Further discussions will be required regarding tolerance of impact on the Eastern Woodlot due to road alignment. The impact between the woodlot and residential property will need to be reviewed and mitigated as required. Delcan to consider narrowing the ROW to minimize impact where practical and feasible. — Delcan
- CH advised that MNR will likely target natural meadows rather than hay fields, for bobolink habitat. AB to check for natural meadows within study area and comment on potential impacts in report.
- CH recommended that MNR to be engaged early during detail design regarding bobolink habitat and should be noted accordingly in the ESR.
- Aquafor Beech to provide Giant Hogweed warning in ESR.
- CH commented that a permit may be required for SWM facilities draining to tributaries classified as Silver Shiner habitat. This will be noted in the ESR.
- Halton Region committed to Jefferson Salamander and Calling Amphibian Surveys in spring of 2013 and will be added to the draft ESR. — Halton Region

5. Next Steps

- AB to confirm drainage areas with CH.
- AB to provide ELC mapping to CH.
- AB to update model with preferred Mannings n value.
- CH to provide comments to Halton Region by October 22nd.
- Schedule next meeting to discuss comments and provide updated modeling results.

cc: All present

Note: These minutes are believed to be an accurate summary of the discussions of the meeting. Please advise as soon as possible if there are any errors or omissions.

Minutes of November 8, 2012 Project Team Meeting

Britannia Road (Regional Road 6) Transportation Corridor Improvements
Tremaine Road (Regional Road 22) To Highway 407

HELD ON: Tuesday, November 8, 2012 at 1:00 p.m.

LOCATION: Maplegrove Room, Woodlands Building, Halton Region

PRESENT:

Melissa Green-Battiston	Halton Region
Alicia Jakaitis	Halton Region
Tony Finelli	Halton Region
Nick Palomba	Delcan Corporation
Stan Pijl	Delcan Corporation
Andrew McGregor	Delcan Corporation (Minutes)
Chris Lorenz	Aquafor Beech
Greg Frew	Aquafor Beech

Items Discussed	Action

1. Review of Preliminary Design

The preliminary design and impacts to individual property owners needs to be reviewed/determined with respect to significant landscaping, ponds, heritage significance, parking and wells. Preliminary design should first be assessed to determine if impacts can be avoided by shifting the alignment. If impacts are unavoidable, a strategy needs to be developed on how we will engage the property owner ie. letter vs. meeting. Delcan to investigate whether design modifications are viable. — Delcan

With respect to alignment modifications, Delcan to look at encroaching into the woodlot at the east limits, to avoid impacting small pond on the south side. This would require input from Conservation Halton (CH). Delcan to provide modified alignment to CH for review. — Delcan

A 4 lane cross-section needs to be developed for the by-pass around Omagh to eliminate encroachment onto the ball diamond. A plan for AT facilities on the by-pass and/or on old Britannia Road should be included for the Town of Milton to review. Need to determine if the barn that is located south of the bypass can be demolished – barn swallow habitat implications. ESR to note that a Barn Swallow assessment is to be undertaken during detailed design. — Delcan

The original letter to the Town of Milton that was drafted for Halton Region by Delcan in April 2012 was not sent out. The original alignment impacted 6007 Trafalgar Road and there was discussion about potential removal or relocation. The revised Britannia alignment no longer impacts the property. Region to commit to

undertaking a Heritage Impact Assessment of this property during detailed design. 8815 Britannia Road – To avoid impacting the trees, either the sidewalk could be made curb-face or the roadway could be shifted to the south. Delcan to explore these options. Revised letter is to go out to Town of Milton.	Delcan
Grading plan is to be reviewed at the creek crossings once modeling is completed.	Delcan
A plan to begin/terminate the AT facility at the 407 interchange is to be developed. Delcan to contact 407/MTO to determine their requirements.	Delcan
Preliminary design to be updated with all driveway connections, culverts and include a 2021 and 2031 design.	Delcan

2. CN and CP Tracks

At the meeting, Delcan identified that the costs of providing an underpass for the CN tracks could be significantly greater than that of an overpass. However, given that there is not a technical reason that an underpass cannot work, Halton Region stated their preference for an underpass vs. overpass due to noise and aesthetic reasons. Delcan provided their completed evaluation table to Halton Region for review. Delcan to revise general arrangement to underpass, review impact of a grade separation to adjacent creeks and set new date for CN meeting.	Delcan
ESR will include a section on CP requirements at spur line at 407 for when a train is crossing.	Delcan

3. Response to Conservation Halton

ABL to meet with CH asap to confirm the following: • Drainage areas and flows to apply to size the openings for hydraulic conveyance • opening criteria for those crossings that require wildlife passage • Which crossings require a minimum span based on bankfull (i.e. 2x bankfull)	Aquafor Beech
ABL is to provide a memo back on whether the request is reasonable and time required to complete the model update prior to commencing work. *Subsequent to the meeting, ABL contacted CH*	Aquafor Beech

to set up a meeting with CH on Nov. 22nd

All reports will have to be updated if modelling results change and preliminary design will also need to be adjusted to reflect new culvert sizes. — Aquafor Beech

ABL is to recommend locations for terrestrial and aquatic crossings and confirm with CH whether additional geomorphological analysis is required once benches/shelves are proposed. — Aquafor Beech

ABL to provide cost estimate for Jefferson Salamander study asap. — Aquafor Beech

Response to CH will be completed by inserting response following their comment. — Aquafor Beech

4. Infrastructure Ontario

Subsequent to the last meeting, Delcan has followed up with Infrastructure Ontario (IO), formerly Ontario Realty Corporation (ORC), with regards to IO's EA and documentation requirements. ESR to be updated based on IO's requirements. — Delcan

5. MNR

ABL to follow up with MNR on silver shiner gathering form and what is required to file the ESR vs. detailed design. — Aquafor Beech

cc: All present

Note: These minutes are believed to be an accurate summary of the discussions of the meeting. Please advise as soon as possible if there are any errors or omissions.

APPENDIX 8: MARSH MONITORING PROGRAM FIELDSHEETS

Amphibian Calling Survey Field Sheet

Site Information:

Site: Britannia Rd. Station No.: 1

Observer: TK Date: Apr. 15/2017 Visit No.: 1

Temperature: 10°C Wind Speed (Beaufort scale): 0 Cloud Cover (10th): 5

Precipitation (check one): ☑ None/Dry ○ Damp/Haze/Fog ○ Drizzle ○ Rain

Station Start Time: 8:40 Background Noise Code: 4

Call Level Codes:

Code 1: Calls not simultaneous, number of individuals can be accurately counted

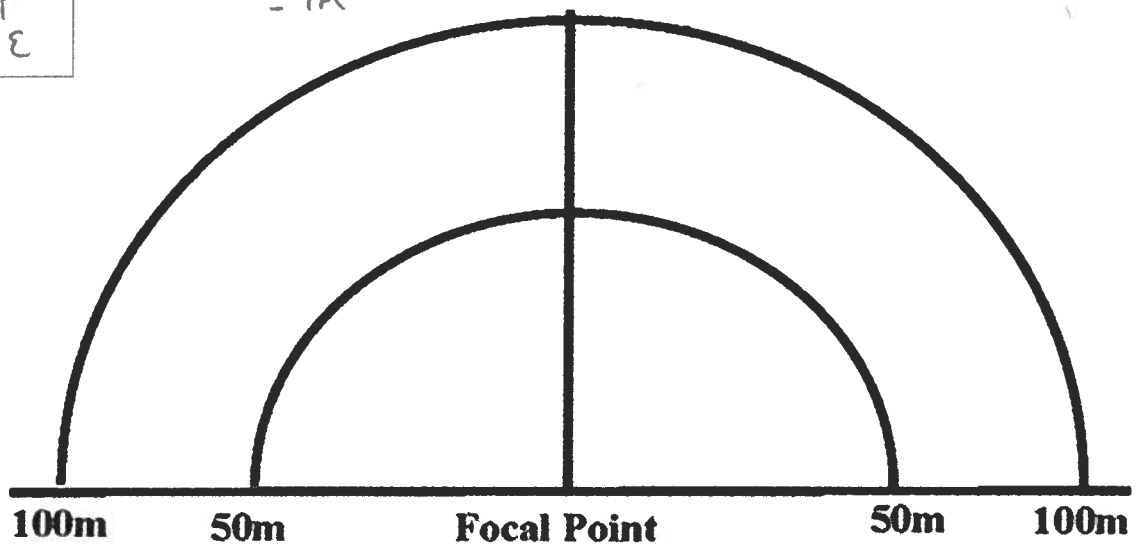
Code 2: Some calls simultaneous, number of individuals can be reliably estimated

Code 3: Full chorus, calls continuous and overlapping, number of individuals cannot be reliably estimated

17T 0599663
4822520
±4m

Bearing:

↑ SE



Notes:

- Woodcocks (2, ~80m away)
- No calling amphibians
- Very little wetland vegetation

Amphibian Calling Survey Field Sheet

Site Information:

Site: Britannia Rd. Station No.: 2

Observer: TK Date: Apr. 15/2013 Visit No.: 1

Temperature: 10°C Wind Speed (Beaufort scale): 0 Cloud Cover (10th): 5

Precipitation (check one): (✓) None/Dry ( ) Damp/Haze/Fog ( ) Drizzle ( ) Rain

Station Start Time: 8:52 Background Noise Code: 4

Call Level Codes:

Code 1: Calls not simultaneous, number of individuals can be accurately counted

Code 2: Some calls simultaneous, number of individuals can be reliably estimated

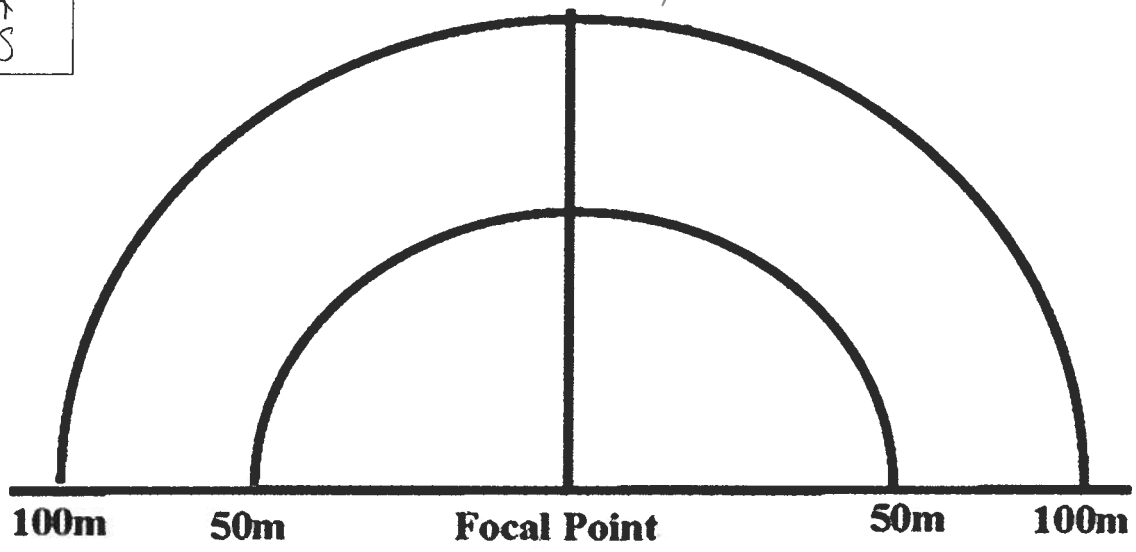
Code 3: Full chorus, calls continuous and overlapping, number of individuals cannot be reliably estimated

17T 0599456
4822245
±4m

SPPE
2-7

Bearing:

↑
S



Notes: - No breeding amphibians
- No/minimal vegetation in pond
- Spring Peepers far off to the South

Amphibian Calling Survey Field Sheet

Site Information:

Site: Britannia Rd. Station No.: 3

Observer: TK Date: Apr 15/2013 Visit No.: 1

Temperature: 10°C Wind Speed (Beaufort scale): 0 Cloud Cover (10th): 5

Precipitation (check one): (✓) None/Dry ( ) Damp/Haze/Fog ( ) Drizzle ( ) Rain

Station Start Time: 9:05 Background Noise Code: 4

Call Level Codes:

Code 1: Calls not simultaneous, number of individuals can be accurately counted

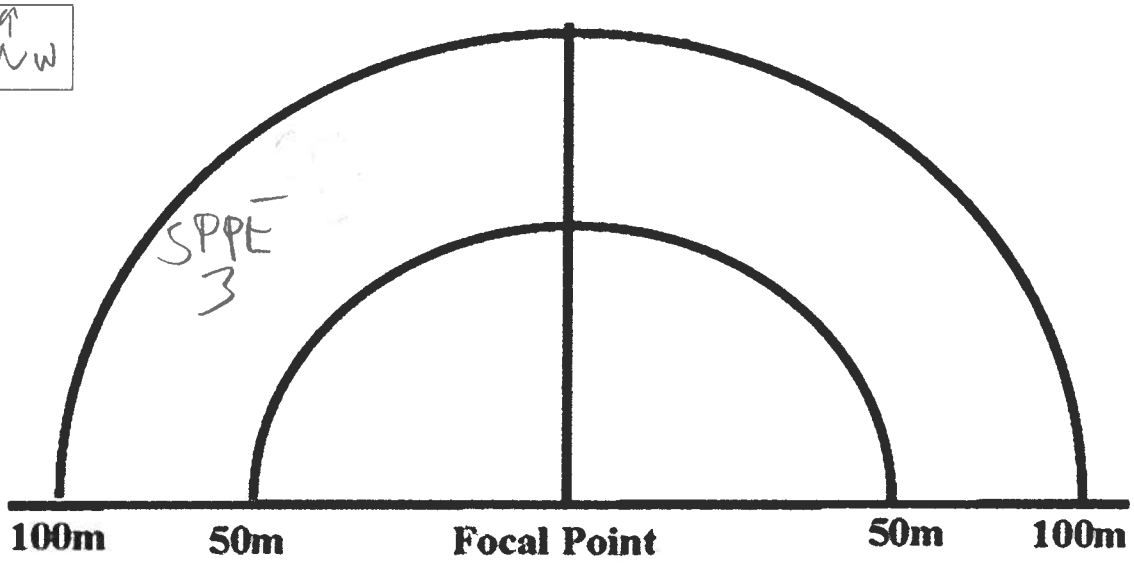
Code 2: Some calls simultaneous, number of individuals can be reliably estimated

Code 3: Full chorus, calls continuous and overlapping, number of individuals cannot be reliably estimated

17 T 0598728
4820821
±4m

Bearing:

↑ NW



Notes: - No SPPE in river; heard to the west in forested area

Amphibian Calling Survey Field Sheet

Site Information:

Site: Britannia Rd. Station No.: 4

Observer: TK Date: Apr. 15/2013 Visit No.: 1

Temperature: 11°C Wind Speed (Beaufort scale): 0 Cloud Cover (10th): 5

Precipitation (check one): ☑ None/Dry ○ Damp/Haze/Fog ○ Drizzle ○ Rain

Station Start Time: 9:12 Background Noise Code: 4

Call Level Codes:

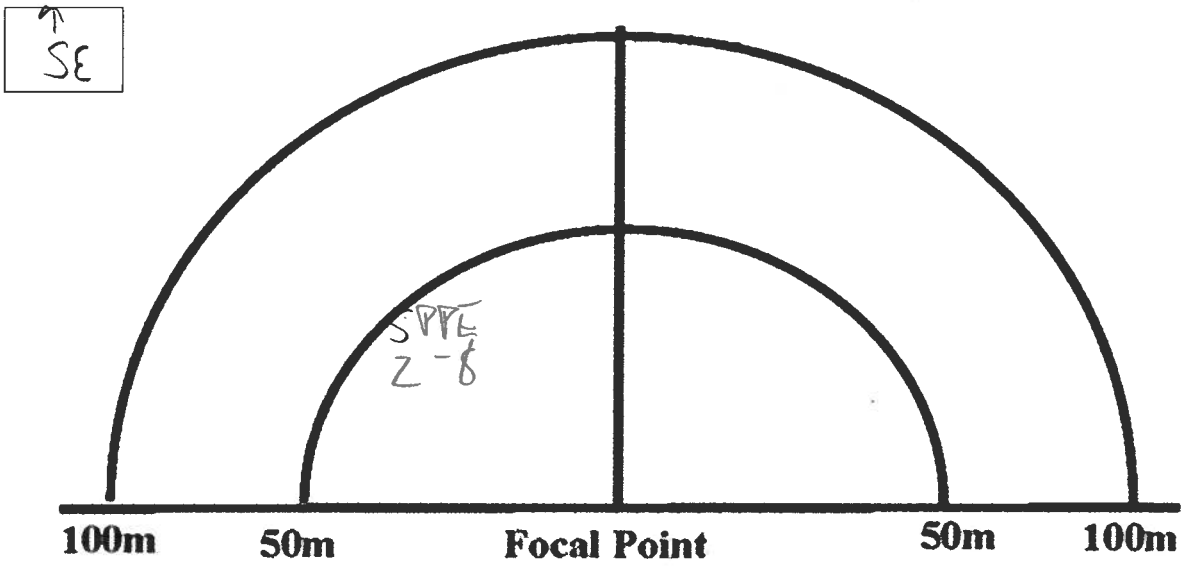
Code 1: Calls not simultaneous, number of individuals can be accurately counted

Code 2: Some calls simultaneous, number of individuals can be reliably estimated

Code 3: Full chorus, calls continuous and overlapping, number of individuals cannot be reliably estimated

17T 0598028
4820425

Bearing:



Notes: Wetland vegetation not visble from road

Amphibian Calling Survey Field Sheet

Site Information:

Site: Britannia Rd. Station No.: 5

Observer: TK Date: Apr. 15/2017 Visit No.: 1

Temperature: 11°C Wind Speed (Beaufort scale): 0 Cloud Cover (10th): 8th

Precipitation (check one): ✓ None/Dry ◯ Damp/Haze/Fog ◯ Drizzle ◯ Rain

Station Start Time: 9:20 Background Noise Code: 3 (few cars, airplane)

Call Level Codes:

Code 1: Calls not simultaneous, number of individuals can be accurately counted

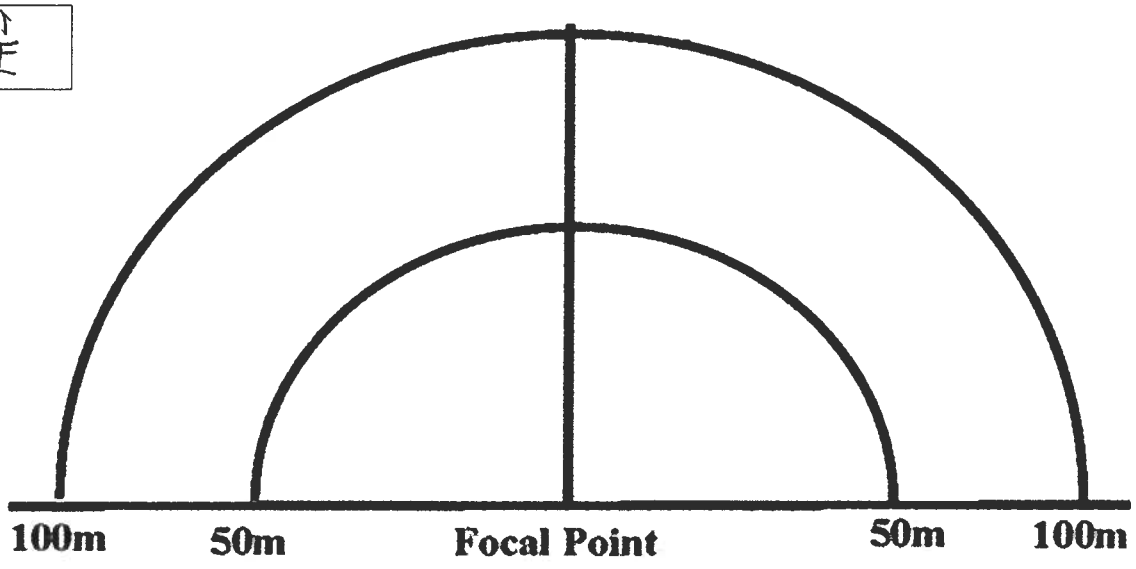
Code 2: Some calls simultaneous, number of individuals can be reliably estimated

Code 3: Full chorus, calls continuous and overlapping, number of individuals cannot be reliably estimated

17T 0595955
4817707
±6m

Bearing:

NE ↑



Notes:- No amphibians
- cattails

Amphibian Calling Survey Field Sheet

Site Information:

Site: Britannia Rd. Station No.: 6

Observer: TK Date: Apr. 15/2013 Visit No.: 1

Temperature: 11°C Wind Speed (Beaufort scale): 0 Cloud Cover (10th): 8

Precipitation (check one): (✓) None/Dry ( ) Damp/Haze/Fog ( ) Drizzle ( ) Rain

Station Start Time: 9:31 Background Noise Code: 1

Call Level Codes:

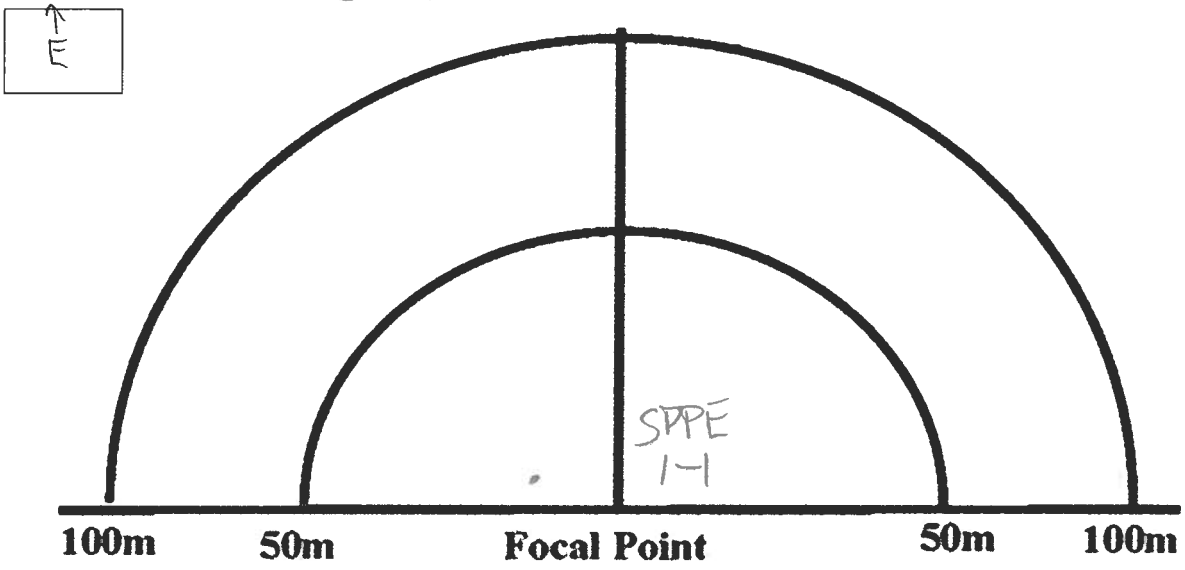
Code 1: Calls not simultaneous, number of individuals can be accurately counted

Code 2: Some calls simultaneous, number of individuals can be reliably estimated

Code 3: Full chorus, calls continuous and overlapping, number of individuals cannot be reliably estimated

17T 0596252
4817732
±5m

Bearing:



Notes: - Multiple ducks
- ring of wetland vegetation around pond

Amphibian Calling Survey Field Sheet

Site Information:

Site: Britannia Rd. Station No.: 7

Observer: TK Date: Apr. 15/2013 Visit No.: 1

Temperature: 12°C Wind Speed (Beaufort scale): 0 Cloud Cover (10th): 7

Precipitation (check one): ✓ None/Dry ○ Damp/Haze/Fog ○ Drizzle ○ Rain

Station Start Time: 9:45 Background Noise Code: 2

Call Level Codes:

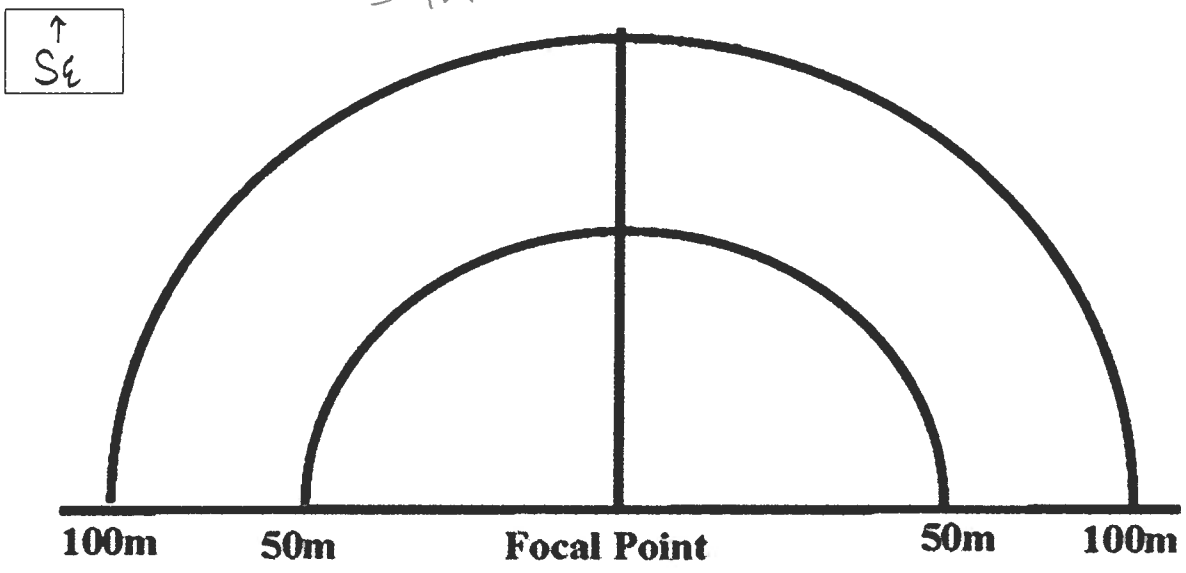
Code 1: Calls not simultaneous, number of individuals can be accurately counted

Code 2: Some calls simultaneous, number of individuals can be reliably estimated

Code 3: Full chorus, calls continuous and overlapping, number of individuals cannot be reliably estimated

17T 0595927
4817461
± 4m

Bearing:



Notes: No amphibians

Amphibian Calling Survey Field Sheet

Site Information:

Site: Britannia Rd. Station No.: 8

Observer: Tk Date: Apr. 15/2013 Visit No.: 1

Temperature: 12°C Wind Speed (Beaufort scale): 0 Cloud Cover (10th): 8th

Precipitation (check one): ✓ None/Dry ○ Damp/Haze/Fog ○ Drizzle ○ Rain

Station Start Time: 9:56 Background Noise Code: 3

Call Level Codes:

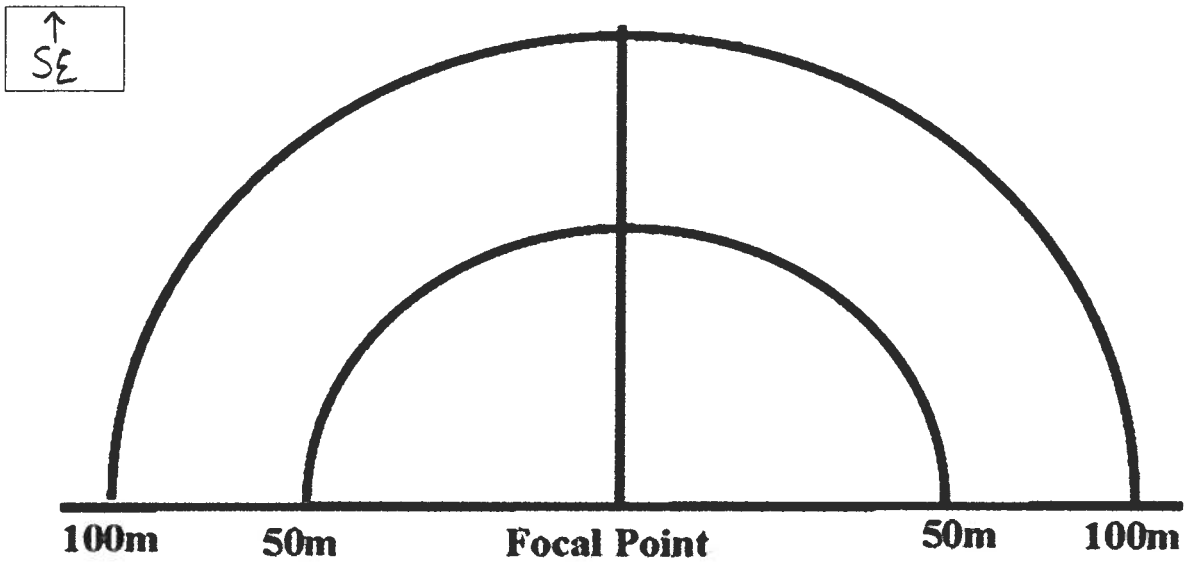
Code 1: Calls not simultaneous, number of individuals can be accurately counted

Code 2: Some calls simultaneous, number of individuals can be reliably estimated

Code 3: Full chorus, calls continuous and overlapping, number of individuals cannot be reliably estimated

17T 0595132
4816705
±5m

Bearing:



Notes: No amphibians
- Minimal emergent vegetation

Amphibian Calling Survey Field Sheet

Site Information:

Site: Britannia Rd. Station No.: 9

Observer: TK Date: Apr. 15/2013 Visit No.: 1

Temperature: 12°C Wind Speed (Beaufort scale): 0 Cloud Cover (10th): 6-7/10

Precipitation (check one): (✓) None/Dry ( ) Damp/Haze/Fog ( ) Drizzle ( ) Rain

Station Start Time: 9:59 Background Noise Code: 2

Call Level Codes:

Code 1: Calls not simultaneous, number of individuals can be accurately counted

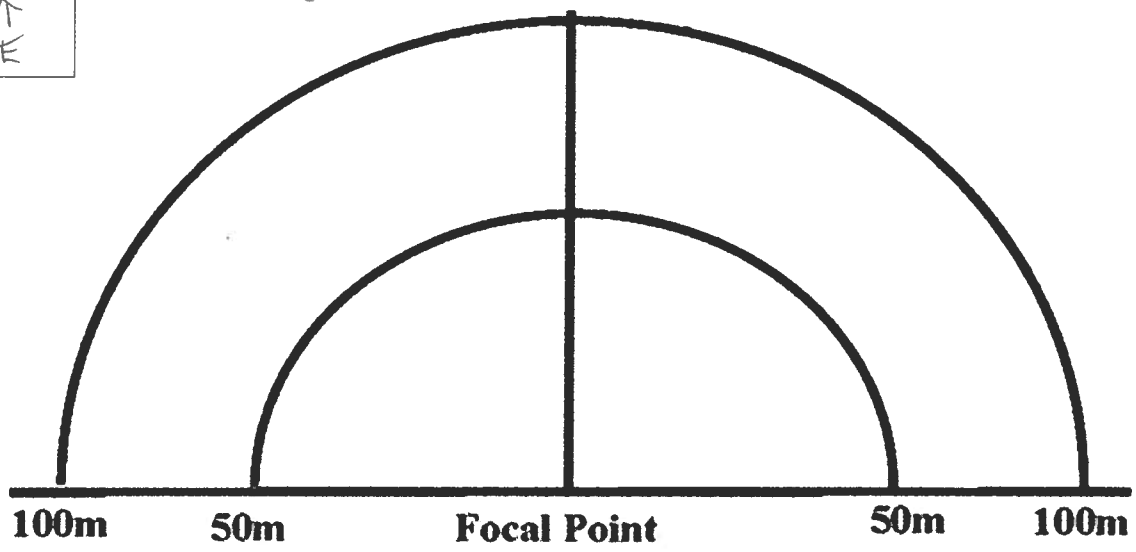
Code 2: Some calls simultaneous, number of individuals can be reliably estimated

Code 3: Full chorus, calls continuous and overlapping, number of individuals cannot be reliably estimated

17 T 0594929
4816785
±5m

Bearing:

↑
NE



Notes:
- No amphibians
- No/minimal wetland vegetation
- Canada geese on pond
- killdeer

Amphibian Calling Survey Field Sheet

Site Information:

Site: Britannia Rd. Station No.: 10

Observer: TK Date: Apr. 15/2013 Visit No.: 1

Temperature: 10°C Wind Speed (Beaufort scale): 0 Cloud Cover (10th): 0+

Precipitation (check one): ✓ None/Dry ○ Damp/Haze/Fog ○ Drizzle ○ Rain

Station Start Time: 10:04 Background Noise Code: 3

Call Level Codes:

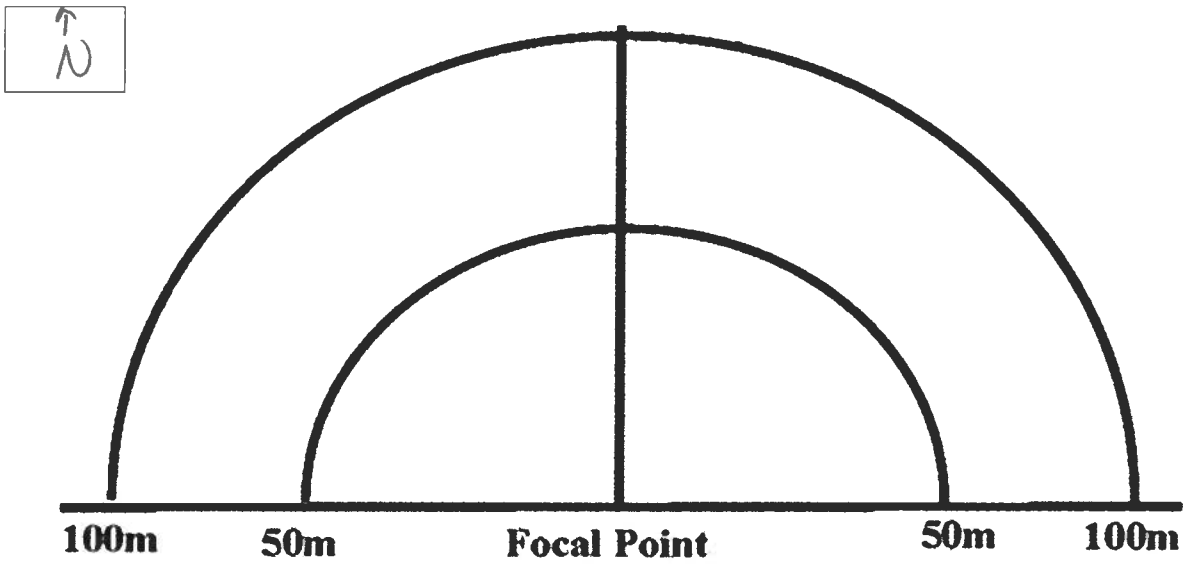
Code 1: Calls not simultaneous, number of individuals can be accurately counted

Code 2: Some calls simultaneous, number of individuals can be reliably estimated

Code 3: Full chorus, calls continuous and overlapping, number of individuals cannot be reliably estimated

17T 0594589
4816011
±4m

Bearing:



Notes: - No amphibians
- Woodcock

Amphibian Calling Survey Field Sheet

Site Information:

Site: Britannia Rd. Station No.: 11

Observer: TK Date: Apr 15/2013 Visit No.: 1

Temperature: 12°C Wind Speed (Beaufort scale): 6 Cloud Cover (10th): 6th

Precipitation (check one): ✓ None/Dry ○ Damp/Haze/Fog ○ Drizzle ○ Rain

Station Start Time: 10:12 Background Noise Code: 3

Call Level Codes:

Code 1: Calls not simultaneous, number of individuals can be accurately counted

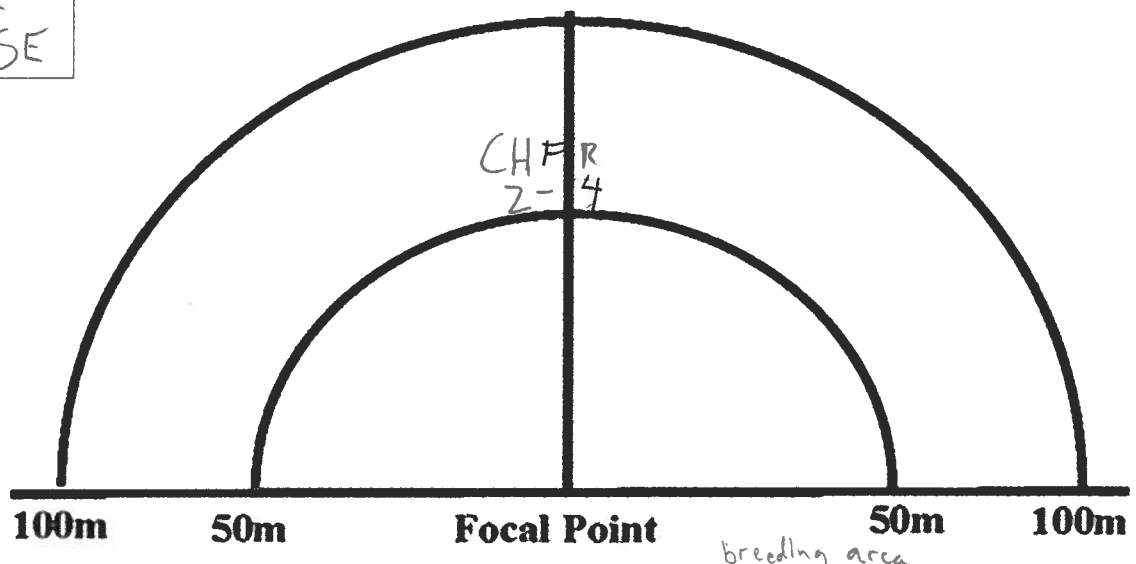
Code 2: Some calls simultaneous, number of individuals can be reliably estimated

Code 3: Full chorus, calls continuous and overlapping, number of individuals cannot be reliably estimated

17 T 0593800
4814973
±5m

Bearing:

↑ SE



breeding area

Notes: Wetland vegetation for CHFR not visible

Amphibian Calling Survey Field Sheet

Site Information:

Site: Britannia Rd. Station No.: 17

Observer: TK Date: Apr. 15/2013 Visit No.: 1

Temperature: 11°C Wind Speed (Beaufort scale): 0 Cloud Cover (10th): 8th

Precipitation (check one): ✓ None/Dry ○ Damp/Haze/Fog ○ Drizzle ○ Rain

Station Start Time: 10:21 Background Noise Code: 3

Call Level Codes:

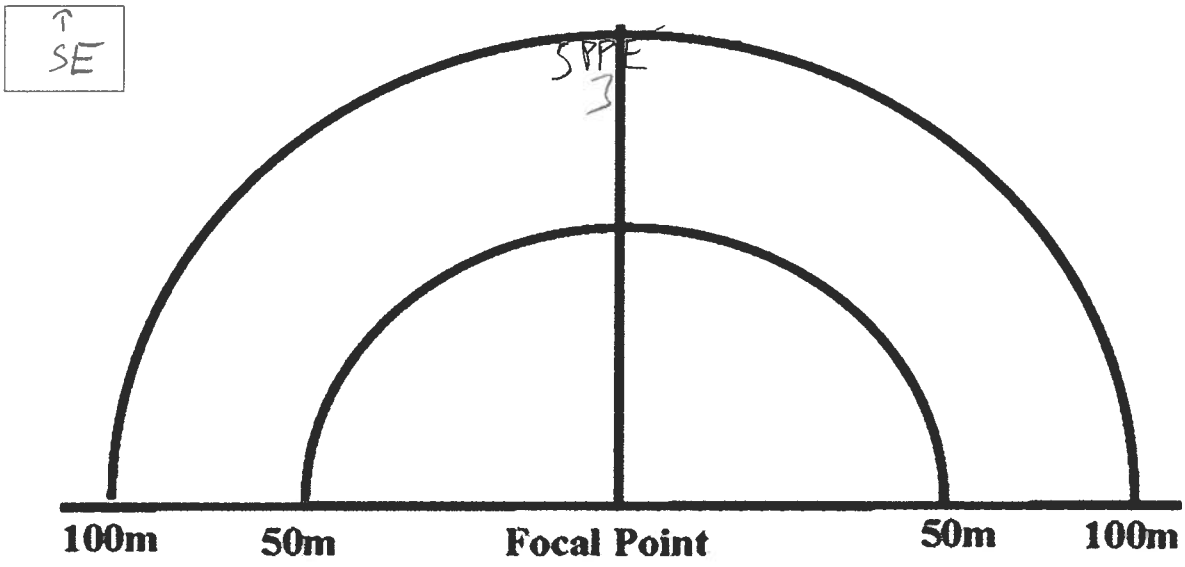
Code 1: Calls not simultaneous, number of individuals can be accurately counted

Code 2: Some calls simultaneous, number of individuals can be reliably estimated

Code 3: Full chorus, calls continuous and overlapping, number of individuals cannot be reliably estimated

17 T 0593202
4814190
± 5m

Bearing:



Notes: Spring Peepers far off in distance

Amphibian Calling Survey Field Sheet

Site Information:

Site: Britannia Rd. Station No.: 13

Observer: TK Date: Apr. 15/2013 Visit No.: 1

Temperature: 10°C Wind Speed (Beaufort scale): 0 Cloud Cover (10th): 5

Precipitation (check one): ✓ None/Dry ○ Damp/Haze/Fog ○ Drizzle ○ Rain

Station Start Time: 8:47 Background Noise Code: 4

Call Level Codes:

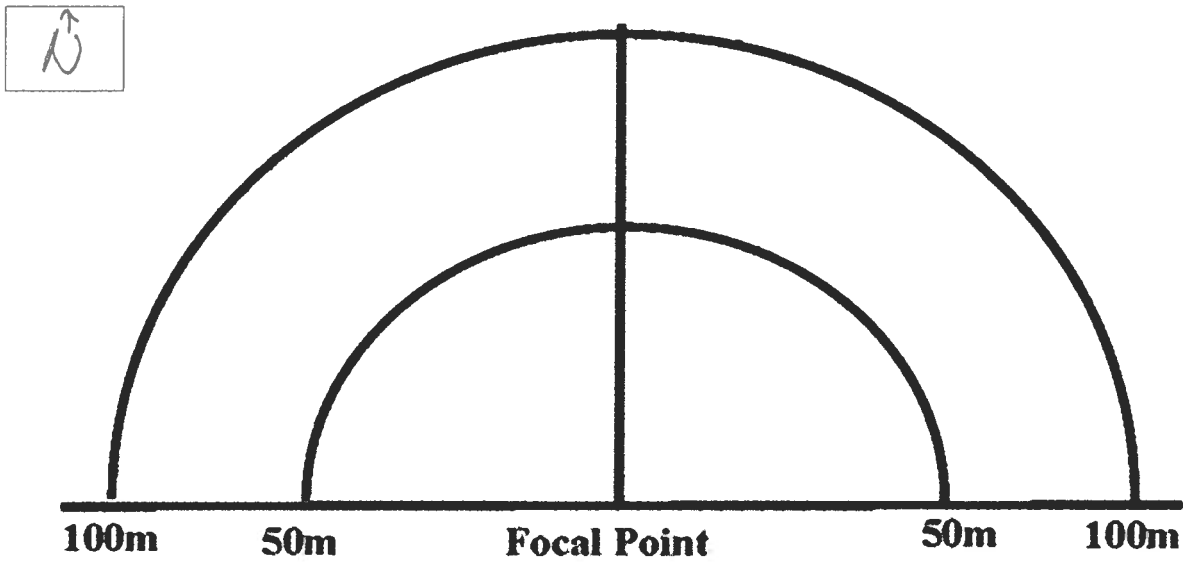
Code 1: Calls not simultaneous, number of individuals can be accurately counted

Code 2: Some calls simultaneous, number of individuals can be reliably estimated

Code 3: Full chorus, calls continuous and overlapping, number of individuals cannot be reliably estimated

17T 0599506
4822348

Bearing:



Notes:

- Woodcocks
- No breeding amphibians

Amphibian Calling Survey Field Sheet

Site Information:

Site: Britannia Rd. Station No.: 1

Observer: TK Date: May 8/2013 Visit No.: 2

Temperature: 18°C Wind Speed (Beaufort scale): 1 Cloud Cover (10th): 9+c

Precipitation (check one): ☑ None/Dry ○ Damp/Haze/Fog ○ Drizzle ○ Rain

Station Start Time: 9:00 Background Noise Code: 3

Call Level Codes:

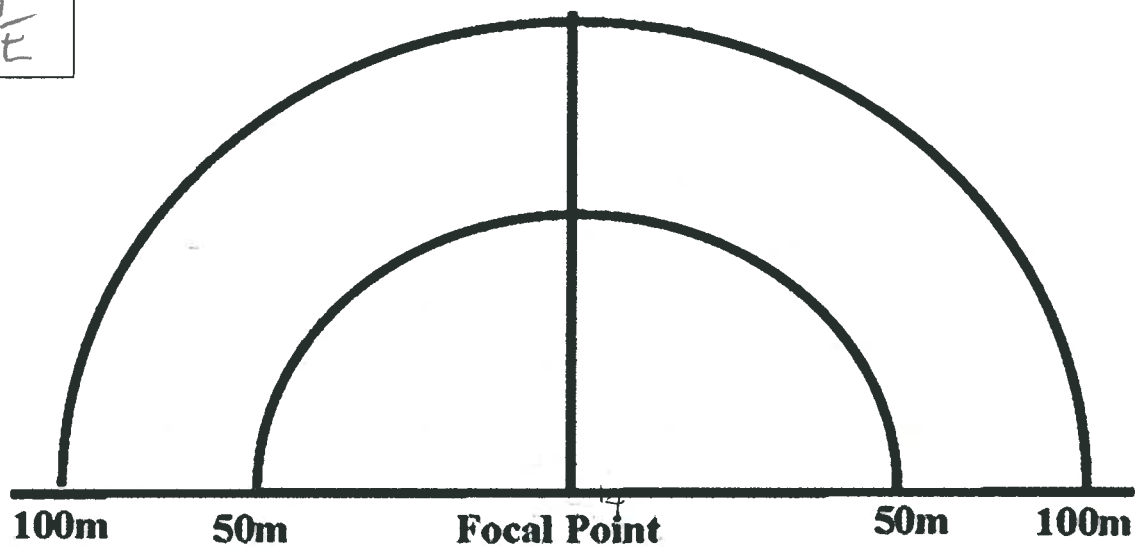
Code 1: Calls not simultaneous, number of individuals can be accurately counted

Code 2: Some calls simultaneous, number of individuals can be reliably estimated

Code 3: Full chorus, calls continuous and overlapping, number of individuals cannot be reliably estimated

Bearing:

SE



Notes: - Ducks

- Woodcocks to the South
- limited ring of cattails around pond

Amphibian Calling Survey Field Sheet

Site Information:

Site: Britannia Rd. Station No.: 2

Observer: TK Date: May 8/2017 Visit No.: 2

Temperature: 18°C Wind Speed (Beaufort scale): 1 Cloud Cover (10th): 8

Precipitation (check one): ☑ None/Dry ○ Damp/Haze/Fog ○ Drizzle ○ Rain

Station Start Time: 9:10pm Background Noise Code: 3

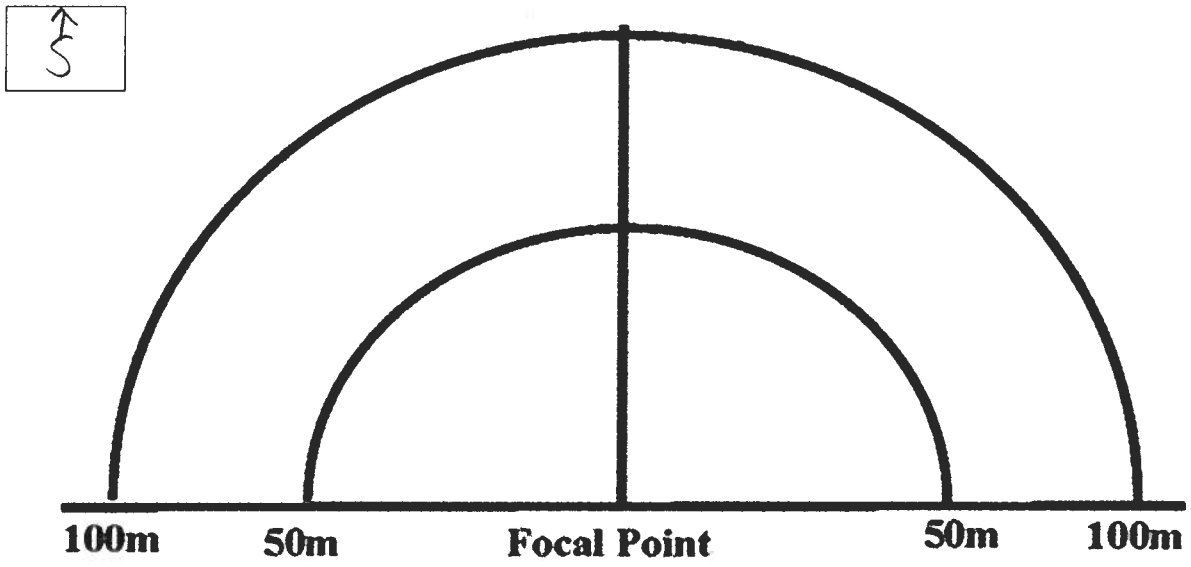
Call Level Codes:

Code 1: Calls not simultaneous, number of individuals can be accurately counted

Code 2: Some calls simultaneous, number of individuals can be reliably estimated

Code 3: Full chorus, calls continuous and overlapping, number of individuals cannot be reliably estimated

Bearing:



Notes: Woodcocks
No calling amphibians

Amphibian Calling Survey Field Sheet

Site Information:

Site: Britannia Rd. Station No.: 3

Observer: TK Date: May 8/2013 Visit No.: 2

Temperature: 18°C Wind Speed (Beaufort scale): 1 Cloud Cover (10th): 8

Precipitation (check one): ◯ None/Dry ◯ Damp/Haze/Fog ✓ Drizzle ◯ Rain

Station Start Time: 9:17 pm Background Noise Code: 3

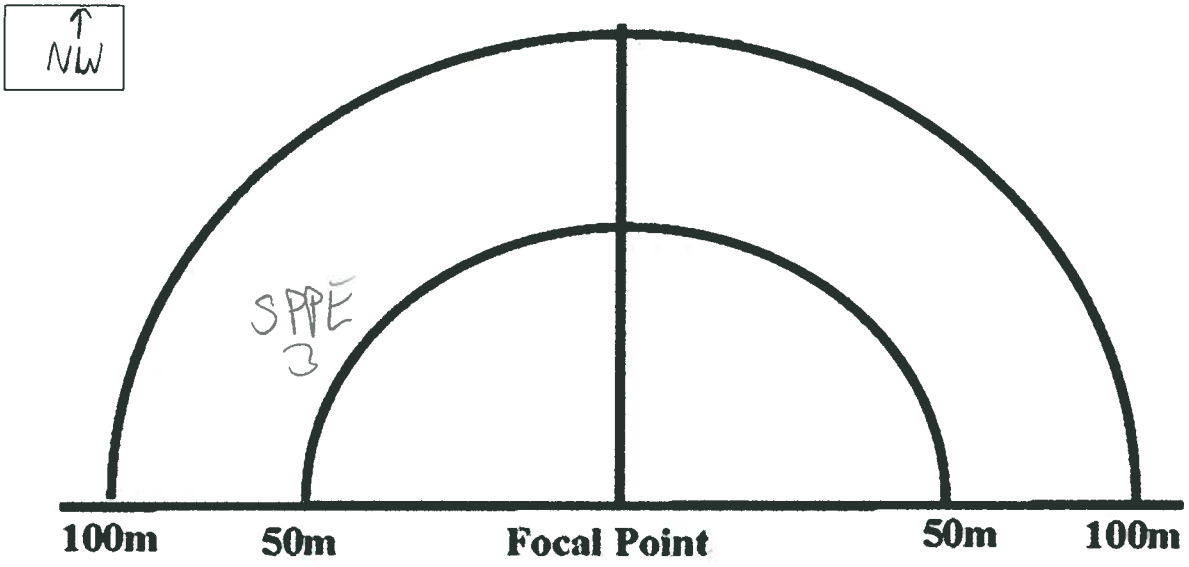
Call Level Codes:

Code 1: Calls not simultaneous, number of individuals can be accurately counted

Code 2: Some calls simultaneous, number of individuals can be reliably estimated

Code 3: Full chorus, calls continuous and overlapping, number of individuals cannot be reliably estimated

Bearing:



Notes:

AMTO
1-7

Amphibian Calling Survey Field Sheet

Site Information:

Site: Britannia Rd. Station No.: 4

Observer: JK Date: May 8/2013 Visit No.: 2

Temperature: 15 °C Wind Speed (Beaufort scale): 1 Cloud Cover (10th): 9/10

Precipitation (check one): (●) None/Dry ( ) Damp/Haze/Fog ( ) Drizzle ( ) Rain

Station Start Time: 9:26 Background Noise Code: 3

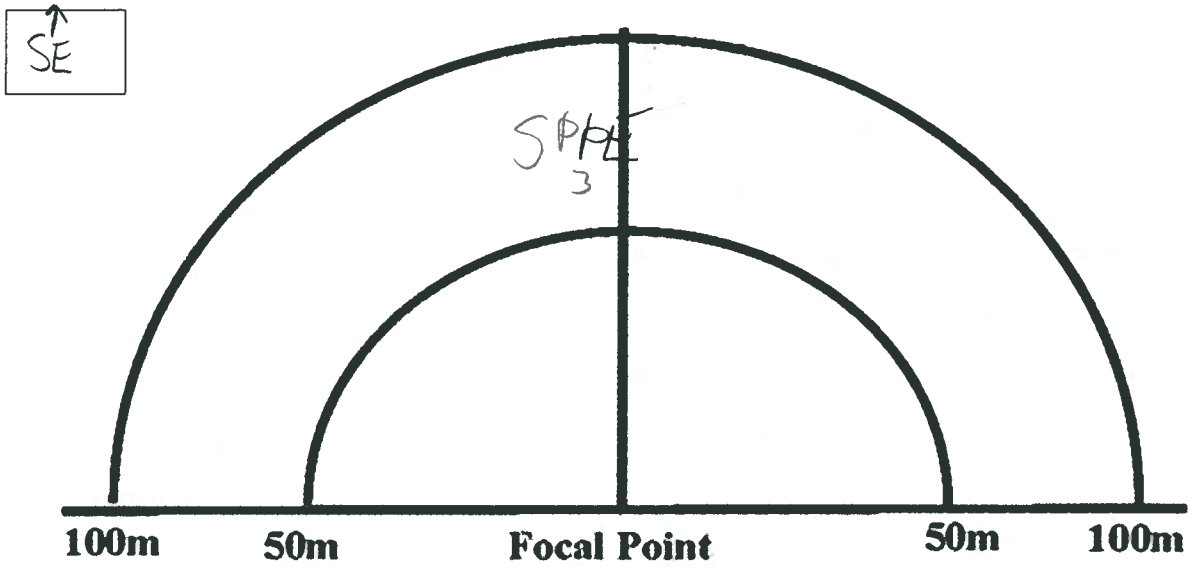
Call Level Codes:

Code 1: Calls not simultaneous, number of individuals can be accurately counted

Code 2: Some calls simultaneous, number of individuals can be reliably estimated

Code 3: Full chorus, calls continuous and overlapping, number of individuals cannot be reliably estimated

Bearing:



Notes:

Amphibian Calling Survey Field Sheet

Site Information:

Site: Britannia Rd. Station No.: S

Observer: TK Date: May 8/2013 Visit No.: 2

Temperature: 14°C Wind Speed (Beaufort scale): 1 Cloud Cover (10th): 9

Precipitation (check one): ◯ None/Dry ◯ Damp/Haze/Fog ◯ Drizzle ◯ Rain

Station Start Time: 9:34 Background Noise Code: 2

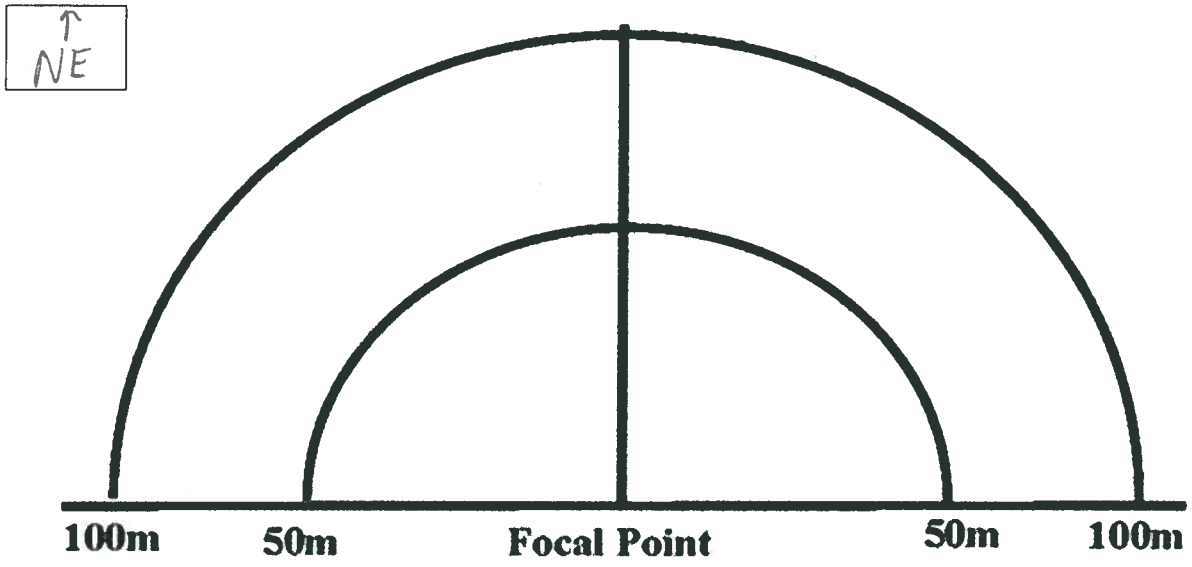
Call Level Codes:

Code 1: Calls not simultaneous, number of individuals can be accurately counted

Code 2: Some calls simultaneous, number of individuals can be reliably estimated

Code 3: Full chorus, calls continuous and overlapping, number of individuals cannot be reliably estimated

Bearing:



Notes:

Amphibian Calling Survey Field Sheet

Site Information:

Site: Britannia Rd. Station No.: 6

Observer: TK Date: May 8/2013 Visit No.: 2

Temperature: 14 °C Wind Speed (Beaufort scale): 1 Cloud Cover (10th): 9

Precipitation (check one): (✓) None/Dry ( ) Damp/Haze/Fog ( ) Drizzle ( ) Rain

Station Start Time: 9:39 Background Noise Code: 1

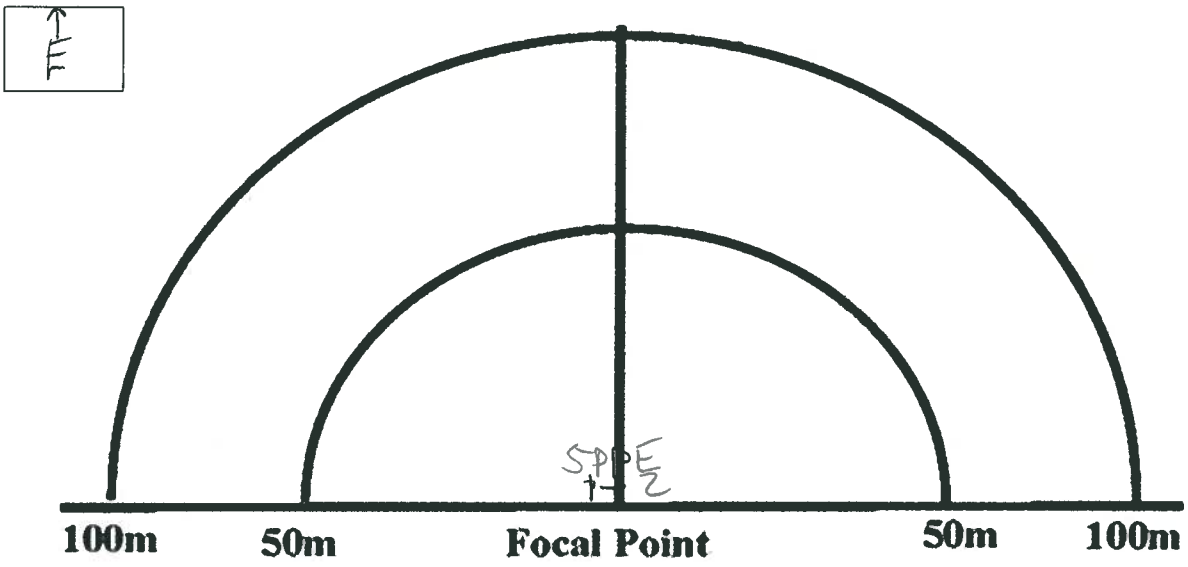
Call Level Codes:

Code 1: Calls not simultaneous, number of individuals can be accurately counted

Code 2: Some calls simultaneous, number of individuals can be reliably estimated

Code 3: Full chorus, calls continuous and overlapping, number of individuals cannot be reliably estimated

Bearing:



Notes:

Amphibian Calling Survey Field Sheet

Site Information:

Site: Britannia Rd. Station No.: 7

Observer: JK Date: May 8/2013 Visit No.: 2

Temperature: 15°C Wind Speed (Beaufort scale): 1 Cloud Cover (10th): 9TH

Precipitation (check one): ✓ None/Dry ○ Damp/Haze/Fog ○ Drizzle ○ Rain

Station Start Time: 9:46 Background Noise Code: 2

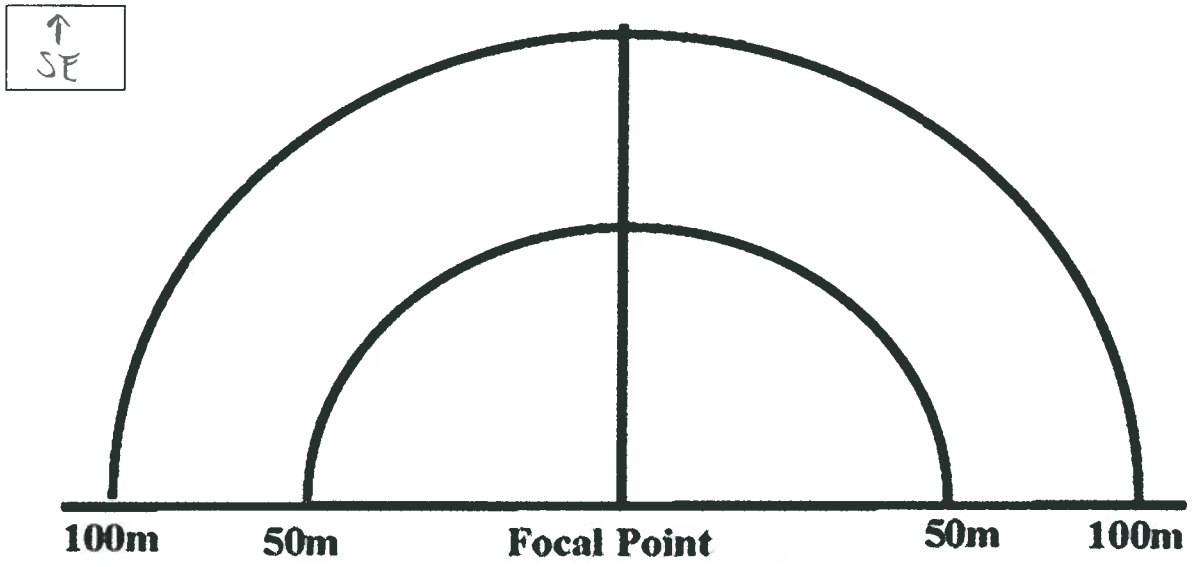
Call Level Codes:

Code 1: Calls not simultaneous, number of individuals can be accurately counted

Code 2: Some calls simultaneous, number of individuals can be reliably estimated

Code 3: Full chorus, calls continuous and overlapping, number of individuals cannot be reliably estimated

Bearing:



Notes: No calling amphibians

Amphibian Calling Survey Field Sheet

Site Information:

Site: Britannia Rd. Station No.: 8

Observer: TK Date: May 8/2013 Visit No.:

Temperature: 15°C Wind Speed (Beaufort scale): 1 Cloud Cover (10th): 9

Precipitation (check one): ✓ None/Dry ○ Damp/Haze/Fog ○ Drizzle ○ Rain

Station Start Time: 9:54 Background Noise Code: 3

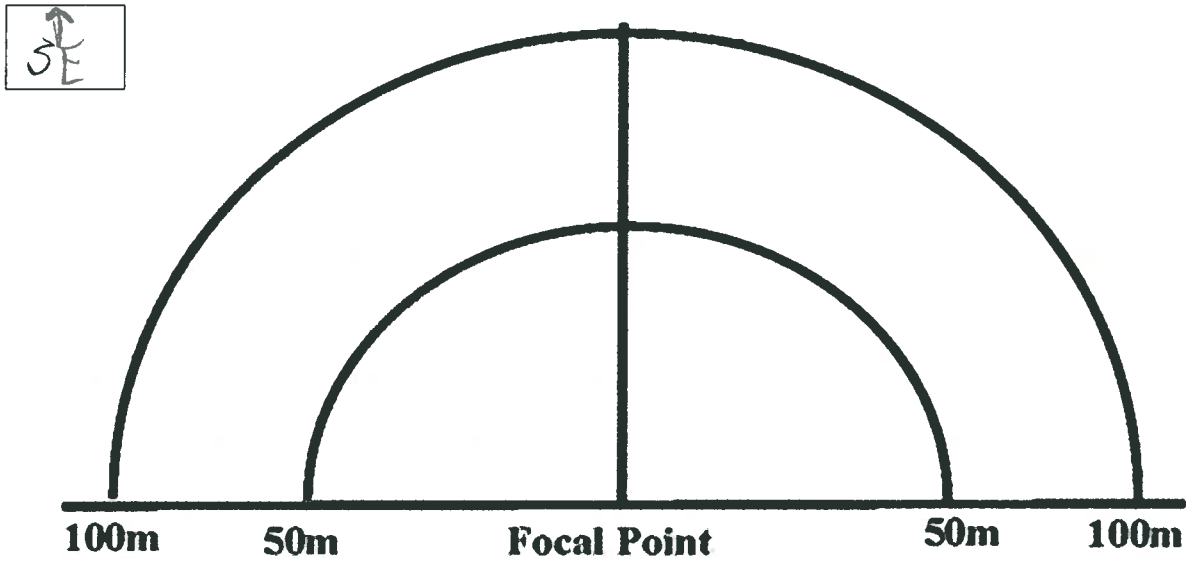
Call Level Codes:

Code 1: Calls not simultaneous, number of individuals can be accurately counted

Code 2: Some calls simultaneous, number of individuals can be reliably estimated

Code 3: Full chorus, calls continuous and overlapping, number of individuals cannot be reliably estimated

Bearing:



Notes:
- No calling amphibians
- little to no pond vegetation

Amphibian Calling Survey Field Sheet

Site Information:

Site: Britannia Rd. Station No.: 9

Observer: JK Date: May 6/2013 Visit No.: 2

Temperature: 15°C Wind Speed (Beaufort scale): 1 Cloud Cover (10th): 9

Precipitation (check one): (✓) None/Dry ( ) Damp/Haze/Fog ( ) Drizzle ( ) Rain

Station Start Time: 9:57 Background Noise Code: 3

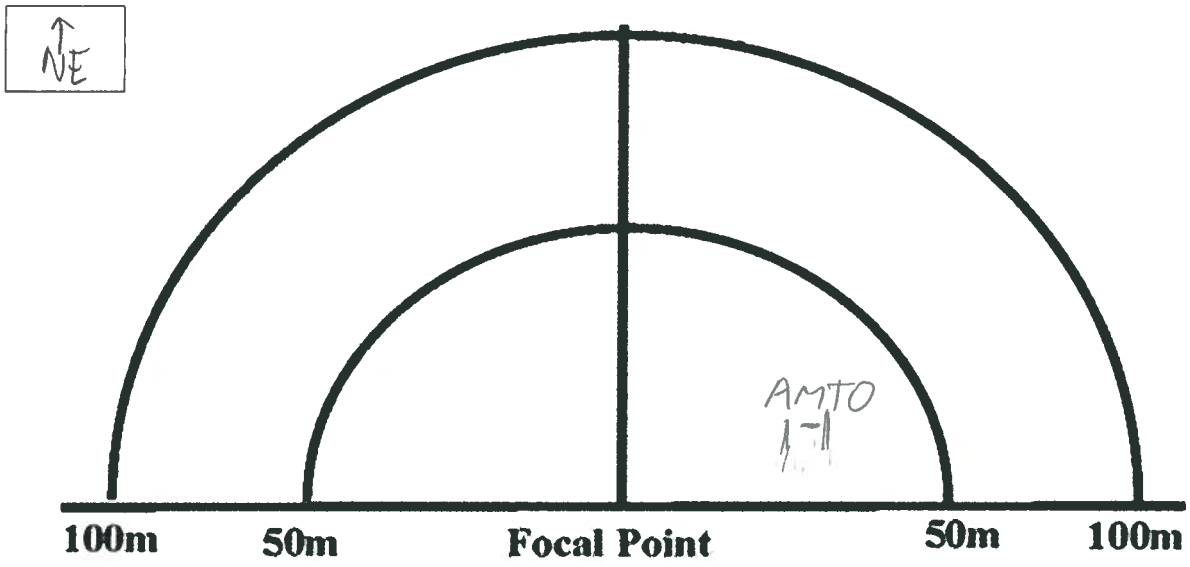
Call Level Codes:

Code 1: Calls not simultaneous, number of individuals can be accurately counted

Code 2: Some calls simultaneous, number of individuals can be reliably estimated

Code 3: Full chorus, calls continuous and overlapping, number of individuals cannot be reliably estimated

Bearing:



Notes: Ducks, Canada geese

Amphibian Calling Survey Field Sheet

Site Information:

Site: Britannia Rd. Station No.: 10

Observer: JK Date: May 8/2017 Visit No.: 2

Temperature: 15°C Wind Speed (Beaufort scale): 1 Cloud Cover (10th): 9

Precipitation (check one): (✓) None/Dry ( ) Damp/Haze/Fog ( ) Drizzle ( ) Rain

Station Start Time: 10:02 Background Noise Code: 3

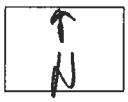
Call Level Codes:

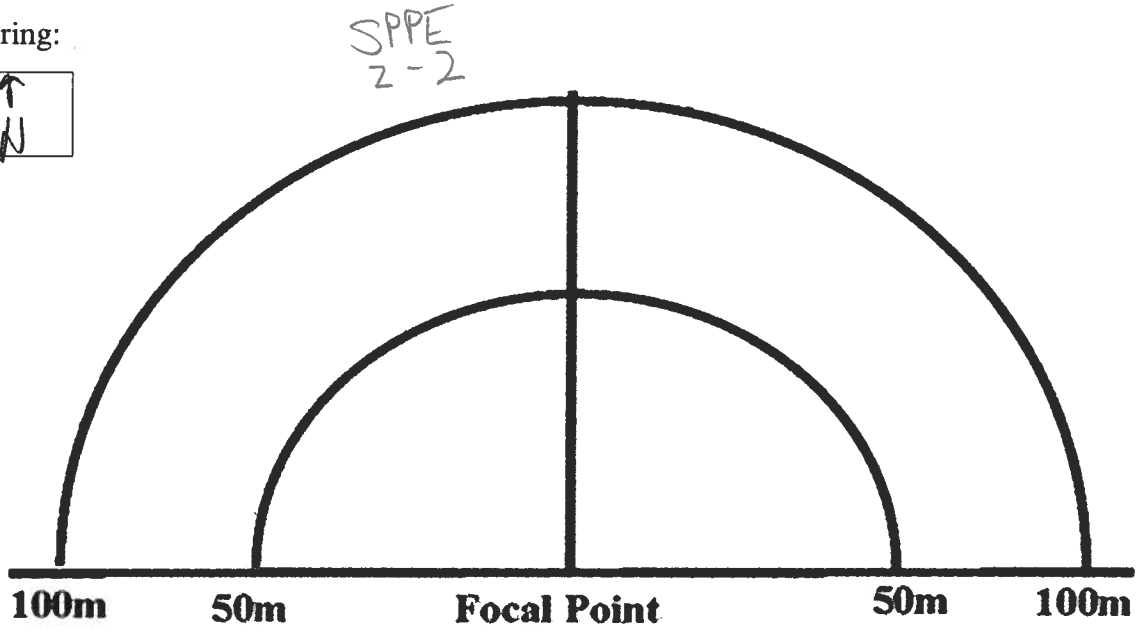
Code 1: Calls not simultaneous, number of individuals can be accurately counted

Code 2: Some calls simultaneous, number of individuals can be reliably estimated

Code 3: Full chorus, calls continuous and overlapping, number of individuals cannot be reliably estimated

Bearing:





Notes: SPPE far off in background

Amphibian Calling Survey Field Sheet

Site Information:

Site: Britannia Rd. Station No.: 11

Observer: TK Date: May 8/2013 Visit No.: 2

Temperature: 14°C Wind Speed (Beaufort scale): 1 Cloud Cover (10th): 9

Precipitation (check one): ⊘ None/Dry ○ Damp/Haze/Fog ○ Drizzle ○ Rain

Station Start Time: 10:08 Background Noise Code: 2

Call Level Codes:

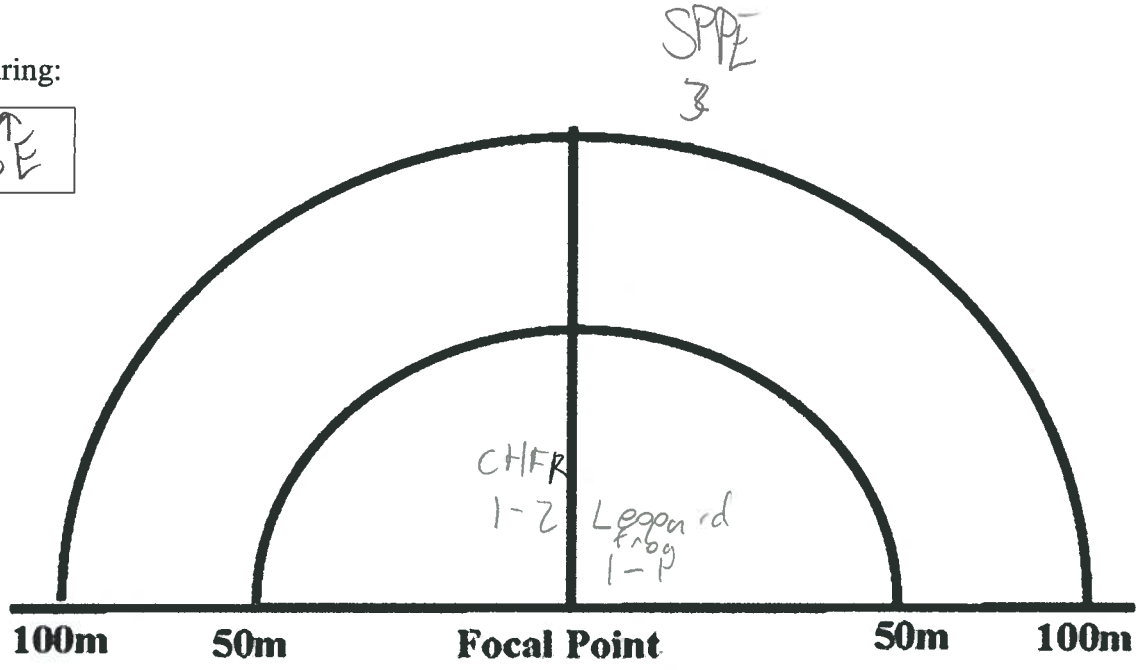
Code 1: Calls not simultaneous, number of individuals can be accurately counted

Code 2: Some calls simultaneous, number of individuals can be reliably estimated

Code 3: Full chorus, calls continuous and overlapping, number of individuals cannot be reliably estimated

Bearing:

SE



Notes: SPPE far off in background

Amphibian Calling Survey Field Sheet

Site Information:

Site: Britannia Rd. Station No.: 12

Observer: TK Date: May 8/2013 Visit No.: 2

Temperature: 15°C Wind Speed (Beaufort scale): 1 Cloud Cover (10th): 9

Precipitation (check one): (✓) None/Dry ( ) Damp/Haze/Fog ( ) Drizzle ( ) Rain

Station Start Time: 10:15 Background Noise Code: 2

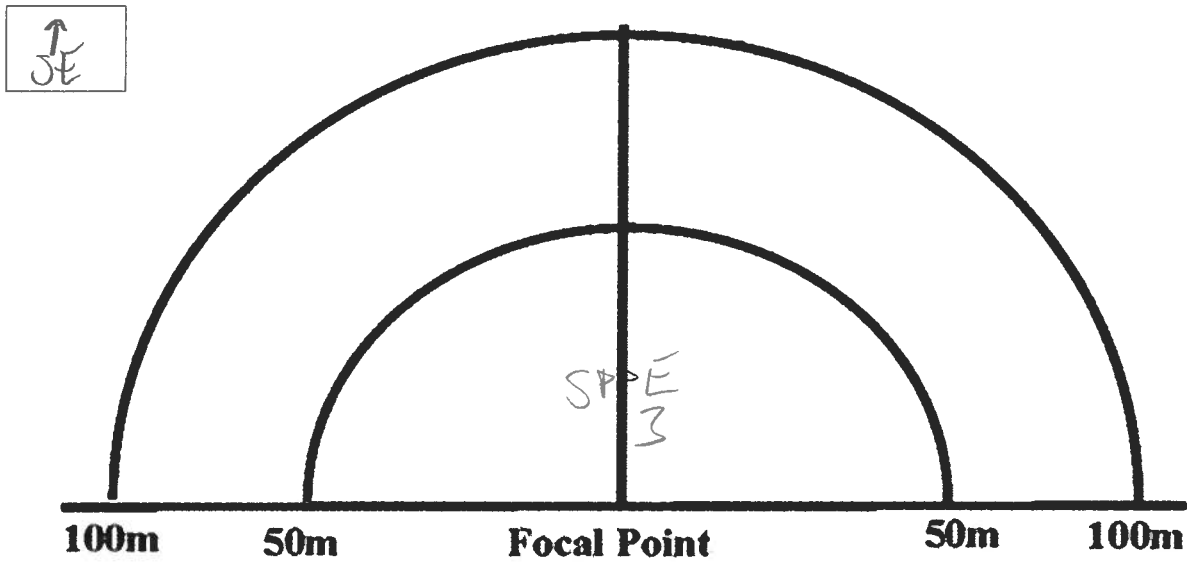
Call Level Codes:

Code 1: Calls not simultaneous, number of individuals can be accurately counted

Code 2: Some calls simultaneous, number of individuals can be reliably estimated

Code 3: Full chorus, calls continuous and overlapping, number of individuals cannot be reliably estimated

Bearing:



Notes:

Amphibian Calling Survey Field Sheet

Site Information:

Site: Britannia Rd. Station No.: 13

Observer: TL Date: May 8/2012 Visit No.: 2

Temperature: 18°C Wind Speed (Beaufort scale): 1 Cloud Cover (10th): 9

Precipitation (check one): ✓ None/Dry ◯ Damp/Haze/Fog ◯ Drizzle ◯ Rain

Station Start Time: 9:05 Background Noise Code: _____

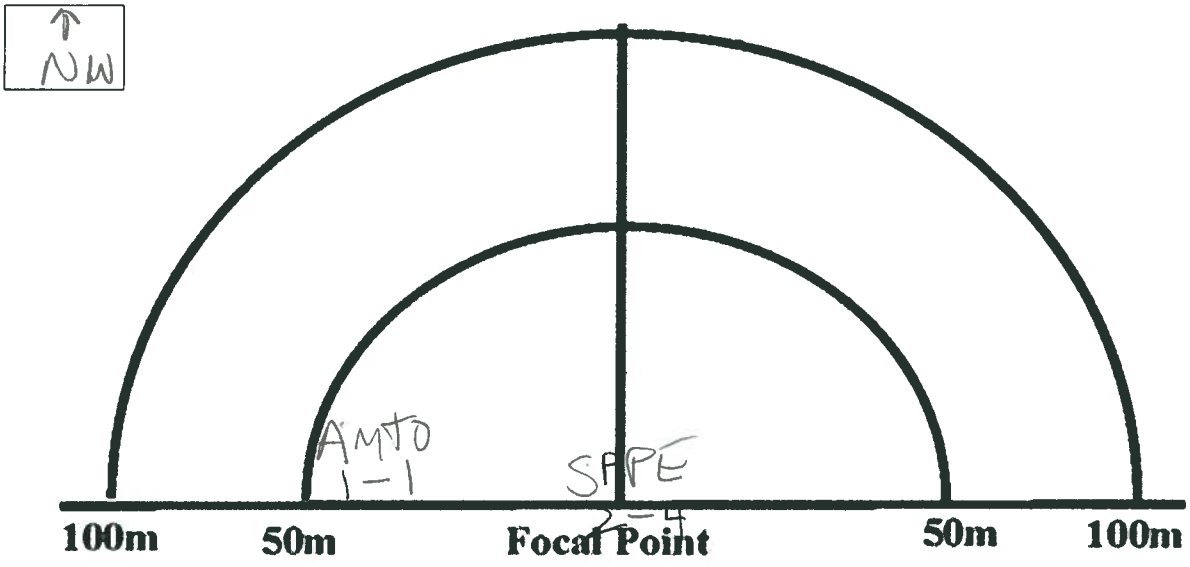
Call Level Codes:

Code 1: Calls not simultaneous, number of individuals can be accurately counted

Code 2: Some calls simultaneous, number of individuals can be reliably estimated

Code 3: Full chorus, calls continuous and overlapping, number of individuals cannot be reliably estimated

Bearing:



Notes:

Amphibian Calling Survey Field Sheet

Site Information:

Site: Britannia Rd. Station No.: 1

Observer: TK & Jenn Cooper Date: June 24/2013 Visit No.: 3

Temperature: 28°C Wind Speed (Beaufort scale): 1 Cloud Cover (10^{th}): 8

Precipitation (check one): ◯ None/Dry ◯ Damp/Haze/Fog ◯ Drizzle ◯ Rain

Station Start Time: 9:28 Background Noise Code: 3

Call Level Codes:

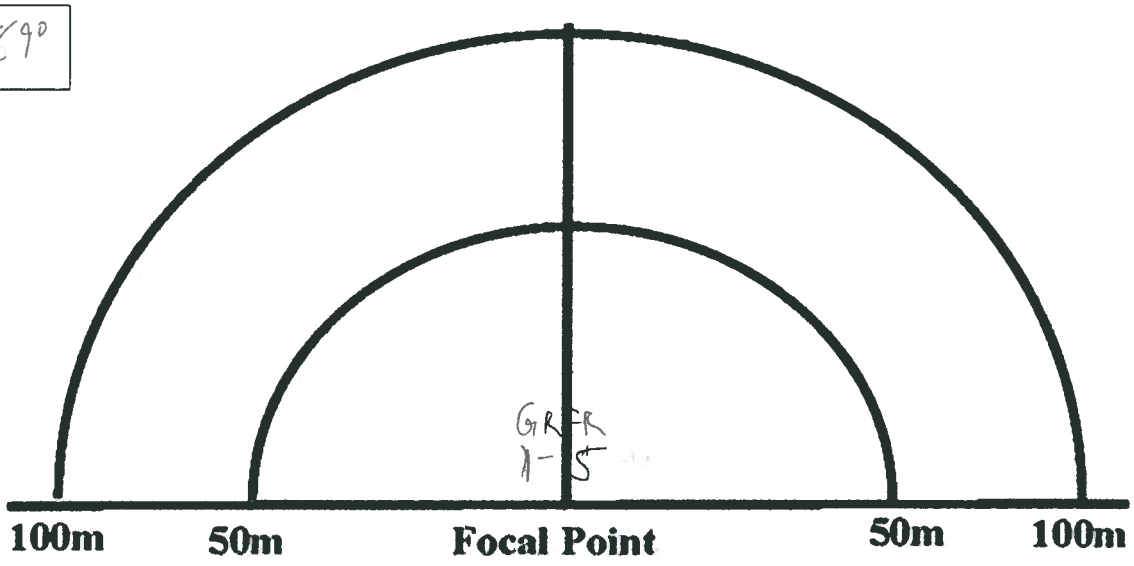
Code 1: Calls not simultaneous, number of individuals can be accurately counted

Code 2: Some calls simultaneous, number of individuals can be reliably estimated

Code 3: Full chorus, calls continuous and overlapping, number of individuals cannot be reliably estimated

Bearing:

89°



Notes:

7 Cattails

Amphibian Calling Survey Field Sheet

Site Information:

Site: Britannia Rd Station No.: 2

Observer: TK & JC Date: June 24/2013 Visit No.: 3

Temperature: 24° Wind Speed (Beaufort scale): 0 Cloud Cover (10th): 4

Precipitation (check one): ◯ None/Dry ☑ Damp/Haze/Fog ◯ Drizzle ◯ Rain

Station Start Time: 9:37 Background Noise Code: 3

Call Level Codes:

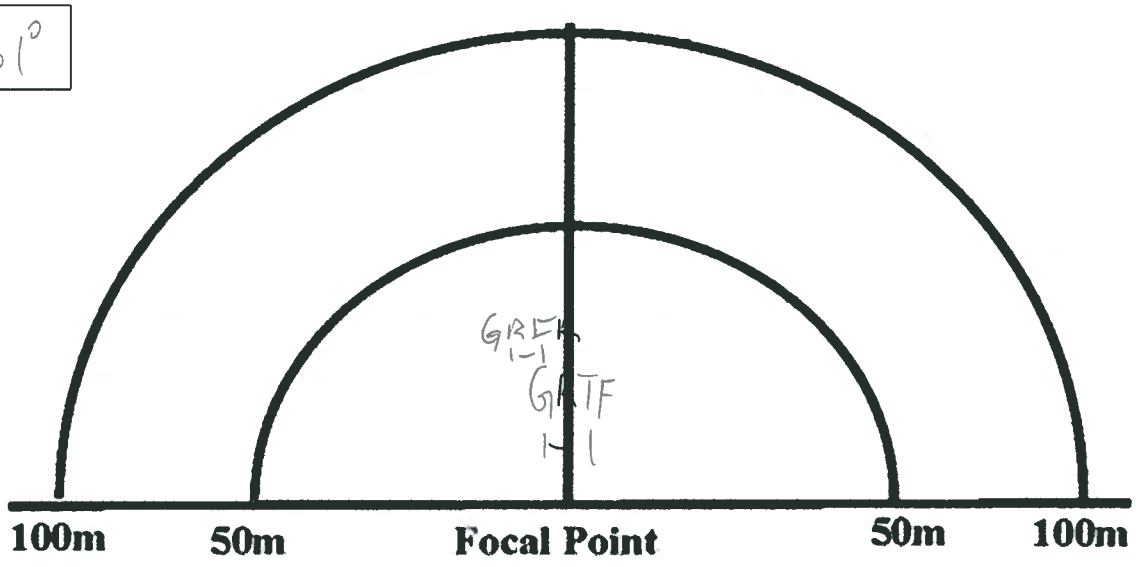
Code 1: Calls not simultaneous, number of individuals can be accurately counted

Code 2: Some calls simultaneous, number of individuals can be reliably estimated

Code 3: Full chorus, calls continuous and overlapping, number of individuals cannot be reliably estimated

Bearing:

161°



Notes:

Amphibian Calling Survey Field Sheet

Site Information:

Site: Brittania Rd. Station No.: 13

Observer: TK & JC Date: June 24/2013 Visit No.: 3

Temperature: 27°C Wind Speed (Beaufort scale): 1 Cloud Cover (10th): 4

Precipitation (check one): ◯ None/Dry ☑ Damp/Haze/Fog ◯ Drizzle ◯ Rain

Station Start Time: 9:46pm Background Noise Code: 3

Call Level Codes:

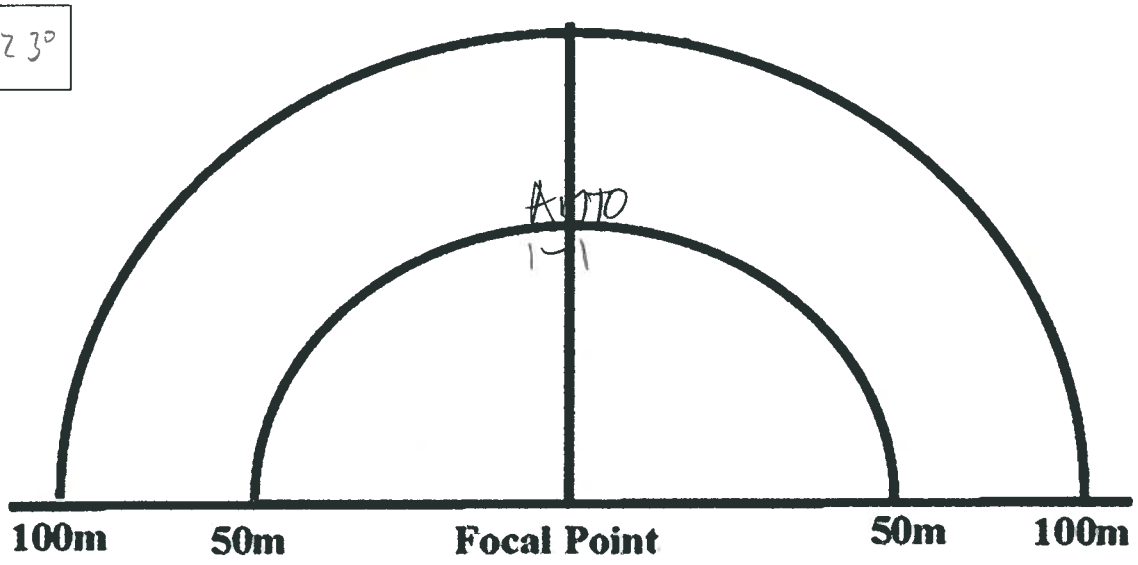
Code 1: Calls not simultaneous, number of individuals can be accurately counted

Code 2: Some calls simultaneous, number of individuals can be reliably estimated

Code 3: Full chorus, calls continuous and overlapping, number of individuals cannot be reliably estimated

Bearing:

42 3°



Notes: in floodplain, not Swamp

Amphibian Calling Survey Field Sheet

Site Information:

Site: Britannia Rd Station No.: 4

Observer: TK ; SC Date: June 24/2013 Visit No.: 3

Temperature: 28°C Wind Speed (Beaufort scale): 7 Cloud Cover (10th): 6

Precipitation (check one): ◯ None/Dry ◉ Damp/Haze/Fog ◯ Drizzle ◯ Rain

Station Start Time: 9:54 pm Background Noise Code: 3

Call Level Codes:

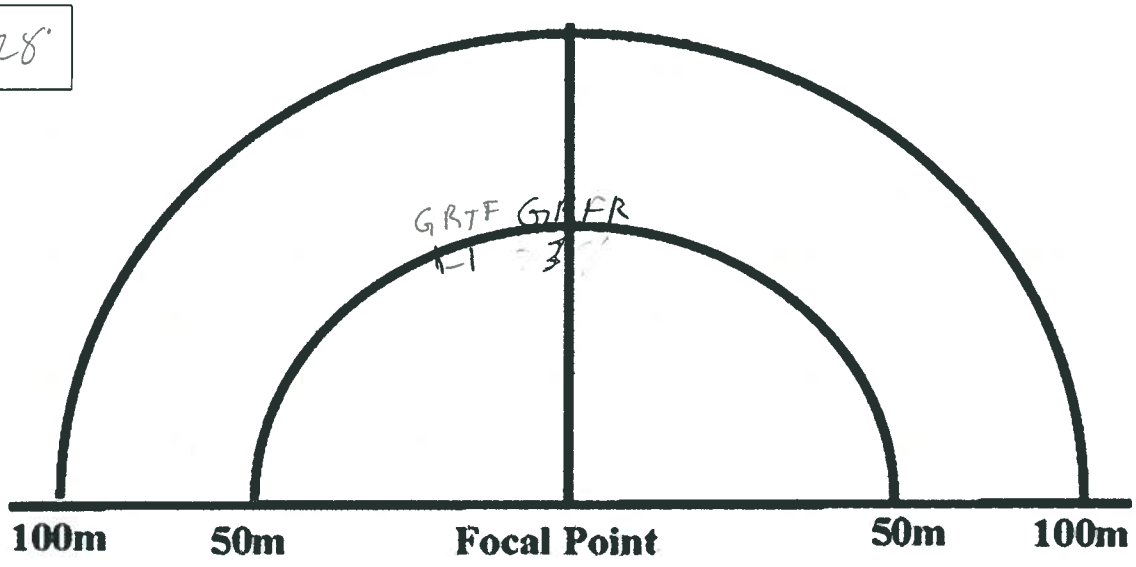
Code 1: Calls not simultaneous, number of individuals can be accurately counted

Code 2: Some calls simultaneous, number of individuals can be reliably estimated

Code 3: Full chorus, calls continuous and overlapping, number of individuals cannot be reliably estimated

Bearing:

128°



Notes:

Amphibian Calling Survey Field Sheet

Site Information:

Site: Britannia Rd Station No.: 5

Observer: TK & SC Date: June 24/2013 Visit No.: 3

Temperature: 26°C Wind Speed (Beaufort scale): 1 Cloud Cover (10th): 6TH

Precipitation (check one): ◯ None/Dry ◯ Damp/Haze/Fog ◯ Drizzle ◯ Rain

Station Start Time: 10:04 pm Background Noise Code: 2

Call Level Codes:

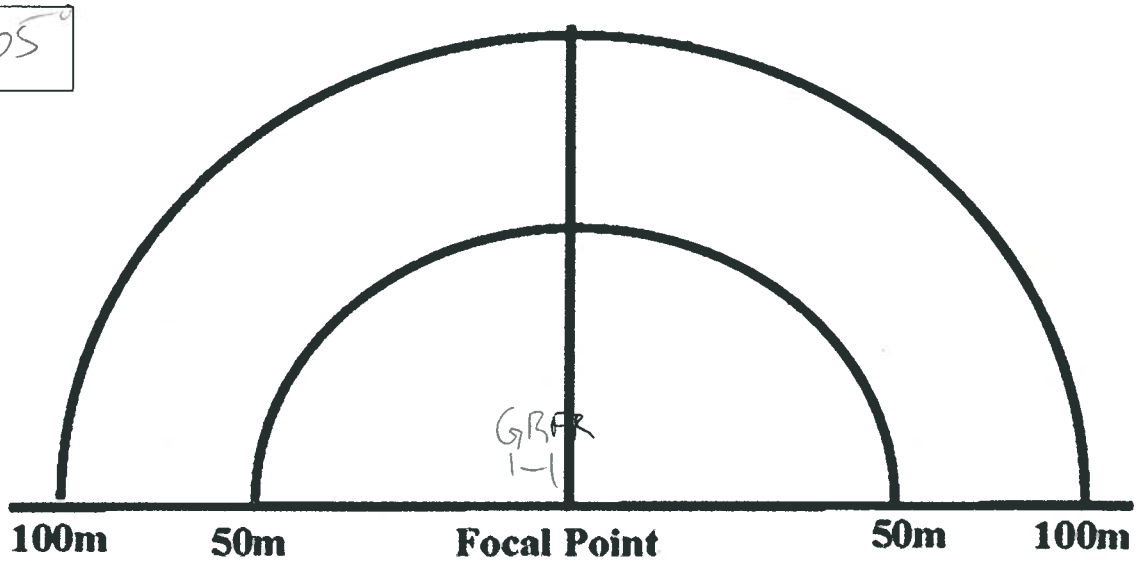
Code 1: Calls not simultaneous, number of individuals can be accurately counted

Code 2: Some calls simultaneous, number of individuals can be reliably estimated

Code 3: Full chorus, calls continuous and overlapping, number of individuals cannot be reliably estimated

Bearing:

305°



Notes:

Amphibian Calling Survey Field Sheet

Site Information:

Site: Britannia Rd Station No.: 6

Observer: TK & JC Date: June 24/2013 Visit No.: 3

Temperature: 26° Wind Speed (Beaufort scale): 2 Cloud Cover (10th): 9

Precipitation (check one): ◯ None/Dry ◯ Damp/Haze/Fog ◯ Drizzle ◯ Rain

Station Start Time: 10:17 Background Noise Code: 1

Call Level Codes:

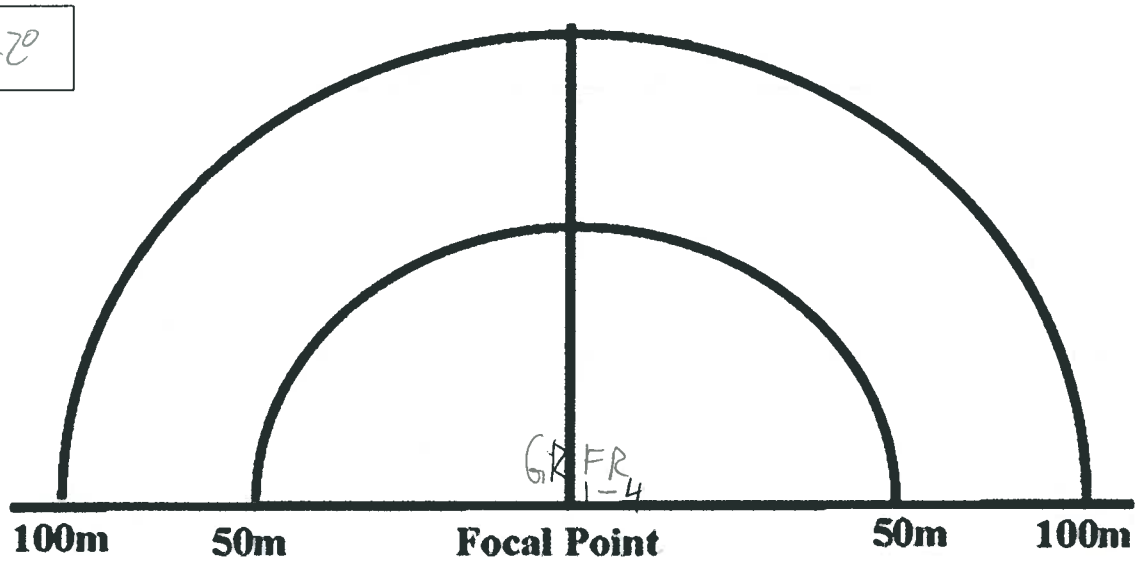
Code 1: Calls not simultaneous, number of individuals can be accurately counted

Code 2: Some calls simultaneous, number of individuals can be reliably estimated

Code 3: Full chorus, calls continuous and overlapping, number of individuals cannot be reliably estimated

Bearing:

42°



Notes: GRFR (multiple) along watercourse as well

Amphibian Calling Survey Field Sheet

Site Information:

Site: Brittania Rd. Station No.: 7

Observer: TK & JC Date: June 24/2013 Visit No.: 3

Temperature: 26°C Wind Speed (Beaufort scale): 1 Cloud Cover (10th): 8

Precipitation (check one): ◯ None/Dry ◯ Damp/Haze/Fog ◯ Drizzle ◯ Rain

Station Start Time: 10:37 pm Background Noise Code: 3

Call Level Codes:

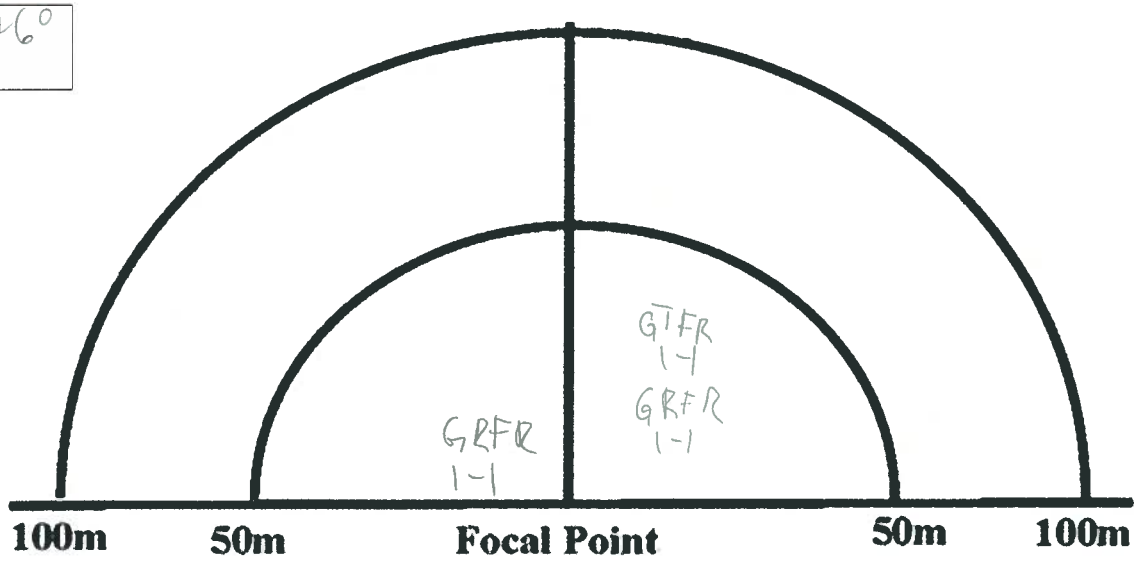
Code 1: Calls not simultaneous, number of individuals can be accurately counted

Code 2: Some calls simultaneous, number of individuals can be reliably estimated

Code 3: Full chorus, calls continuous and overlapping, number of individuals cannot be reliably estimated

Bearing:

46°



Notes:

Amphibian Calling Survey Field Sheet

Site Information:

Site: Bijtanmin Rd. Station No.: 8

Observer: TK & JC Date: June 24/2013 Visit No.: 3

Temperature: 27°C Wind Speed (Beaufort scale): 1 Cloud Cover (10th): 6

Precipitation (check one): ✓ None/Dry ○ Damp/Haze/Fog ○ Drizzle ○ Rain

Station Start Time: 10:46 am Background Noise Code: 3

Call Level Codes:

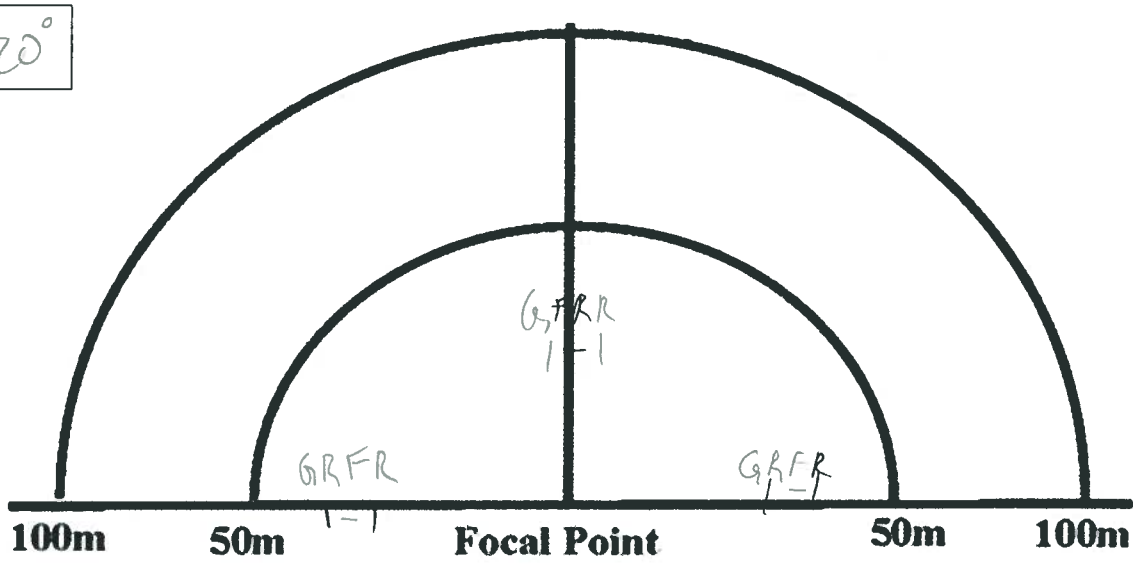
Code 1: Calls not simultaneous, number of individuals can be accurately counted

Code 2: Some calls simultaneous, number of individuals can be reliably estimated

Code 3: Full chorus, calls continuous and overlapping, number of individuals cannot be reliably estimated

Bearing:

120°



Notes: 3 GRFR

Amphibian Calling Survey Field Sheet

Site Information:

Site: Brittania Rd Station No.: 9

Observer: TK & JC Date: June 24 Visit No.: 3

Temperature: 26°C Wind Speed (Beaufort scale): 1 Cloud Cover (10th): 6

Precipitation (check one): (✓) None/Dry ( ) Damp/Haze/Fog ( ) Drizzle ( ) Rain

Station Start Time: 10:45 pm Background Noise Code: 3

Call Level Codes:

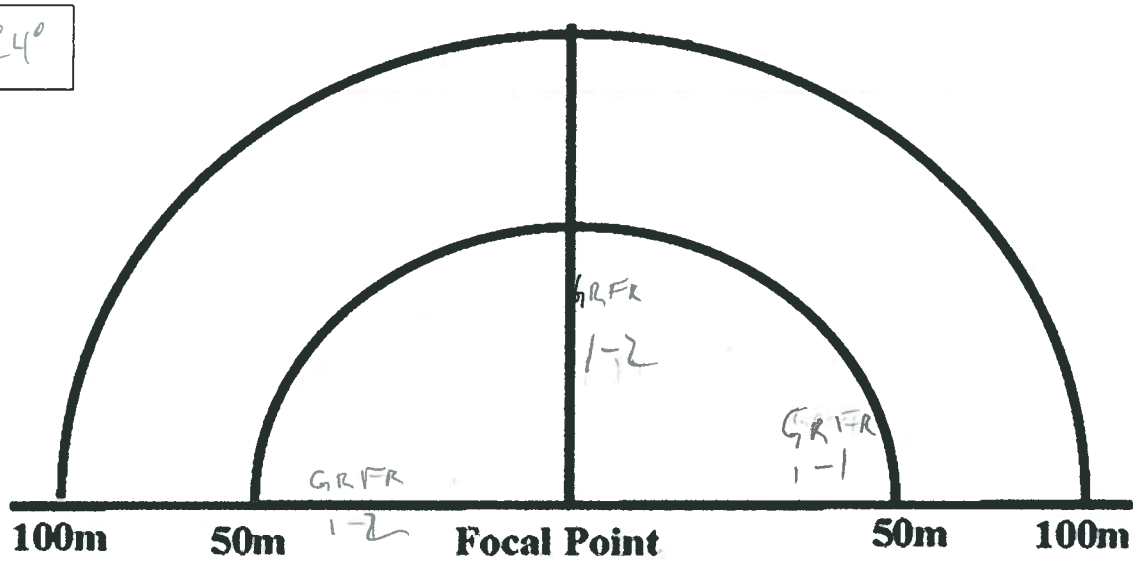
Code 1: Calls not simultaneous, number of individuals can be accurately counted

Code 2: Some calls simultaneous, number of individuals can be reliably estimated

Code 3: Full chorus, calls continuous and overlapping, number of individuals cannot be reliably estimated

Bearing:

24°



Notes:

Amphibian Calling Survey Field Sheet

Site Information:

Site: Britannia Rd. Station No.: 10

Observer: TK & JC Date: June 24/2017 Visit No.: 3

Temperature: 26°C Wind Speed (Beaufort scale): 1 Cloud Cover (10th): 5

Precipitation (check one): (✓) None/Dry ( ) Damp/Haze/Fog ( ) Drizzle ( ) Rain

Station Start Time: 10:50 Background Noise Code: 3

Call Level Codes:

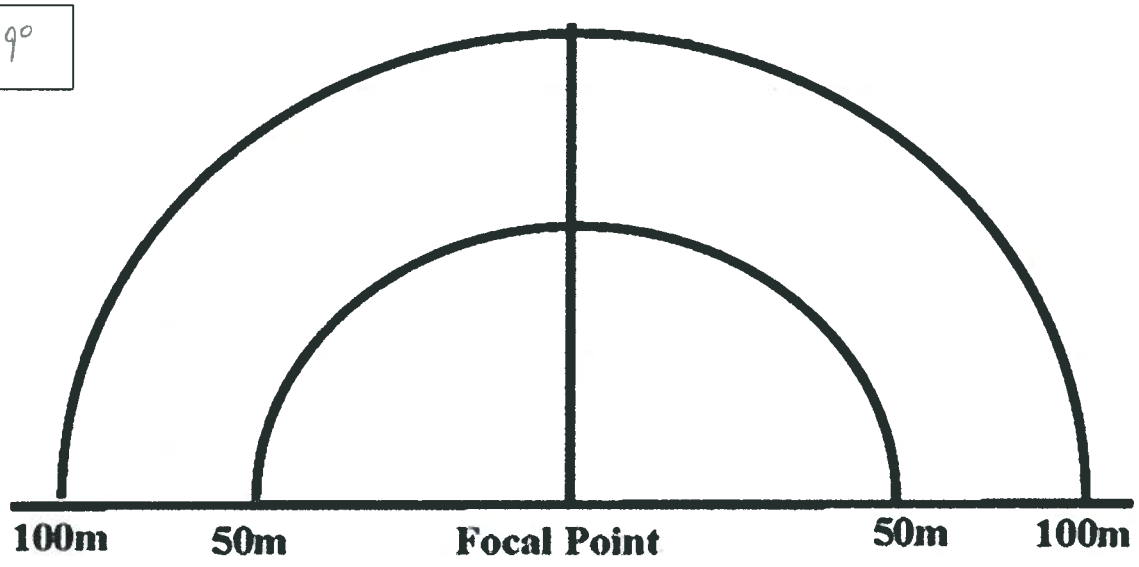
Code 1: Calls not simultaneous, number of individuals can be accurately counted

Code 2: Some calls simultaneous, number of individuals can be reliably estimated

Code 3: Full chorus, calls continuous and overlapping, number of individuals cannot be reliably estimated

Bearing:

299°



Notes: No calling amphibians

Amphibian Calling Survey Field Sheet

Site Information:

Site: Britannia Rd. Station No.: 11

Observer: TK & JC Date: June 24/2017 Visit No.: 3

Temperature: 27°C Wind Speed (Beaufort scale): 1 Cloud Cover (10th): 5TH

Precipitation (check one): ☑ None/Dry ○ Damp/Haze/Fog ○ Drizzle ○ Rain

Station Start Time: 10:56 Background Noise Code: 2

Call Level Codes:

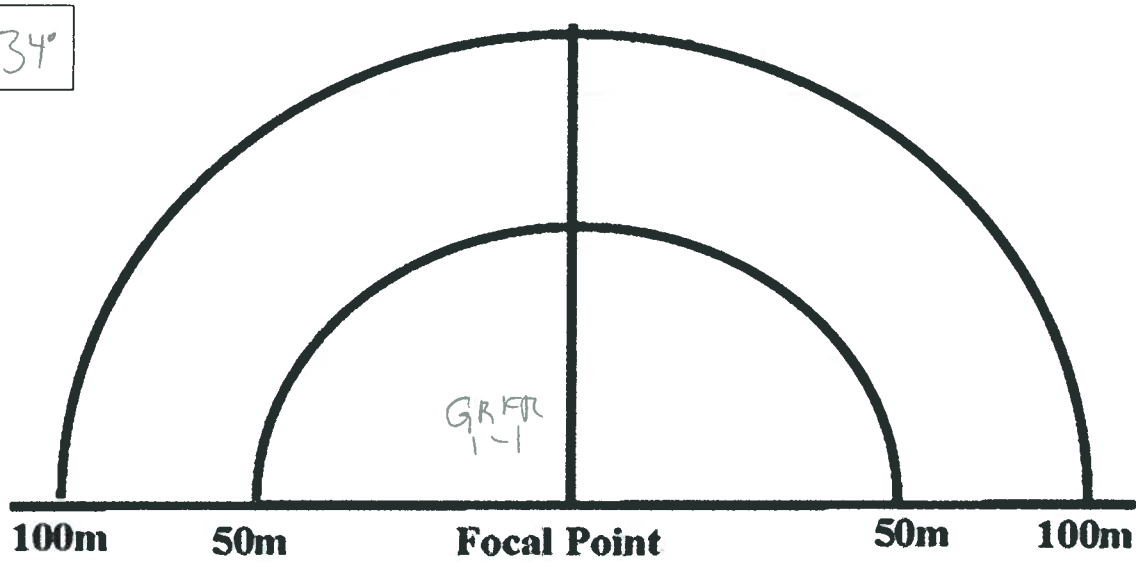
Code 1: Calls not simultaneous, number of individuals can be accurately counted

Code 2: Some calls simultaneous, number of individuals can be reliably estimated

Code 3: Full chorus, calls continuous and overlapping, number of individuals cannot be reliably estimated

Bearing:

134°



Notes:

GRFR
1-1
(north of road)

Amphibian Calling Survey Field Sheet

Site Information:

Site: Britannia Rd. Station No.: 12

Observer: TK & JC Date: June 24/2013 Visit No.: 3

Temperature: 27°C Wind Speed (Beaufort scale): 7 Cloud Cover (10th): 4

Precipitation (check one): ☑ None/Dry ○ Damp/Haze/Fog ○ Drizzle ○ Rain

Station Start Time: 11:04 Background Noise Code: 1

Call Level Codes:

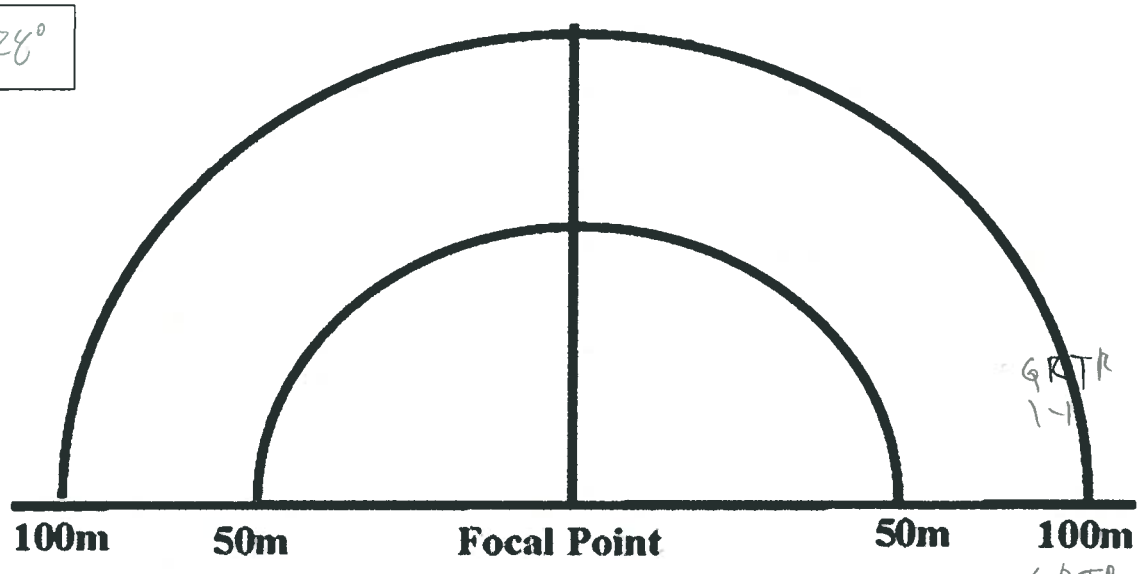
Code 1: Calls not simultaneous, number of individuals can be accurately counted

Code 2: Some calls simultaneous, number of individuals can be reliably estimated

Code 3: Full chorus, calls continuous and overlapping, number of individuals cannot be reliably estimated

Bearing:

126°



Notes:

Amphibian Calling Survey Field Sheet

Site Information:

Site: Britannia Rd. Station No.: 13

Observer: TK & JC Date: June 24/2013 Visit No.: 3

Temperature: 28°C Wind Speed (Beaufort scale): 1 Cloud Cover (10th): 8

Precipitation (check one): ◯ None/Dry ☑ Damp/Haze/Fog ◯ Drizzle ◯ Rain

Station Start Time: 9:35 pm Background Noise Code: 3

Call Level Codes:

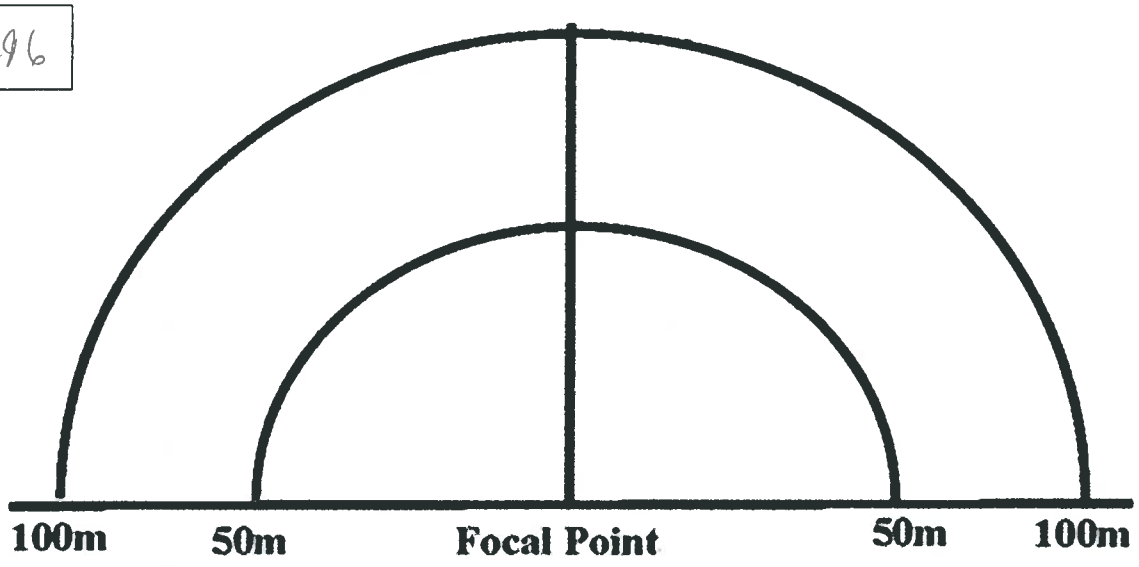
Code 1: Calls not simultaneous, number of individuals can be accurately counted

Code 2: Some calls simultaneous, number of individuals can be reliably estimated

Code 3: Full chorus, calls continuous and overlapping, number of individuals cannot be reliably estimated

Bearing:

296



Notes:

- Water completely gone by 3rd visit
- no calling amphibians

APPENDIX 9: BREEDING BIRD SURVEY (ROADSIDE)

Appendix 6. Road side breeding bird point count results along Britannia Road between Tremaine Road and Highway 407. * denotes an introduced species ** denotes an area sensitive species

			Rarity Status						Point Count Breeding Evidence																				
Scientific Name		Common Name	G Rank	S Rank	COSEWIC	MNR	Halton NAI	SOWE Region 7	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
	Anas platyrhynchos	Mallard	G5	S5				FALSE		PO			PR					PO											
	Ardea herodias	Great Blue Heron	G5	S5				FALSE						O		O		O											
	Charadrius vociferus	Killdeer	G5	S5B,S5N				FALSE	PO	PO	PO		PO	O	O	O	PO	PO	O				PR				O			
	Actitis macularia	Spotted Sandpiper	G5	S5				FALSE								PO		PO	PO				O							
*	Columba livia	Rock Pigeon	G5	SNA				FALSE											PR											
	Zenaida macroura	Mourning Dove	G5	S5				FALSE			PO		PO				PO	PO	PO	PO	PR		O				O			
**	Picoides villosus	Hairy Woodpecker	G5	S5				FALSE						O																
	Contopus virens	Eastern Wood-pewee	G5	S4B	**SC**			FALSE																				O	
	Empidonax traillii	Willow Flycatcher	G5	S5B			HU	FALSE																					O
	Tyrannus tyrannus	Eastern Kingbird	G5	S4B				FALSE	PO						PO	PO													
	Vireo gilvus	Warbling Vireo	G5	S5B				FALSE		PO				O	PO									PO			O	O		O
	Cyanocitta cristata	Blue Jay	G5	S5				FALSE	PO							PO						O							
	Corvus brachyrhynchos	American Crow	G5	S5B				FALSE			O								PO										O	
	Eremophila alpestris	Horned Lark	G5	S5B			HU	FALSE	PO	PO	PR	PO					PO	O	PO	PO	PO									
	Tachycineta bicolor	Tree Swallow	G5	S4B				FALSE										O						O						
	Stelgidopteryx serripennis	Northern Rough-winged Swallow	G5	S4B			HU	FALSE															O							
	Petrochelidon pyrrhonota	Cliff Swallow	G5	S4B				FALSE																C						
	Hirundo rustica	Barn Swallow	G5	S4B	THR	**TH**		FALSE		PO				O	O	O	O	O		O							PR			
	Poecile atricapillus	Black-capped Chickadee	G5	S5				FALSE	PO		PO			O	PO	PO												O	PR	PR
	Troglodytes aedon	House Wren	G5	S5B				FALSE						O	PO															
	Turdus migratorius	American Robin	G5	S5B				FALSE	PO	PO	PO	PR		O		C	PO	PR			PR		O	PO	PO	PO	O	O		O
	Dumetella carolinensis	Gray Catbird	G5	S4B				FALSE																	PO					
	Mimus polyglottos	Northern Mockingbird	G5	S4			HU	FALSE												PR										
*	Sturnus vulgaris	European Starling	G5	SNA				FALSE					PO	O		PO		O	C											

	Scientific Name	Common Name	Rarity Status						Point Count Breeding Evidence																				
			G Rank	S Rank	COSEWIC	MNR	Halton NAI	SOWE Region 7	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
	Bombycilla cedrorum	Cedar Waxwing	G5	S5B				FALSE					PO										PO						
	Dendroica petechia	Yellow Warbler	G5	S5B				FALSE						O	PO								O	PO	PO		PO			
	Geothlypis trichas	Common Yellowthroat	G5	S5B				FALSE																	PO			O	O	O
	Spizella passerina	Chipping Sparrow	G5	S5B				FALSE				O				PO	PO					O								
	Pooecetes gramineus	Vesper Sparrow	G5	S4B			HU	FALSE	PO		PO	PO				PO														
**	Passerculus sandwichensis	Savannah Sparrow	G5	S4B				FALSE	PO	PO	PO	PO	PO			PO	PR	PO		PO	PO	O			PR	PR	O	O		
	Melospiza melodia	Song Sparrow	G5	S5B				FALSE	PO	PO	PO	PO	PO		PR	PR		PO	PO	PO	PR		O	PR	PO	PO	O	O	O	O
	Cardinalis cardinalis	Northern Cardinal	G5	S5				FALSE			PO			O	PO												O		O	O
	Passerina cyanea	Indigo Bunting	G5	S4B				FALSE							PO											PO				O
**	Dolichonyx oryzivorus	Bobolink	G5	S4B	THR	THR		FALSE									PR		PO	PR		C								
	Agelaius phoeniceus	Red-winged Blackbird	G5	S5				FALSE	PO	PO	O		C	PR	PO	PO	C	O	PO	PR	PR		O	PR		C	O	O	O	PR
	Quiscalus quiscula	Common Grackle	G5	S5B				FALSE		C														PO						
	Molothrus ater	Brown-headed Cowbird	G5	S4B				FALSE			PO			O			PO							PO						
	Icterus galbula	Baltimore Oriole	G5	S4B				FALSE				PO																		
*	Carpodacus mexicanus	House Finch	G5	SNA				FALSE														O								
	Carduelis tristis	American Goldfinch	G5	S5B				FALSE	PO					O	PO	PO			PO		PO	O	O		PO	PO	PR			
*	Passer domesticus	House Sparrow	G5	SNA				FALSE									PO		PO			O	O							

APPENDIX 10: BREEDING BIRD SURVEY (WESTERN WOODLAND)

Species	Number of individuals	Highest level of breeding evidence recorded	Breeding status	Within subject area. i.e. woodlot	Within immediately adjacent lands	Notes/Location
American Goldfinch	2	X	Observed	Y	Y	One in woodlot close to road, one in wet thicket to South$_A$
American Robin	1	A	Probable	Y		
Barn Swallow *	**3**	**AE**	**Confirmed**		**Y**	**Pair visiting nest in culvert running under Britannia Rd, slightly to West of woodlot**
Blue Jay	2	A	Probable	Y		Pair
Cedar Waxwing	2	P	Probable	Y		Pair detected momentarily
Chipping Sparrow	1	S	Possible	Y		At Northern edge of woodlot, close to road
Eastern Wood-pewee**	**1**	**S**	**Possible**	**Y**		**In North end of woodlot, detected across width of woodlot, within approximately 50m of the road**
Great-crested Flycatcher	1	A	Probable	Y		
Grey Catbird	1	S	Possible		Y	Occasionally singing from southern edge of woodlot; evidence suggested nest in wet thicket to the south
Horned Lark	2	S	Possible		Y	
Northern Cardinal	1	A	Probable	Y		Conflict behaviour with Blue Jay pair
Northern Flicker	1	A	Probable	Y		
Red-eyed Vireo	1	S	Possible	Y		
Song Sparrow	6	V	Probable	Y		≥1 pair detected, 4 singing males, along along shrubby edges of woodlot
Vesper Sparrow	2	S	Possible		Y	In adjacent agricultural field to the east
Willow Flycatcher	1	S	Possible		Y	In wet thicket to south

*** Barn Swallow is a Nationally and Provincially Threatened species.**

**** Eastern Wood-pewee is a species of Special Concern Nationally.**

APPENDIX 11: TREE INVENTORY

						Coordinates					
Waypoint	**Scientific Name**	**Common Name**	**Condition**	**Size**	**Class**	**Easting**	**Northing**	**Outside ROW**	**Dripline within ROW**	**Trunk within ROW**	**Retain/Remove**
222	Quercus macrocarpa	bur oak	dl, d	41.5	4	4813332.526	592541.4664			✓	Remove
223	Acer saccharinum	silver maple	dl, d	>25	4	4813325.545	592534.1232			✓	Remove
224	Quercus macrocarpa	bur oak	dl, ad	>25	3	4813317.634	592529.6478			✓	Remove
225	Quercus macrocarpa	bur oak		>25	1	4813487.857	592637.8424			✓	Remove
226	Quercus macrocarpa	bur oak		>25	1	4813457.819	592613.3342			✓	Remove
227	Carya ovata	shagbark hickory		>25	1	4813438.988	592601.4213			✓	Remove
228	Quercus macrocarpa	bur oak	dl	>25	1	4813432.098	592595.9685			✓	Remove
229	Quercus macrocarpa	bur oak	dl	>25	2	4813425.834	592590.7247			✓	Remove
230	Quercus macrocarpa	bur oak		>25	1	4813409.283	592580.0885			✓	Remove
231	Carya ovata	shagbark hickory		>25	1	4813408.518	592579.3264			✓	Remove
232	Quercus macrocarpa	bur oak	dl	>25	2	4813403.61	592572.5179			✓	Remove
233	Quercus macrocarpa	bur oak		>25	1	4813392.687	592566.2394			✓	Remove
234	Quercus macrocarpa	bur oak		>25	1	4813389.363	592562.1889			✓	Remove
235	Quercus macrocarpa	bur oak	ad, dl	>25	2	4813369.425	592549.6938			✓	Remove
236	Quercus macrocarpa	bur oak	dl, d	>25	4	4813368.563	592549.3125			✓	Remove
237	Quercus macrocarpa	bur oak	dl	>25	2	4813347.324	592532.8879			✓	Remove
238	Quercus macrocarpa	bur oak	dl	>25	2	4813340.372	592526.3784			✓	Remove
239	Quercus macrocarpa	bur oak		>25	1	4813347.968	592553.3316			✓	Remove
240	Carya ovata	shagbark hickory		>25	1	4813353.555	592556.8082			✓	Remove
241	Quercus macrocarpa	bur oak	st	>25	2	4813359.474	592562.0438			✓	Remove
242	Carya ovata	shagbark hickory		>25	1	4813358.481	592563.61			✓	Remove
243	Quercus macrocarpa	bur oak	dl	>25	2	4813371.737	592570.8872			✓	Remove
244	Quercus macrocarpa	bur oak		>25	1	4813392.387	592586.4103			✓	Remove
245	Quercus macrocarpa	bur oak		>25	1	4813393.341	592591.5443			✓	Remove
246	Quercus macrocarpa	bur oak		>25	1	4813394.486	592593.5358			✓	Remove
247	Quercus macrocarpa	bur oak		>25	1	4813394.191	592594.3942			✓	Remove
248	Quercus macrocarpa	bur oak		>25	1	4813405.32	592604.0273			✓	Remove
249	Quercus macrocarpa	bur oak	st, dl	>25	2	4813403.458	592598.7221			✓	Remove
250	Quercus macrocarpa	bur oak	dl	>25	2	4813411.314	592599.8827			✓	Remove

						Coordinates					
Waypoint	**Scientific Name**	**Common Name**	**Condition**	**Size**	**Class**	**Easting**	**Northing**	**Outside ROW**	**Dripline within ROW**	**Trunk within ROW**	**Retain/Remove**
251	Quercus macrocarpa	bur oak	dl	>25	2	4813419.655	592609.9327			✓	Remove
252	Quercus macrocarpa	bur oak	dl	>25	2	4813418.412	592611.6383			✓	Remove
253	Carya ovata	shagbark hickory		>25	1	4813425.579	592614.1917			✓	Remove
254	Quercus alba	white oak	dl, d	>25	4	4813428.952	592618.4308			✓	Remove
255	Carya ovata	shagbark hickory	dl, d	>25	4	4813431.368	592622.1676			✓	Remove
256	Carya ovata	shagbark hickory	dl	>25	2	4813435.593	592621.2625			✓	Remove
257	Quercus macrocarpa	bur oak	dl	>25	2	4813444.732	592627.7757			✓	Remove
258	Carya ovata	shagbark hickory		>25	1	4813463.178	592640.7788			✓	Remove
259	Fraxinus americana	white ash	dl, d	>25	3	4813600.959	592725.5523			✓	Remove
260	Crataegus sp.	hawthorn species	dl	>25	2	4813603.939	592731.6484			✓	Remove
262	Malus pumila	common apple	dl	>25	2	4813659.209	592794.7511			✓	Remove
263	Quercus macrocarpa	bur oak	dl	>25	2	4814084.41	593132.3351			✓	Remove
264	Malus pumila	common apple	dl	>25	1	4814313.514	593278.7617			✓	Remove
265	Ulmus americana	American elm	dl	>25	1	4814617.148	593506.6981			✓	Remove
266	Malus pumila	common apple	dl, st	>25	2	4814798.351	593635.908			✓	Remove
267	Malus pumila	common apple	dl, st, d	>25	2	4814808.695	593624.5435	✓			Retain
268	Acer negundo	Manitoba maple	dl, d	>25	4	4814837.562	593700.5243			✓	Remove
269	Malus pumila	common apple	dl	>25	2	4814863.677	593697.6792			✓	Remove
270	Malus pumila	common apple	dl, st	>25	2	4814862.897	593699.2294			✓	Remove
271	Malus pumila	common apple	dl	>25	2	4814870.686	593702.2804			✓	Remove
272	Crataegus sp.	hawthorn species	dl, d	>25	3	4814878.861	593710.2747			✓	Remove
273	Quercus macrocarpa	bur oak		>25	1	4815012.128	593786.0674		✓		
274	Fraxinus americana	white ash	dl	>25	2	4815083.231	593881.4355			✓	Remove
275	Fraxinus americana	white ash	dl	>25	2	4815084.44	593880.66			✓	Remove
276	Quercus macrocarpa	bur oak	dl	>25	2	4815086.035	593882.2441			✓	Remove
277	Tilia americana	basswood	st, dl	>25	3	4815093.273	593887.8519			✓	Remove
278	Quercus macrocarpa	bur oak		>25	1	4815147.414	593928.5333			✓	Remove
279	Ulmus americana	American elm	dl	>25	3	4815196.758	593941.0441			✓	Remove
280	Tilia americana	basswood	st, dl	>25	3	4815209.154	593973.9286			✓	Remove

						Coordinates					
Waypoint	**Scientific Name**	**Common Name**	**Condition**	**Size**	**Class**	**Easting**	**Northing**	**Outside ROW**	**Dripline within ROW**	**Trunk within ROW**	**Retain/Remove**
281	Quercus macrocarpa	bur oak	st	>25	2	4815331.139	594068.3908			✓	Remove
282	Quercus macrocarpa	bur oak		119	1	4815441.046	594173.2078			✓	Remove
283	Carya ovata	shagbark hickory		>25	1	4815417.405	594157.1126			✓	Remove
284	Quercus macrocarpa	bur oak		>60	1	4815408.201	594151.4043			✓	Remove
285	Quercus macrocarpa	bur oak		>60	1	4815388.547	594134.209			✓	Remove
286	Quercus macrocarpa	bur oak	dl, ad	>25	2	4815324.322	594084.9325			✓	Remove
287	Quercus macrocarpa	bur oak	dl, d	>25	3	4815299.128	594067.591			✓	Remove
288	Quercus macrocarpa	bur oak	ad, st	>25	2	4815235.755	594019.9626			✓	Remove
289	Quercus macrocarpa	bur oak	dl	>25	2	4815138.842	593956.7138	✓			Retain
290	Quercus macrocarpa	bur oak	dl	>25	2	4815134.95	593958.1035	✓			Retain
293	Acer negundo	Manitoba maple		>25	1	4815590.518	594294.7541			✓	Remove
294	Populus balsamifera	balsam poplar	dl	>25	2	4815676.208	594322.2222			✓	Remove
295	Salix x rubens	hybrid willow	dl	>25	2	4815737.864	594367.4892			✓	Remove
296	Malus pumila	common apple		>25	1	4816145.823	594723.515			✓	Remove
297	Quercus rubra	red oak	st	>25	1	4816125.831	594717.4447			✓	Remove
298	Quercus rubra	red oak		>25	1	4816126.546	594722.5457			✓	Remove
299	Quercus rubra	red oak	dl	>25	2	4816125.076	594723.3395		✓		
300	Carya ovata	shagbark hickory		>25	1	4816109.729	594716.5391		✓		
301	Carya ovata	shagbark hickory		>25	1	4816109.688	594711.5644		✓		
302	Quercus macrocarpa	bur oak		87.5	1	4816108.093	594710.0616		✓		
303	Acer negundo	Manitoba maple	l, dl	>25	2	4816093.659	594683.5025			✓	Remove
303	Acer negundo	Manitoba maple	l, dl	>25	2	4816093.659	594683.5025			✓	Remove
303	Acer negundo	Manitoba maple	l, dl	>25	2	4816093.659	594683.5025			✓	Remove
303	Acer negundo	Manitoba maple	l, dl	>25	2	4816093.659	594683.5025			✓	Remove
303	Acer negundo	Manitoba maple	l, dl	>25	2	4816093.659	594683.5025			✓	Remove
303	Acer negundo	Manitoba maple	l, dl	>25	2	4816093.659	594683.5025			✓	Remove
304	Ulmus americana	American elm	dl	>25	2	4816044.266	594643.803			✓	Remove
306	Acer negundo	Manitoba maple	dl	>25	1	4815976.591	594588.4845			✓	Remove
310	Malus pumila	common apple	dl	>40	2	4815911.262	594488.6834		✓		

						Coordinates					
Waypoint	**Scientific Name**	**Common Name**	**Condition**	**Size**	**Class**	**Easting**	**Northing**	**Outside ROW**	**Dripline within ROW**	**Trunk within ROW**	**Retain/Remove**
311	Fraxinus americana	white ash	dl, d	>25	3	4815912.973	594497.7901			✓	Remove
312	Malus pumila	common apple	dl, st, d	>25	4	4815920.405	594511.1893			✓	Remove
313	Fraxinus americana	white ash	dl	>35	2	4815922.616	594510.8598			✓	Remove
314	Fraxinus americana	white ash	dl, st	>35	3	4815923.193	594512.7498			✓	Remove
315	Fraxinus americana	white ash	dl, st	>40	2	4815923.427	594512.8687			✓	Remove
316	Carya ovata	shagbark hickory	dl	>25	2	4815926.608	594519.3044			✓	Remove
317	fraxinus pennsylvanica	green ash	dl	>25	2	4815959.879	594540.0819			✓	Remove
318	Salix alba x fragilis	hybrid willow	dl, w	179	3	4815964.392	594541.9029			✓	Remove
319	Ulmus americana	American elm	dl	>25	2	4815965.261	594543.3957			✓	Remove
320	Salix alba x fragilis	hybrid willow	dl	>30	2	4815976.849	594547.8427			✓	Remove
321	Salix alba x fragilis	hybrid willow		>30	1	4815977.696	594547.1596			✓	Remove
322	Salix x rubens	hybrid willow	dl, st, d	>80	4	4816043.706	594589.2833		✓		
323	Carya cordiformis	bitternut hickory		>25	1	4816142.694	594663.9275		✓		
324	Carya ovata	shagbark hickory	dl	>40	2	4816139.841	594665.6352		✓		
325	Carya cordiformis	bitternut hickory	st	>70	2	4816142.978	594659.6398	✓			Retain
326	Acer saccharum	sugar maple		>40	1	4816147.749	594671.781		✓		
327	Carya cordiformis	bitternut hickory		>50	1	4816145.631	594674.1157		✓		
328	Quercus macrocarpa	bur oak	dl	>60	2	4816161.471	594682.1959		✓		
329	Malus pumila	common apple	dl	>25	1	4816192.325	594754.9638			✓	Remove
330	Quercus macrocarpa	bur oak	dl	>80	2	4816388.836	594871.8342			✓	Remove
331	Quercus macrocarpa	bur oak		>40	1	4816399.061	594881.797			✓	Remove
332	Quercus macrocarpa	bur oak		>40	1	4816401.161	594882.9198			✓	Remove
333	Acer x freemanii	Freeman's maple	dl, d	>35	4	4816412.709	594889.6567			✓	Remove
334	Acer x freemanii	Freeman's maple	dl, d	>40	5	4816417.457	594890.9459			✓	Remove
335	Acer x freemanii	Freeman's maple	dl	>40	3	4816419.812	594892.9457			✓	Remove
336	Fraxinus americana	white ash	dl	>25	3	4816420.292	594894.6202			✓	Remove
337	Quercus macrocarpa	bur oak	dl	>30	2	4816402.122	594901.4648			✓	Remove
338	Acer saccharinum	silver maple	dl	>25	2	4816652.742	595097.5724			✓	Remove
339	Acer saccharinum	silver maple	dl	>25	2	4816659.588	595103.7249			✓	Remove

						Coordinates					
Waypoint	**Scientific Name**	**Common Name**	**Condition**	**Size**	**Class**	**Easting**	**Northing**	**Outside ROW**	**Dripline within ROW**	**Trunk within ROW**	**Retain/Remove**
340	Carya ovata	shagbark hickory		>30	1	4816817.84	595196.3115			✓	Remove
341	Acer saccharum	sugar maple	dl, d	>30	4	4816858.759	595232.4477			✓	Remove
342	Carya ovata	shagbark hickory	dl	>25	3	4817247.765	595572.0387			✓	Remove
343	Populus tremuloides	trembling aspen	dl	>25	3	4817479.209	595752.544	✓			Retain
344	Fraxinus americana	white ash	d	>25	3	4817478.28	595752.7812	✓			Retain
345	Salix x rubens	hybrid willow	dl	>40	2	4817492.38	595765.4568	✓			Retain
346	Salix x rubens	hybrid willow	dl, l	>40	3	4817492.784	595770.9072	✓			Retain
347	Fraxinus americana	white ash	dl	>35	3	4817535.891	595803.4879	✓			Retain
348	Acer x freemanii	Freeman's maple		>30	1	4817605.315	595851.4438	✓			Retain
349	Acer saccharinum	silver maple	dl	>40	2	4817649.457	595881.4343	✓			Retain
350	Acer saccharinum	silver maple	dl	>30	2	4817657.881	595881.8899	✓			Retain
351	Fraxinus americana	white ash	dl	>30	3	4817675.675	595895.0548	✓			Retain
352	Acer saccharinum	silver maple	dl	>25	2	4817677.722	595896.2392	✓			Retain
353	Acer saccharinum	silver maple	st, dl	>35	2	4817684.985	595904.1798	✓			Retain
354	Acer platanoides	Norway maple	dl	>25	3	4817692.42	595908.3841	✓			Retain
355	Acer platanoides	Norway maple	dl, d	>40	4	4817703.457	595916.4884	✓			Retain
356	Acer saccharinum	silver maple	dl, d	119.9	4	4817710.209	595931.5925	✓			Retain
357	Crataegus sp.	hawthorn species	dl	25.9	3	4817793.431	595985.9158	✓			Retain
358	Catalpa speciosa	catalpa		>25	1	4817906.18	596045.651	✓			Retain
359	Acer saccharinum	silver maple		>35	1	4817901.393	596035.7779	✓			Retain
360	Fraxinus americana	white ash		>30	1	4817895.921	596028.7743	✓			Retain
361	Acer saccharinum	silver maple	po, dl, d	>40	4	4817886.862	596022.9877	✓			Retain
362	Fraxinus americana	white ash	dl, d	>25	5	4817864.126	596007.3522	✓			Retain
363	Acer saccharum	sugar maple	dl, po	>50	4	4817824.752	595985.2255	✓			Retain
364	Acer saccharum	sugar maple	bt, dl, d	>40	5	4817822.558	595983.5354	✓			Retain
365	Acer x freemanii	Freeman's maple	st	>30	1	4817808.708	595964.9268	✓			Retain
366	Acer negundo	Manitoba maple	st, dl	>40	2	4817779.58	595954.2348	✓			Retain
367	Acer saccharinum	silver maple	st	>40	1	4817755.343	595928.0891	✓			Retain
368	Acer saccharinum	silver maple	st, dl	>40	3	4817749.249	595923.1267	✓			Retain

						Coordinates					
Waypoint	**Scientific Name**	**Common Name**	**Condition**	**Size**	**Class**	**Easting**	**Northing**	**Outside ROW**	**Dripline within ROW**	**Trunk within ROW**	**Retain/Remove**
369	Acer negundo	Manitoba maple	l	>40	2	4817717.587	595905.1316	✓			Retain
370	Acer negundo	Manitoba maple	dl	>30	2	4817714.098	595899.448	✓			Retain
371	Acer negundo	Manitoba maple	dl, st, bt	>30	3	4817711.16	595899.713	✓			Retain
372	Acer negundo	Manitoba maple	dl, st	>40	2	4817648.835	595844.9957	✓			Retain
373	Ulmus americana	American elm	st	>50	1	4817543.909	595779.3759	✓			Retain
374	Robinia pseudo-acacia	black locust	dl, id	>25	3	4818414.108	596485.1032			✓	Remove
375	Quercus macrocarpa	bur oak		>30	1	4818429.026	596495.6092			✓	Remove
376	Fraxinus americana	white ash	dl	>40	2	4818437.826	596502.1915			✓	Remove
378	Ulmus americana	American elm		>35	1	4819353.687	597180.4081			✓	Remove
379	Salix x rubens	hybrid willow	dl	>40	2	4819408.163	597227.8477			✓	Remove
380	Acer negundo	Manitoba maple	st	>30	2	4819429.532	597231.1568			✓	Remove
381	Acer saccharinum	silver maple	dl	>50	2	4819436.608	597229.8217			✓	Remove
382	Acer platanoides	Norway maple		>35	1	4819443.585	597239.0708			✓	Remove
383	Acer saccharinum	silver maple		>45	1	4819497.706	597282.6054			✓	Remove
384	Tilia americana	basswood	st, b, br	>25	3	4819494.67	597290.9557			✓	Remove
385	Fraxinus americana	white ash	l, dl	>40	3	4819508.81	597290.0939			✓	Remove
386	Pinus sylvestris	Scots pine	wh	>25	2	4819515.952	597305.5467			✓	Remove
387	Acer saccharinum	silver maple	st, d	>25	5	4819524.03	597300.8022			✓	Remove
388	Quercus rubra	red oak	dl, s	>50	4	4819526.638	597308.5559			✓	Remove
389	Acer x freemanii	Freeman's maple		>25	1	4819768.565	597493.1226			✓	Remove
390	Acer platanoides	Norway maple		>25	1	4819773.185	597497.1076			✓	Remove
391	Picea glauca	white spruce		>25	1	4819778.961	597499.3274			✓	Remove
392	Acer platanoides	Norway maple		>25	1	4819783.371	597505.4485			✓	Remove
393	Juglans nigra	black walnut		>25	1	4819786.248	597508.6796			✓	Remove
394	Acer saccharinum	silver maple	dl, st	>35	4	4819790.709	597507.5035			✓	Remove
395	Acer saccharinum	silver maple		>40	1	4819794.232	597510.9143			✓	Remove
396	Acer saccharinum	silver maple	br	>40	2	4819814.317	597535.427			✓	Remove
397	Picea pungens	blue spruce		>25	1	4819844.859	597545.1731		✓		
398	Pinus nigra	Austrian pine		>25	1	4819844.477	597547.1436			✓	Remove

						Coordinates					
Waypoint	**Scientific Name**	**Common Name**	**Condition**	**Size**	**Class**	**Easting**	**Northing**	**Outside ROW**	**Dripline within ROW**	**Trunk within ROW**	**Retain/Remove**
399	Pinus nigra	Austrian pine		>25	1	4819847.195	597548.323		✓		
400	Picea pungens	blue spruce	st	>25	1	4819849.715	597550.7056			✓	Remove
401	Juglans nigra	black walnut	dl	>30	1	4820245.458	597866.5926			✓	Remove
402	Juglans nigra	black walnut		>25	1	4820247.926	597862.8509			✓	Remove
403	Ulmus americana	American elm	dl	>40	1	4820399.978	597987.1699			✓	Remove
404	Fraxinus americana	white ash		>25	1	4820627.136	598163.836			✓	Remove
405	Ulmus americana	American elm	fn, dl	>25	3	4820679.423	598206.3452			✓	Remove
406	Fraxinus americana	white ash	dl	>25	3	4820745.092	598256.5435			✓	Remove
407	Pinus strobus	white pine		>25	1	4820789.547	598294.4719			✓	Remove
408	Salix alba x fragilis	hybrid willow	st - 9	>40	2	4820857.813	598379.6323			✓	Remove
409	Ulmus americana	American elm		>25	1	4820912.657	598426.8699			✓	Remove
410	Betula papyrifera	white birch	st	>25	1	4821184.429	598640.4397			✓	Remove
411	Pinus sylvestris	Scots pine		>25	1	4821189.826	598640.868			✓	Remove
412	Acer saccharum	sugar maple		>45	1	4821198.378	598650.7067			✓	Remove
413	Quercus macrocarpa	bur oak	w, dl	>40	3	4821323.744	598719.3249			✓	Remove
414	Betula papyrifera	white birch		>30	1	4821307.514	598743.3382		✓		
417	Fraxinus americana	white ash	dl	>25	1	4822208.403	599401.6223			✓	Remove
418	Fraxinus americana	white ash	dl	>25	2	4822205.252	599400.7744			✓	Remove
419	Tilia americana	basswood		>30	1	4822604.014	599719.7608			✓	Remove
420	Fraxinus americana	white ash	dl	>25	2	4822596.613	599709.8882			✓	Remove
421	Fraxinus americana	white ash	dl	>25	2	4822596.657	599710.3012			✓	Remove
422	Fraxinus americana	white ash	dl	>25	2	4822596.811	599710.6641			✓	Remove
423	Quercus macrocarpa	bur oak	dl	>35	2	4822582.625	599700.3033			✓	Remove
424	Tilia americana	basswood	w	>30	2	4822582.061	599698.6392			✓	Remove
425	Carya ovata	shagbark hickory	dl	>30	2	4822575.897	599696.7729			✓	Remove
426	Quercus rubra	red oak		>45	1	4822575.199	599699.3437			✓	Remove
427	Quercus macrocarpa	bur oak	dl	>30	2	4822572.613	599694.418			✓	Remove
428	Carya ovata	shagbark hickory	dl	>25	2	4822571.702	599697.6892			✓	Remove
429	Carya ovata	shagbark hickory	st	>25	2	4822571.501	599696.0262			✓	Remove

						Coordinates					
Waypoint	**Scientific Name**	**Common Name**	**Condition**	**Size**	**Class**	**Easting**	**Northing**	**Outside ROW**	**Dripline within ROW**	**Trunk within ROW**	**Retain/Remove**
430	Carya ovata	shagbark hickory		>25	1	4822567.598	599689.7246			✓	Remove
431	Tilia americana	basswood	st, dl	>35	2	4822563.905	599688.5876			✓	Remove
432	Acer rubra	red maple	dl	>40	2	4822560.707	599683.2782			✓	Remove
433	Tilia americana	basswood	w, st	>30	2	4822558.418	599680.2371			✓	Remove
434	Quercus macrocarpa	bur oak	dl	>40	2	4822550.879	599676.7866			✓	Remove
435	Tilia americana	basswood	b, st, dl	>30	2	4822548.19	599663.011			✓	Remove
436	Quercus macrocarpa	bur oak	fn, dl	>40	3	4822540.962	599665.3603			✓	Remove
437	Tilia americana	basswood	dl	>40	2	4822531.11	599658.402			✓	Remove
438	Carya ovata	shagbark hickory	st, dl	>25	2	4822525.8	599658.8193			✓	Remove
439	Carya ovata	shagbark hickory	dl	>25	2	4822520.491	599655.0045			✓	Remove
440	Quercus macrocarpa	bur oak	st, dl	>35	2	4822520.414	599649.1607			✓	Remove
441	Picea glauca	white spruce		>25	1	4822522.045	599664.3677			✓	Remove
442	Picea abies	norway spruce		>25	1	4822531.301	599666.9322			✓	Remove
443	Tilia americana	basswood	st	>30	1	4822453.506	599604.0263			✓	Remove
444	Quercus macrocarpa	bur oak	ab, dl	>35	2	4822443.049	599594.5106			✓	Remove
445	Fraxinus americana	white ash		>25	1	4822410.085	599589.3572		✓		
447	Fraxinus americana	white ash	dl	>25	2	4822319.216	599487.3345			✓	Remove
448	Fraxinus americana	white ash	dl	>25	1	4822305.234	599477.5386			✓	Remove

APPENDIX 12: MINISTRY OF TRANSPORTATION FISH HABITAT ASSESSMENT FIELD SHEETS

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
105056	BRITANNIA EA	02	MAY	2011

Is STREAM REALIGNMENT required for this section:

O Yes O No ✓ Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
C. LORENZ L KNIGHT	SUNNY, WINDY	11:30	11:50

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
14°C	8°C	—

PHOTO NUMBERS AND DESCRIPTIONS: See habitat map

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
Indian Creek	L. Ontario	1	1A

LOCATION OF CROSSING: Britannia Rd, east of Tremaine Rd

GPS COORDINATES:	MTO CHAINAGE:
592778E 4813643N ±8m	—

TOWNSHIP:	MNR DISTRICT:
Milton	Aurora

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:
Ag, Res, Transportation	Road, Railway, Agriculture

EXISTING STRUCTURE TYPE

Bridge O	Box CulvertO	Open Foot Culvert ✓	CSP O	N/A O

Other O Describe:

Size (w x h) m^2 2.48m X 1.1m

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (Include on habitat map)
1A1	US detailed

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	✓	O	O	✓	O	—

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):
20m	~0.01 m/s

SUB-SECTION(S)	Run	Pool	Riffle	Flats	Inside culvert	Other
	O	O	O	O	O	
Percentage of area	10%					
Mean depth wetted (m)	0.14					
Mean width wetted (m)	1.10					
Mean bankfull width (m)	1.60					
Mean bankfull depth(m)	0.45					
Substrate	Si					

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	O	✓	O	O
Right Upstream Bank	O	✓	O	O

HABITAT

IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris	Organic debris	Vascular Macrophytes	None
	10	0	0	Instream 5 Overhanging 0	5	Instream 10 Overhanging 25	45

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	O	O	✓	O	O

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
	—	—	35	65
Predominant Species	—	—	—	

MIGRATORY OBSTRUCTIONS:	None	Seasonal	Permanent
	—	Intermittent	—

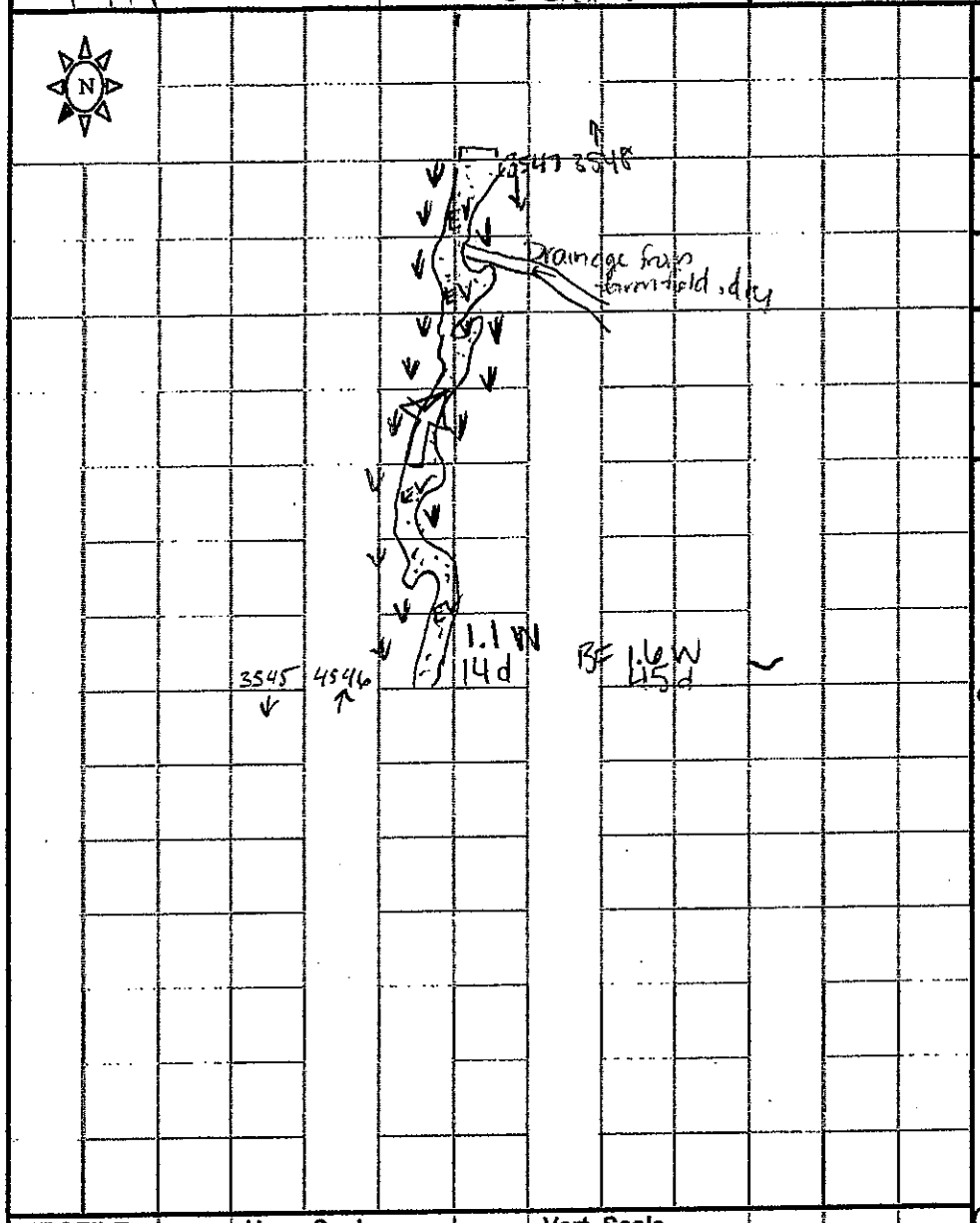
POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other
	—	—	—

POTENTIAL ENHANCEMENT OPPORTUNITIES:

COMMENTS:

Additional Notes Appended? O No O Yes number of pages _____

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
1A1	US ditched	20m	1cm/3m



PROFILE: Horz. Scale Vert. Scale

PROJECT #: 650516

MAPPER: L. Knight

NAME OF WATERBODY: Indian

CROSSING #: 1

STATION #: 1A

DATE: DD-MMM-YY 02-Nov-11

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▓ Island/Bar

⁘ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** * *** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
//////// Eroded Bank

XXX Riprap / Other Stabilization

⊂⊃ Instream Log/Tree
^^^ Dam/Weir/Obstruction

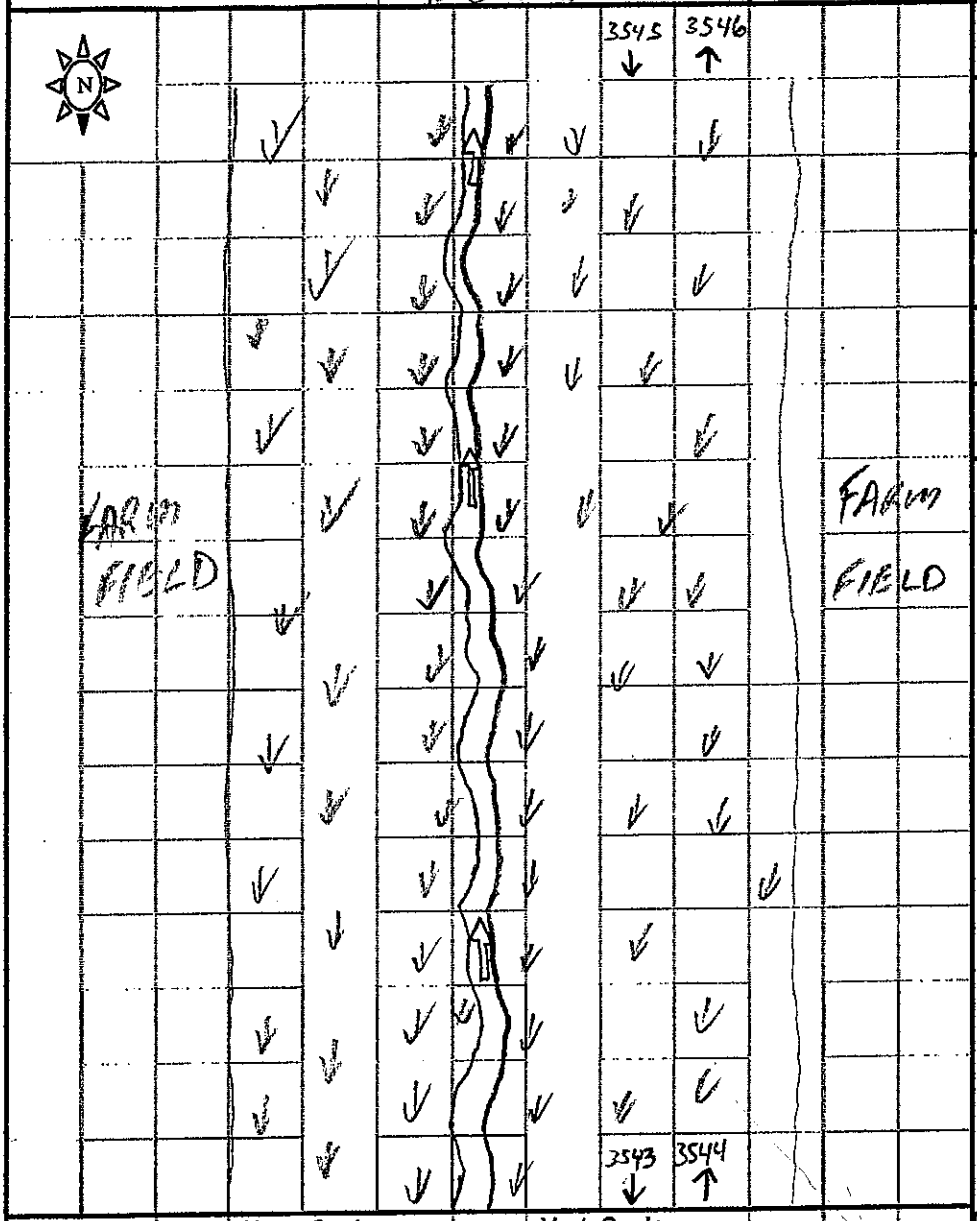
® Riparian Tree

├► Seep/Spring
-------- Undercut Bank

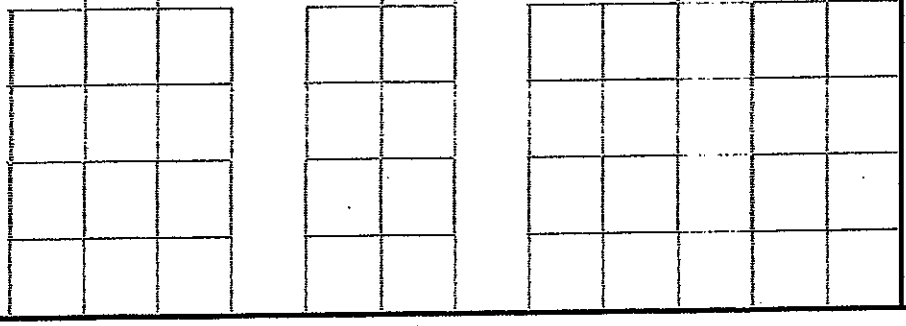
— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
└┘ Culvert

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
1A2	u/s General	30m	1:2



PROFILE: Horz. Scale Vert. Scale



PROJECT #:

MAPPER: C. LORENZ

NAME OF WATERBODY: 16 MILE

CROSSING #: 1 (650926)

STATION #: 1A

DATE: DD-MMM-YY 02-NOV-11

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▓ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** * *** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
//////// Eroded Bank

XXX Riprap / Other Stabilization

⊂⊃ Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree

|▶ Seep/Spring
-------- Undercut Bank

▬ Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
└┘ Culvert

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
	BRITANNIA RD EA	11	OCT	11

Is STREAM REALIGNMENT required for this section:

O Yes O No O Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
KNIGHT CLORENZ	SUNNY, CLOUDY	3:00	

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
24°C	15°C	

PHOTO NUMBERS AND DESCRIPTIONS: SEE HABITAT MAPPING

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
INDIAN CREEK	LAKE ONTARIO	1	1B

LOCATION OF CROSSING: Britannia Rd, east of Tremaine

GPS COORDINATES:	MTO CHAINAGE:
592778 E 4813143N ± 8m	—
TOWNSHIP: MILTON	**MNR DISTRICT:** AURORA

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:
RESIDENTIAL, TRANSPORTATION, AGRICULTURE	AGRICULTURE, ROAD

EXISTING STRUCTURE TYPE

Bridge O	Box Culvert O	Open Foot Culvert ✓	CSP O	N/A O

Other O Describe:

Size (w x h) m² 2.48 x 1.1

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (include on habitat map)
1B1	IN CULVERT

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	O	O	O	✓	O	N/A

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):
7.35	0.01

SUB-SECTION(S)	Run	Pool	Riffle	Flats	Inside culvert	Other
	O	O	O	O	✓	
Percentage of area	—	—	—	—	100	—
Mean depth wetted (m)	—	—	—	—	—	—
Mean width wetted (m)	—	—	—	—	2.48	—
Mean bankfull width (m)	—	—	—	—	2.48	—
Mean bankfull depth(m)	—	—	—	—	—	—
Substrate	—	—	—	—	Si	

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	✓	O	O	O
Right Upstream Bank	✓	O	O	O

HABITAT

IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris Instream Overhanging	Organic debris	Vascular Macrophytes Instream Overhanging	None
							100

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	✓	O	O	O	O

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
Predominant Species				100

MIGRATORY OBSTRUCTIONS:	None	Seasonal	Permanent
	—	Intermittent	—

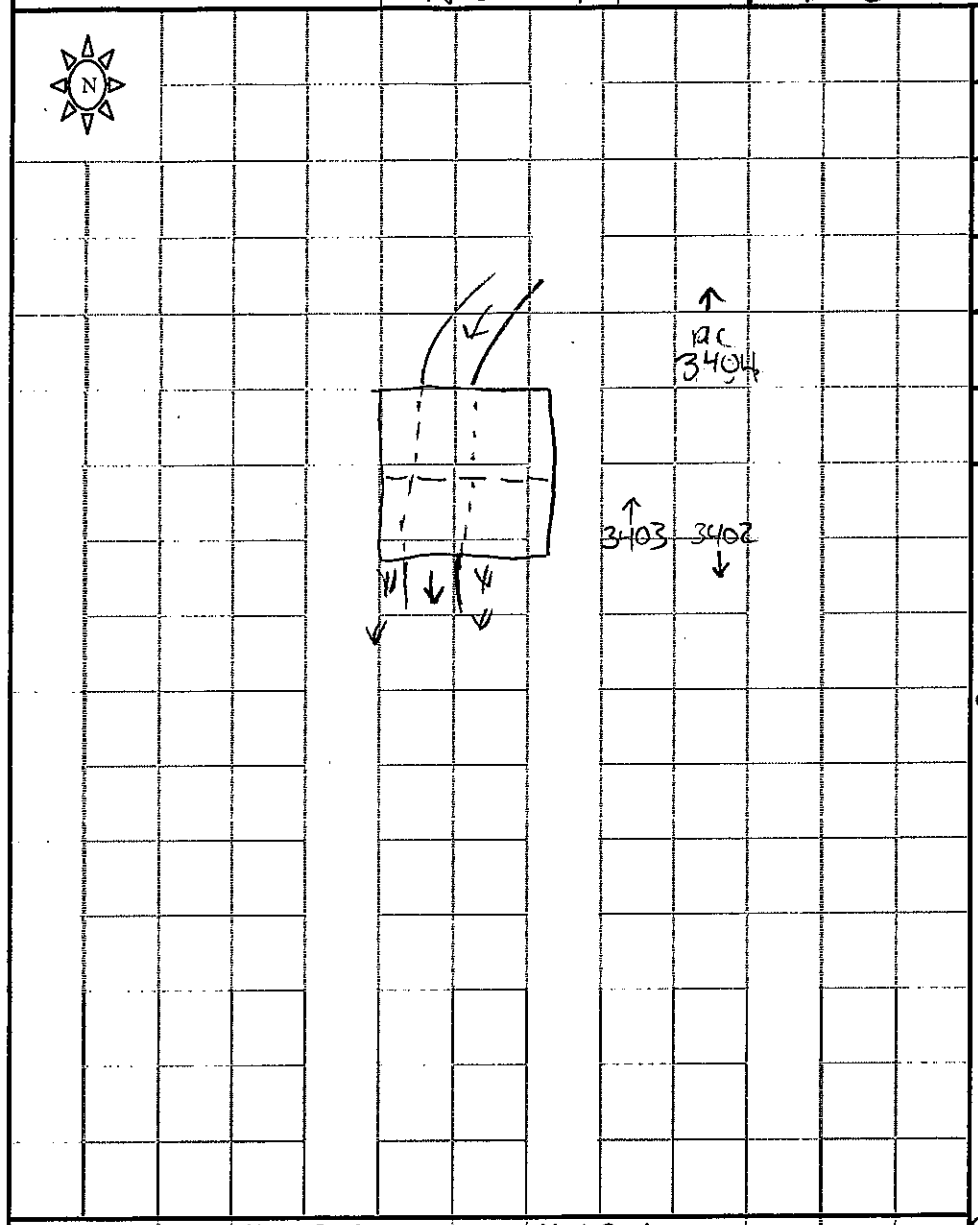
POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other
	—	—	—

POTENTIAL ENHANCEMENT OPPORTUNITIES:

COMMENTS:

Additional Notes Appended? ✓ No O Yes number of pages _____

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
1B1	IN CULVERT	7.35	1 cm / 3m



PROJECT #:	650560
MAPPER:	LKNIGHT
NAME OF WATERBODY:	INDIAN CREEK
CROSSING #:	1
STATION #:	1B
DATE: DD-MMM-YY	11-Oct-11

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▓ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** * *** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
/////// Eroded Bank

XXX Riprap / Other Stabilization

⊂⬭ Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree

├► Seep/Spring
-------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
⊔ Culvert

PROFILE:	Horz. Scale	Vert. Scale

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
60605L6	BRITANNIA RD EA	11	10	2011

Is STREAM REALIGNMENT required for this section:

O Yes O No ✓ Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
L.KNIGHT C.LORENZ	SUNNY, CLOUDY	2:00	

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
24°C	15°C	—

PHOTO NUMBERS AND DESCRIPTIONS: SEE HABITAT MAPPING

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
INDIAN CREEK	LAKE ONTARIO	1	1C

LOCATION OF CROSSING: Britannia Rd, east of Tremaine

GPS COORDINATES:	MTO CHAINAGE:
592806E 4813622N ±3m	—

TOWNSHIP:	MNR DISTRICT:
MILTON	AURORA

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:
AGRICULTURE, RESIDENTIAL, TRANSPORTATION	ROAD, AGRICULTURE

EXISTING STRUCTURE TYPE

Bridge O	Box CulvertO	Open Foot Culvert ✓	CSP O	N/A O

Other O Describe: Size (w x h) m² 2.48m x 1.1m

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (include on habitat map)
1C1	DS detailed

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	O	O	O	✓	O	N/A

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):
50	0.01

SUB-SECTION(S)	Run	Pool	Riffle	Flats	Inside culvert	Other
	O	O	O	✓	O	
Percentage of area	—	—	—	100	—	—
Mean depth wetted (m)	—	—	—	0.15	—	—
Mean width wetted (m)	—	—	—	1.65	—	—
Mean bankfull width (m)	—	—	—	2.9	—	—
Mean bankfull depth(m)	—	—	—	0.50	—	—
Substrate	—	—	—	Cl/Sa	—	—

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	O	✓	O	O
Right Upstream Bank	O	✓	O	O

HABITAT

IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris	Organic debris	Vascular Macrophytes	None
	5	—	—	Instream — Overhanging —	5	Instream 20 Overhanging 50	20

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	O	✓	O	O	O

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
	0	15	70	15
Predominant Species	—	Algae	Grasses (cattails)	

MIGRATORY OBSTRUCTIONS:	None	Seasonal - Intermittent flow	Permanent
	—		—

POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other
	—	—	—

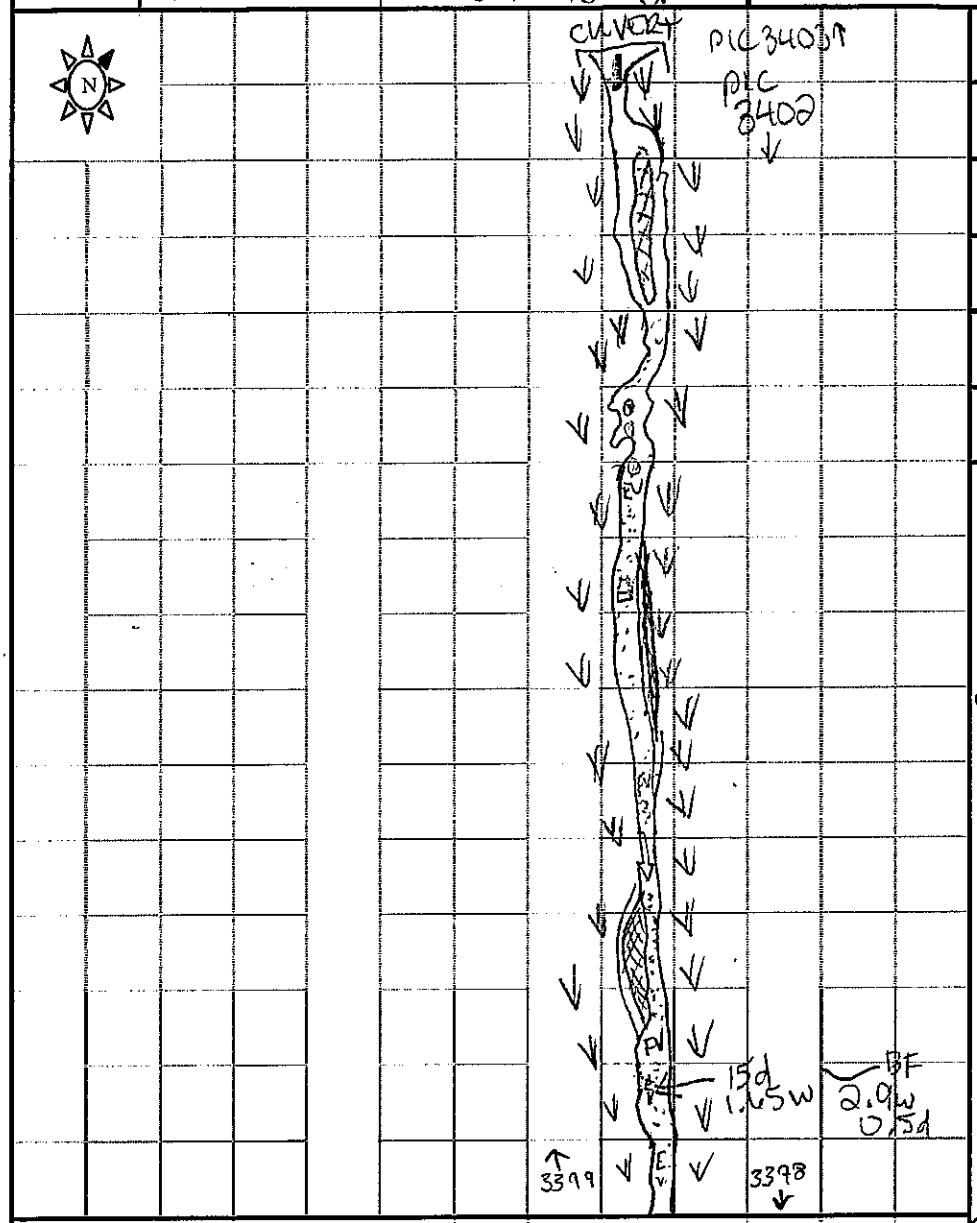
POTENTIAL ENHANCEMENT OPPORTUNITIES:

Larger buffer needed.

COMMENTS:

Additional Notes Appended? ✓ No O Yes number of pages _____

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
C1	DS Detailed	50m	1 cm / 3m



PROFILE: Horz. Scale Vert. Scale

PROJECT #: 65056

MAPPER: L KNIGHT

NAME OF WATERBODY: INDIAN CREEK

CROSSING #: 1

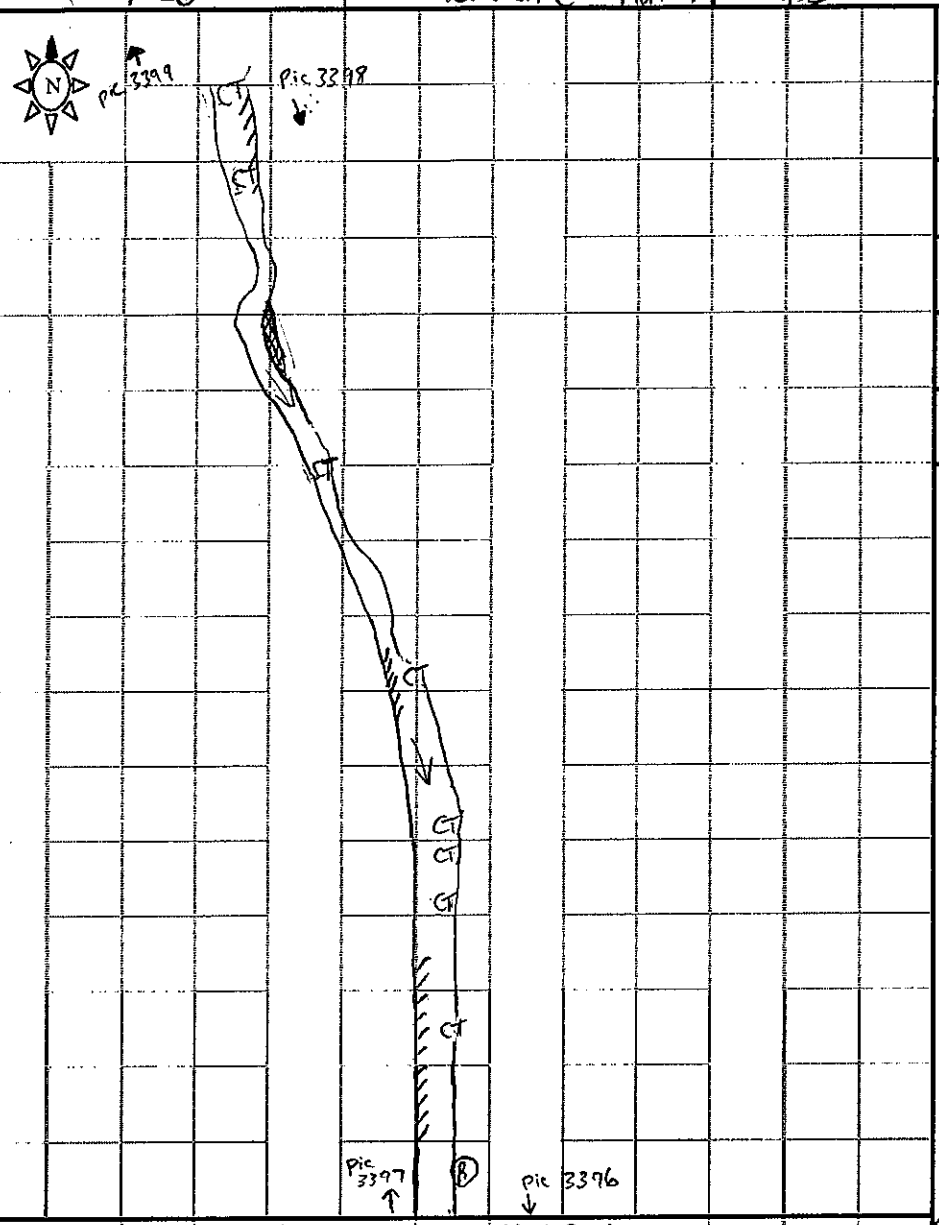
STATION #: 1C

DATE: DD-MMM-YY 11-Oct-11

LEGEND

- Riparian veg
- **10d** depth (cm)
- **6w** width (m)
- ➡ Riffle
- ⇨ Run/Glide
- ⬭ Pool
- ▓ Island/Bar
- ⁘ Fine Substrate
- **###** Gravel Substrate
- **oOooO** Cobble /Boulder
- *** * *** Debris
- **CT** Cattail
- **SV/FV** Submerg/Float Veg
- **EV** Emergent Vegetation
- **W** Watercress
- **Fe** Iron Staining
- **//////** Eroded Bank
- **XXX** Riprap / Other Stabilization
- ⊂⊃ Instream Log/Tree
- **^^^** Dam/Weir/Obstruction
- ® Riparian Tree
- ⊢► Seep/Spring
- **--------** Undercut Bank
- **—** Barrier to Fish Movement
- **-S-** Seasonal Barrier
- **-x--x-** Fence line
- ⊔ Culvert

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
IC2	DS General (US half)	75	1cm/5m



PROFILE: Horz. Scale Vert. Scale

PROJECT #: 605054

MAPPER: C. Lorenz

NAME OF WATERBODY: Indian Creek

CROSSING #: 1

STATION #: PC

DATE: DD-MMM-YY 11 - 10 - 11

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▓ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** * *** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
/////// Eroded Bank

XXX Riprap / Other Stabilization

⊂⊃ Instream Log/Tree
^^^ Dam/Weir/Obstruction

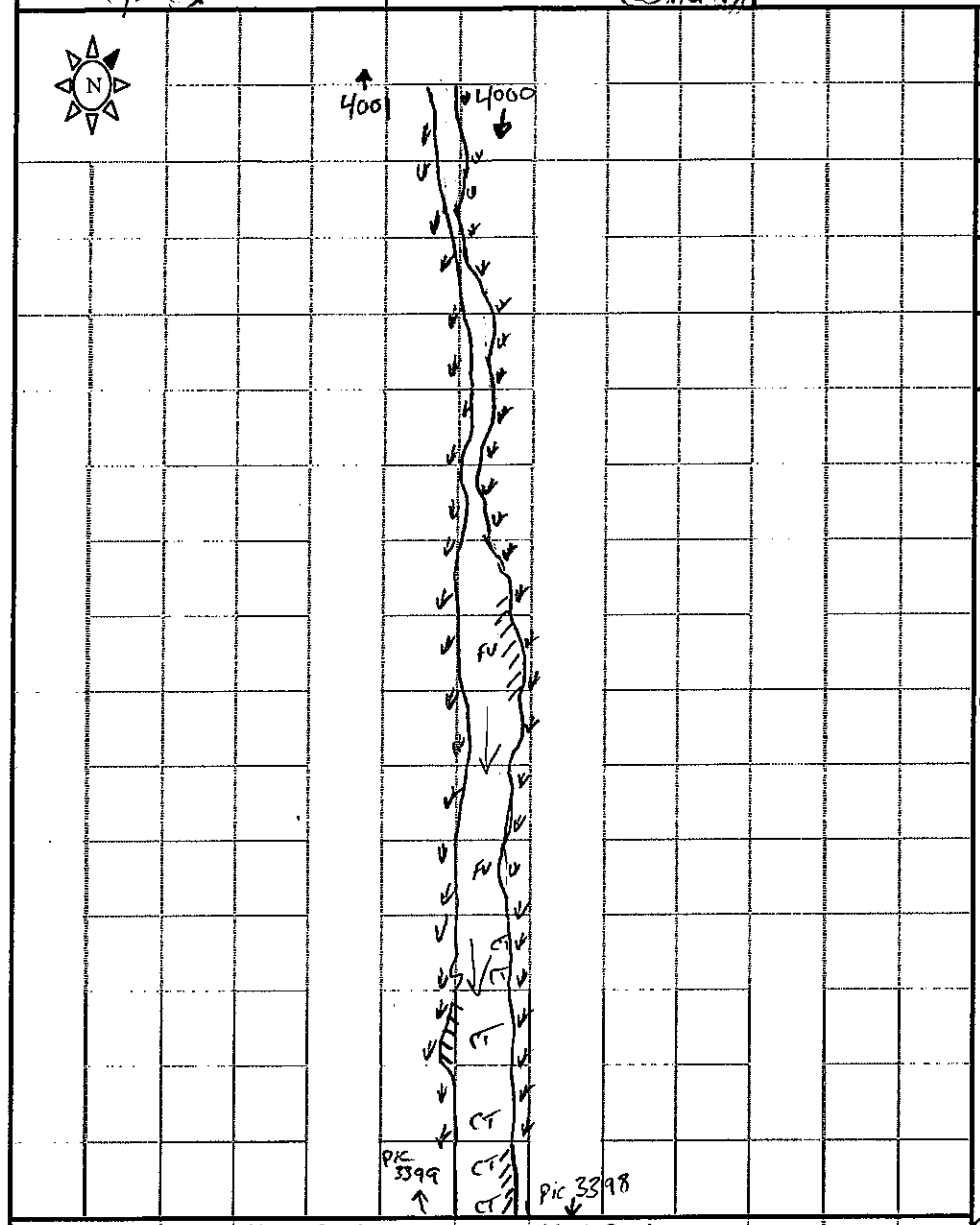
Ⓡ Riparian Tree

├▶ Seep/Spring
-------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
└┘ Culvert

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
1C2	DS GENERAL (DS Half)	75 m	1 cm / 5m



PROFILE: Horz. Scale Vert. Scale

PROJECT #: 050576

MAPPER: C. Lorenz

NAME OF WATERBODY: Indian Creek

CROSSING #: 1

STATION #: 1C

DATE: DD-MMM-YY 11-10-11

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▓ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** * *** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
/////// Eroded Bank

XXX Riprap / Other Stabilization

⊂⬭⊃ Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree

├► Seep/Spring
-------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
└┘ Culvert

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
60056	Britannia EA	12	10	2011

Is STREAM REALIGNMENT required for this section:

O Yes O No ☑ Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
C Lorenz L Knight	Overcast	9:35	9:55

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
17°C	—	—

PHOTO NUMBERS AND DESCRIPTIONS: See habitat mapping

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
Indian Creek	Lake Ontario	2	2C

LOCATION OF CROSSING: Britannia Rd, east of train tracks b/w Tremaine + 1st Line.

GPS COORDINATES:	MTO CHAINAGE:
17T 594213E 4811187N ± 4m	—

TOWNSHIP:	MNR DISTRICT:
Milton	Aurora

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:
Residential, Transportation, Agriculture	Agriculture, Road

EXISTING STRUCTURE TYPE

Bridge O	Box Culvert O	Open Foot Culvert O	CSP ☑	N/A O

Other O Describe: Size (w x h) m² 1.3 m CSP

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (include on habitat map)
2C1	DS DETAILED

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	☑	O	O	☑	☑	NO

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):
50	N/A

SUB-SECTION(S)	Run	Pool	Riffle	Flats	Inside culvert	Other
	O	O	O	O	O	DRY CHANNEL
Percentage of area	—	—	—	—	—	100
Mean depth wetted (m)	—	—	—	—	—	—
Mean width wetted (m)	—	—	—	—	—	—
Mean bankfull width (m)	—	—	—	—	—	1.95
Mean bankfull depth(m)	—	—	—	—	—	0.44
Substrate	—	—	—	—	—	Cl/Sa

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	✓	O	O	O
Right Upstream Bank	✓	O	O	O

HABITAT

IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris	Organic debris	Vascular Macrophytes	None
	0	0	0	Instream 0 Overhanging 0	5	Instream 35 Overhanging 50	10

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	✓	O	O	O	O

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
	0	0	90	10
Predominant Species	—	—	Cattails, grasses, shrubs	

MIGRATORY OBSTRUCTIONS:	None	Seasonal	Permanent
	—	Ephemeral Flow	—

POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other
	—	—	—

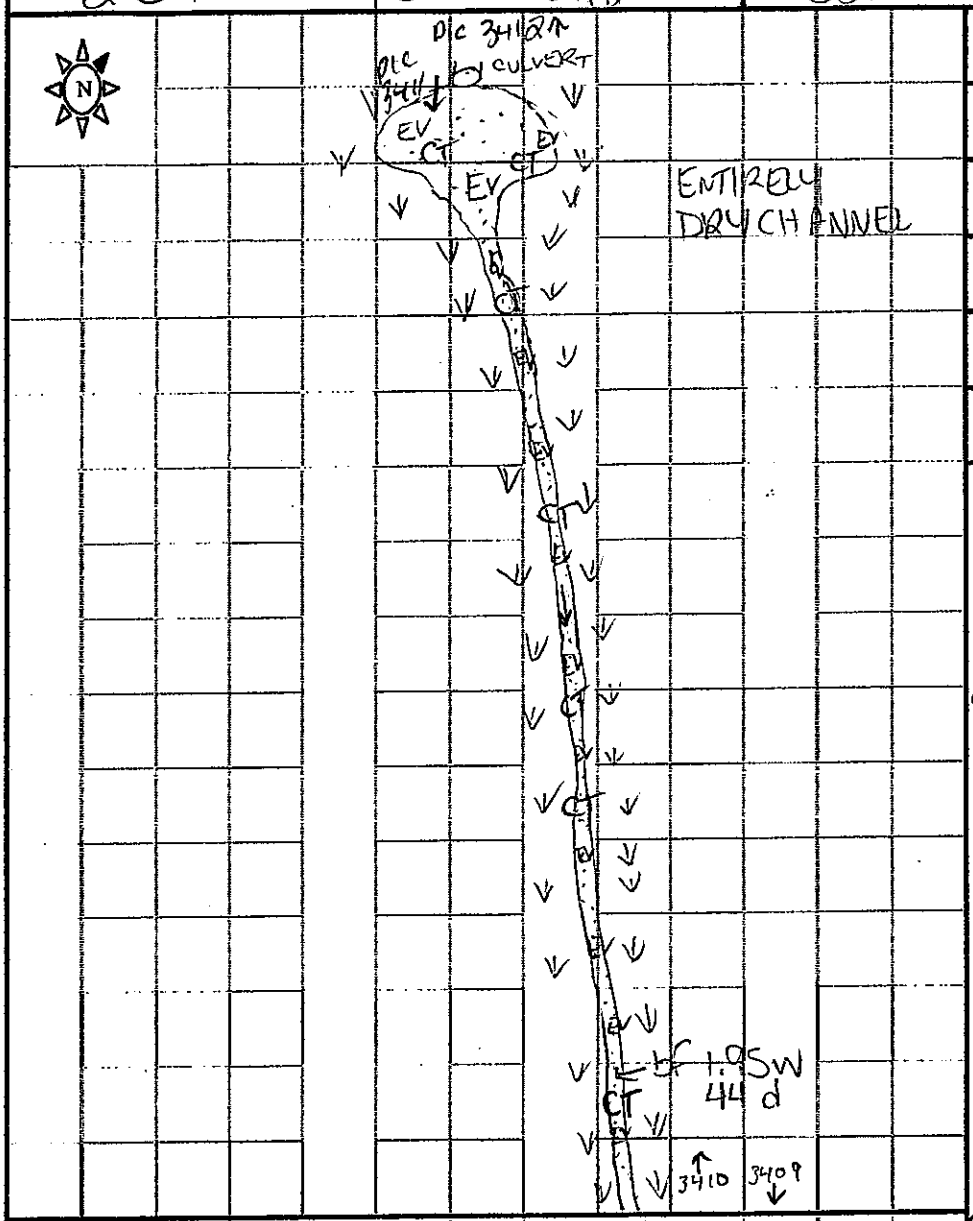
POTENTIAL ENHANCEMENT OPPORTUNITIES:

Open bottom culvert

COMMENTS:

Additional Notes Appended? ✓ No O Yes number of pages _____

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
2C1	DS detailed	50m	1 cm / 3m



PROFILE: Horz. Scale Vert. Scale

PROJECT #: 65056

MAPPER: L Knight

NAME OF WATERBODY: Indian Creek

CROSSING #: 2

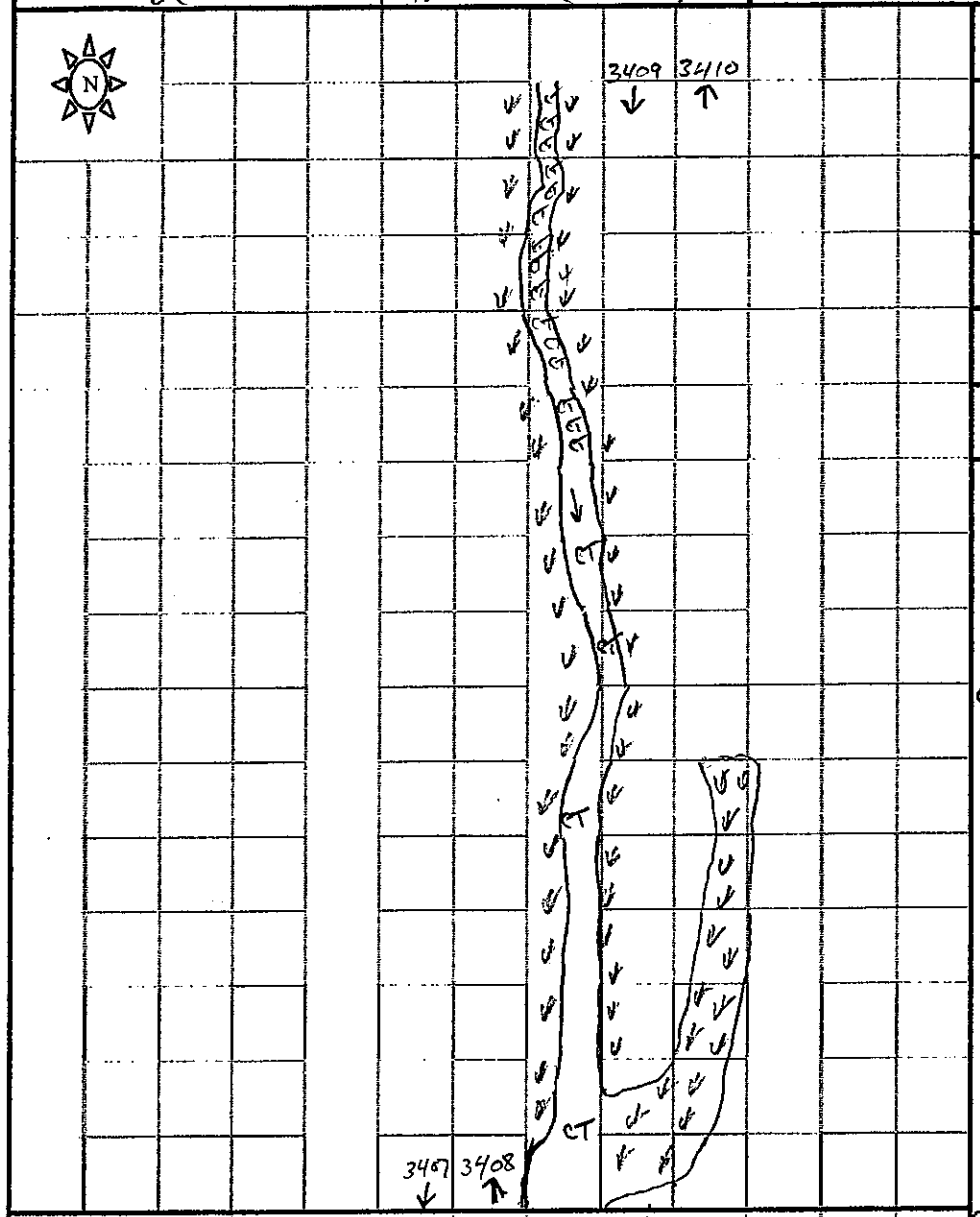
STATION #: 2C

DATE: DD-MMM-YY 12-Oct-11

LEGEND

- riparian veg
- **10d** depth (cm)
- **6w** width (m)
- ➡ Riffle
- ⇨ Run/Glide
- Pool
- Island/Bar
- Fine Substrate
- **###** Gravel Substrate
- **oOooO** Cobble /Boulder
- *** * *** Debris
- **CT** Cattail
- **SV/FV** Submerg/Float Veg
- **EV** Emergent Vegetation
- **W** Watercress
- **Fe** Iron Staining
- **//////** Eroded Bank
- **XXX** Riprap / Other Stabilization
- Instream Log/Tree
- **^^^** Dam/Weir/Obstruction
- ® Riparian Tree
- Seep/Spring
- **------** Undercut Bank
- **—** Barrier to Fish Movement
- **-S-** Seasonal Barrier
- **-x--x-** Fence line
- Culvert

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
2C2	D/S General (us half)	75	1cm = 5m



PROFILE: Horz. Scale Vert. Scale

PROJECT #:	650510
MAPPER:	C. LORENZ
NAME OF WATERBODY:	INDIAN CREEK
CROSSING #:	2
STATION #:	2C
DATE: DD-MMM-YY	12 - Oct - 11

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▮ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
/////// Eroded Bank

XXX Riprap / Other Stabilization

⊂⊃ Instream Log/Tree
^^^ Dam/Weir/Obstruction

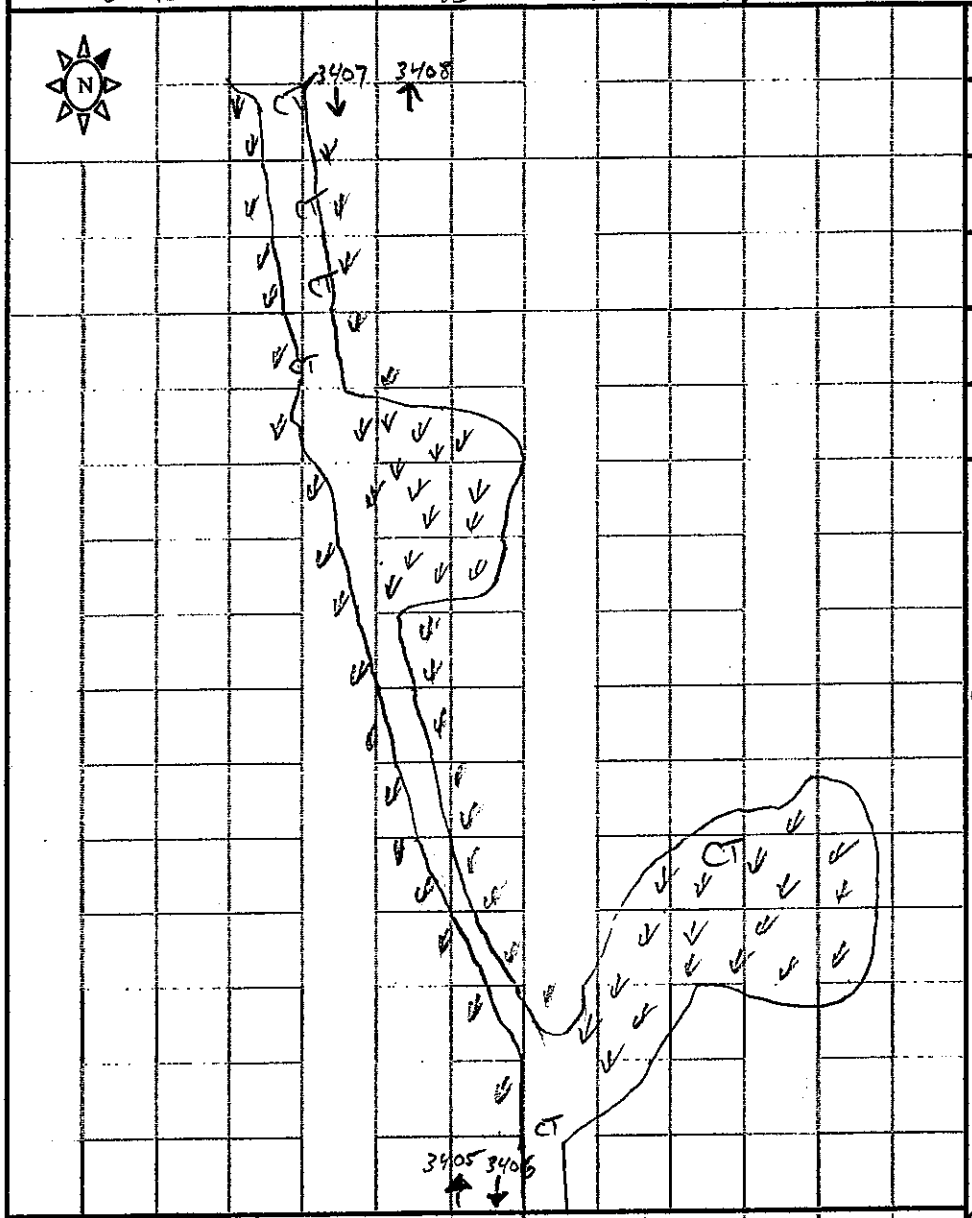
® Riparian Tree

├▶ Seep/Spring
------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
└┘ Culvert

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
2C3	D/S General (d/s Hall)	75 m	1 cm = 5 m



PROFILE: Horz. Scale Vert. Scale

PROJECT #:

MAPPER: C. Lorenz

NAME OF WATERBODY: INDIAN CREEK

CROSSING #: 2

STATION #: 2C

DATE: DD-MMM-YY 12-Oct-11

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▇ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** * *** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
/////// Eroded Bank

XXX Riprap / Other Stabilization

⊂⊃ Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree

├▶ Seep/Spring
------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
└┘ Culvert

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
650560	Britannia SA	01	Nov	11

Is STREAM REALIGNMENT required for this section:

O Yes O No ✓ Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
C. Lorem, L. Knight	Sunny	1105	1117

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
11°C	7°C	—

PHOTO NUMBERS AND DESCRIPTIONS: See habitat map

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
Indian	L Ontario	2	2A

LOCATION OF CROSSING: Britannia Rd, east of train tracks blw Tremaine and 1st Line

GPS COORDINATES:	MTO CHAINAGE:
593213E 4814187N ±4m	—
TOWNSHIP: Milton	**MNR DISTRICT:** Aurora

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:
Transportation, Agriculture	Road, Agriculture, Train tracks

EXISTING STRUCTURE TYPE

Bridge O	Box CulvertO	Open Foot Culvert O	CSP ✓	N/A O

Other O Describe: Size (w x h) m^2 1.3m CSP

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (include on habitat map)
2A1	US detailed

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	✓	O	O	✓	O	NO

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):
20m	0.01

SUB-SECTION(S)	Run	Pool	Riffle	Flats	Inside culvert	Other
	O	O	O	O	O	
Percentage of area	100					
Mean depth wetted (m)	0.10					
Mean width wetted (m)	2.10					
Mean bankfull width (m)	2.50					
Mean bankfull depth(m)	0.45					
Substrate	Cl/Si					

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	✓	0	0	0
Right Upstream Bank	✓	0	0	0

HABITAT

IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris	Organic debris	Vascular Macrophytes	None
	0	0	0	Instream 0 Overhanging 0	0	Instream 70 Overhanging 20	10

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	0	✓	0	0	0

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
	0	0	90	
Predominant Species	—	—	cattails, grasses	10

MIGRATORY OBSTRUCTIONS:	None	Seasonal	Permanent
	—	Intermittent	—

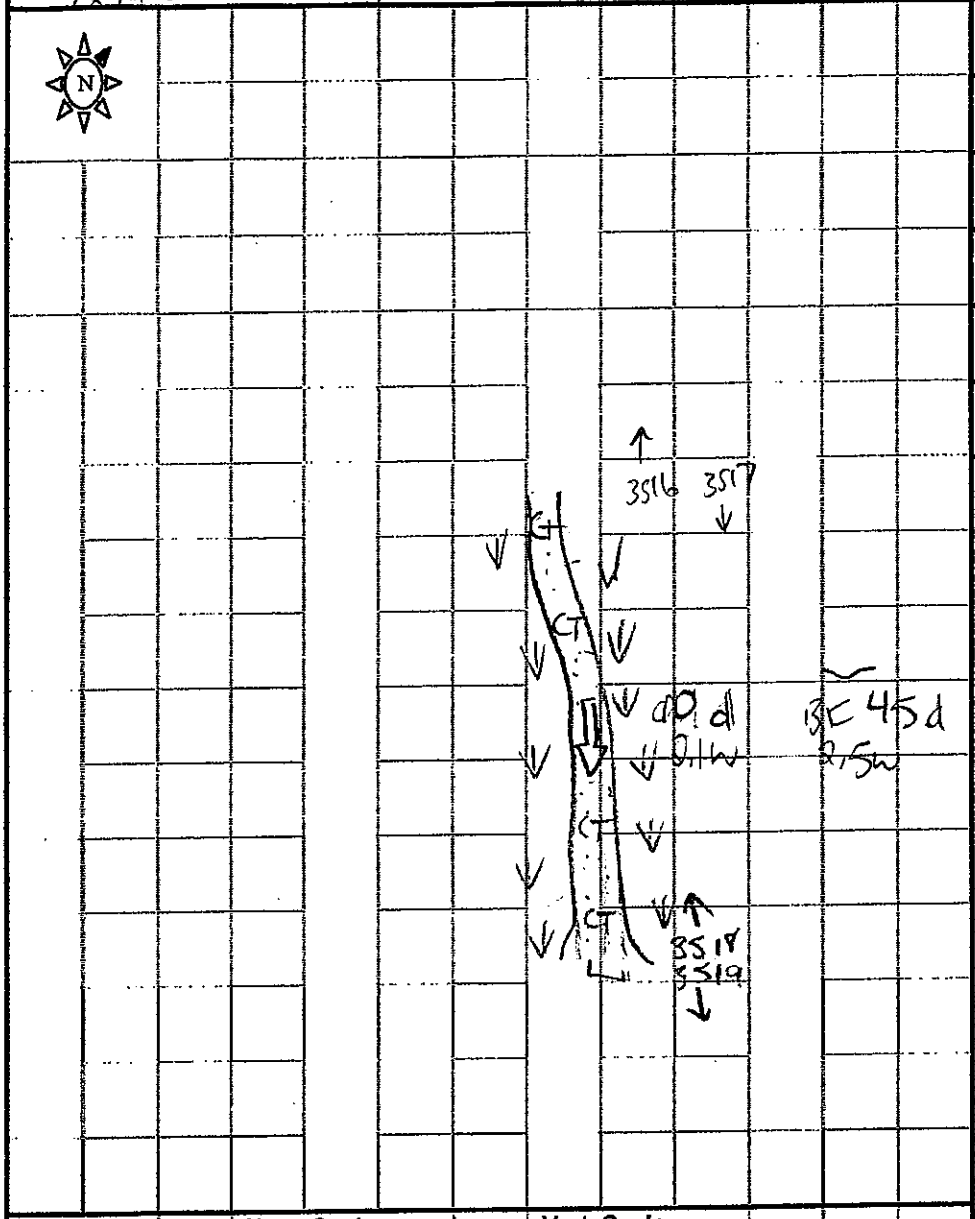
POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other
	—		—

POTENTIAL ENHANCEMENT OPPORTUNITIES:

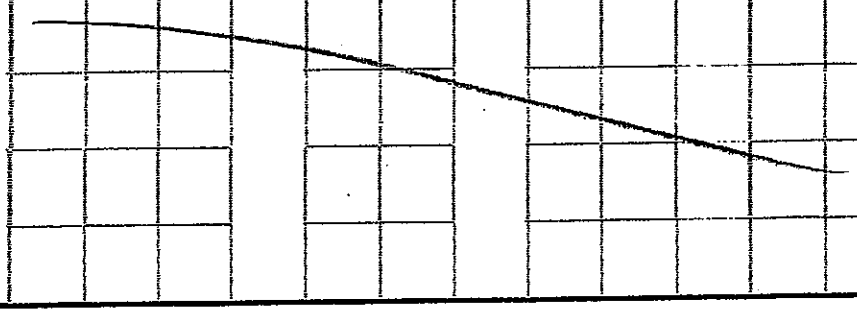
COMMENTS:

Additional Notes Appended? O No O Yes number of pages _____

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
2A1	US debated	20 m	1cm/3m



PROFILE: Horz. Scale Vert. Scale



PROJECT #: 05063

MAPPER: LKnight

NAME OF WATERBODY: 16 Mile

CROSSING #: 2

STATION #: 2A

DATE: DD-MMM-YY 01-Nov-11

LEGEND

10d depth (cm)
6w width (m)

➡ Riffle
⇨ Run/Glide
⬭ Pool
▇ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** * *** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
//////// Eroded Bank

XXX Riprap / Other Stabilization

⊂⊃ Instream Log/Tree
^^^ Dam/Weir/Obstruction

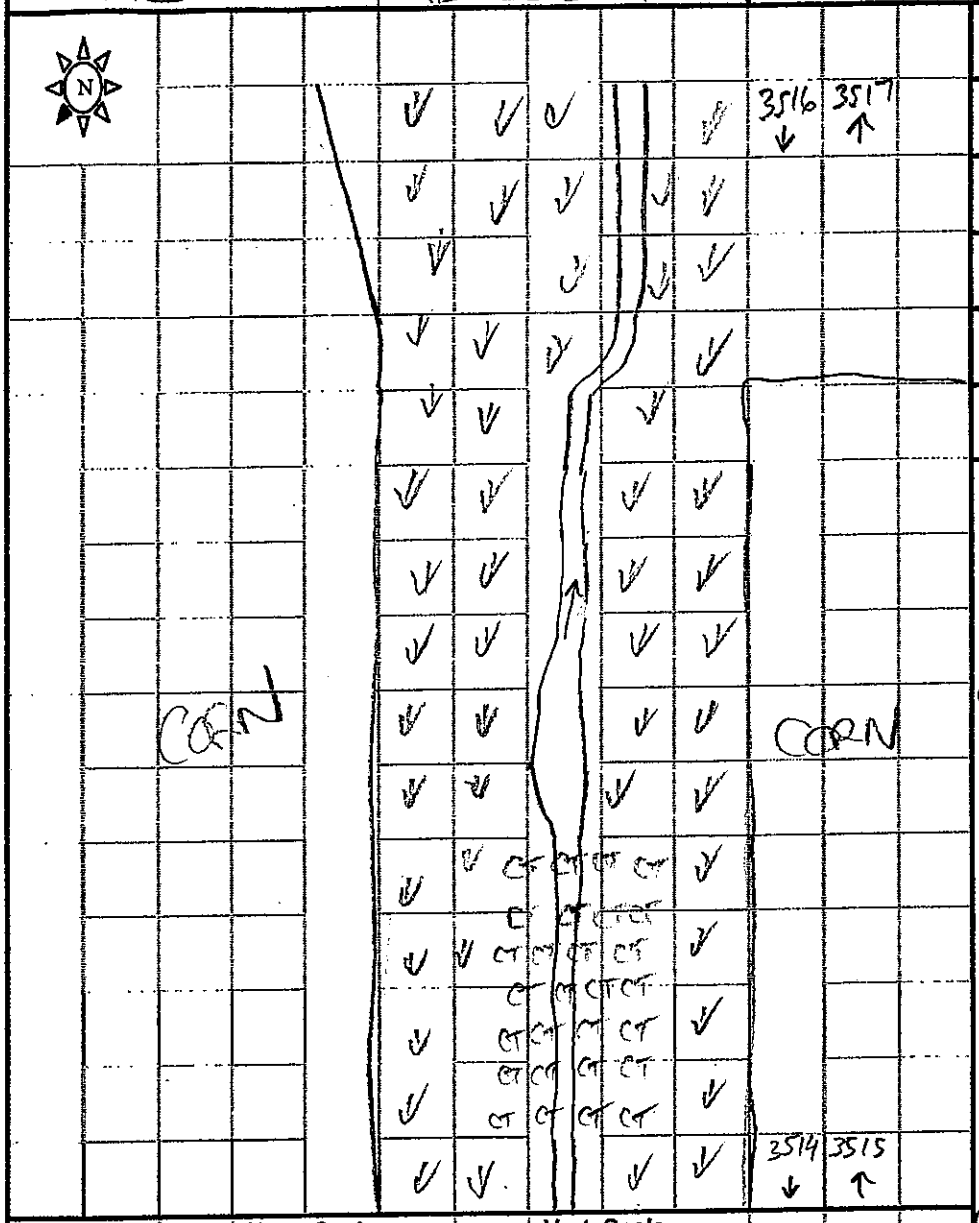
® Riparian Tree

├► Seep/Spring
-------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
└┘ Culvert

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
2AZ	U/S General	30	1/2



PROFILE: Horz. Scale Vert. Scale

PROJECT #: 650163

MAPPER: C. Lorenz

NAME OF WATERBODY: 16 MILE

CROSSING #: 2

STATION #: 2A

DATE: DD-MMM-YY 01-NOV-11

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▓ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
//////// Eroded Bank

XXX Riprap / Other Stabilization

⊂⊃ Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree

├► Seep/Spring
------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
└┘ Culvert

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
050516	BRITANNIA EA	12	Oct	2011

Is STREAM REALIGNMENT required for this section:

O Yes O No ✓ Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
C. LORENZ L. KNIGHT	OVERCAST	10:07	10:21

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
17°C	—	—

PHOTO NUMBERS AND DESCRIPTIONS: See habitat mapping

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
Indian Creek	Lake Ontario	2	2B

LOCATION OF CROSSING: Britannia Rd, east of train tracks betw. Trafalgar and 1st Line

GPS COORDINATES:	MTO CHAINAGE:
593213E 4814187N ± 4m	—

TOWNSHIP:	MNR DISTRICT:
MILTON	Aurora

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:
Agriculture, Residential, Transportation	Agriculture, Road

EXISTING STRUCTURE TYPE

Bridge O	Box Culvert O	Open Foot Culvert O	CSP ✓	N/A O

Other O Describe: Size (w x h) m^2 1.3m CSP

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (include on habitat map)
2B1	In culvert

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	O	O	O	O	✓	No

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):
11.1	0.01

SUB-SECTION(S)	Run	Pool	Riffle	Flats	Inside culvert	Other
	O	O	O	O	✓	
Percentage of area	—	—	—	—	100	—
Mean depth wetted (m)	—	—	—	—	—	—
Mean width wetted (m)	—	—	—	—	—	—
Mean bankfull width (m)	—	—	—	—	1.3	—
Mean bankfull depth(m)	—	—	—	—	0.21	—
Substrate	—	—	—	—	Si	—

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	✓	O	O	O
Right Upstream Bank	✓	O	O	O

HABITAT

IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris / Instream / Overhanging	Organic debris	Vascular Macrophytes / Instream / Overhanging	None
100% culvert							100

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	✓	O	O	O	O

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
Predominant Species	—	—	—	100

MIGRATORY OBSTRUCTIONS:	None	Seasonal	Permanent
	—	Ephemeral flow	—

POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other
	—	—	—

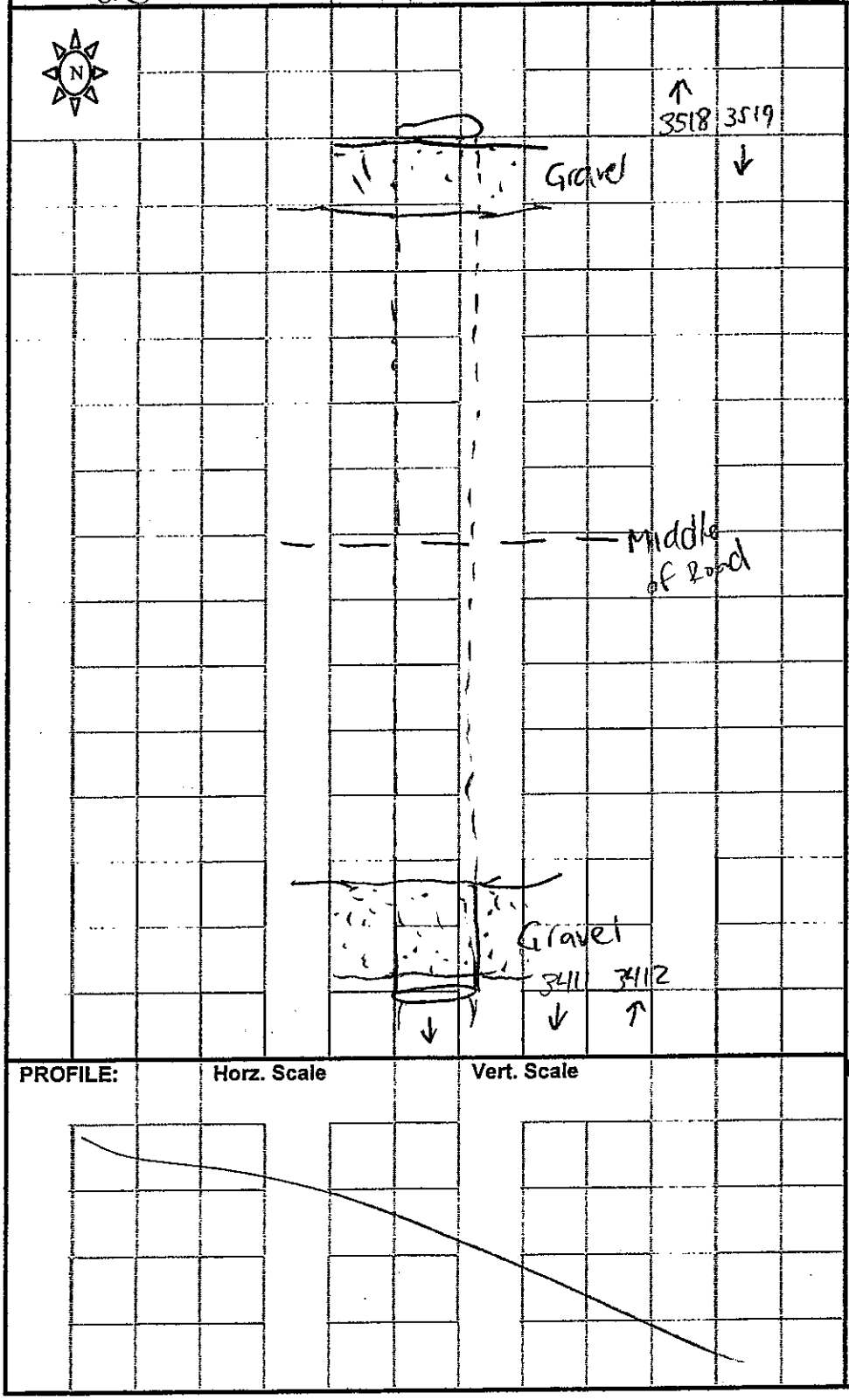
POTENTIAL ENHANCEMENT OPPORTUNITIES:

Open bottom culvert.

COMMENTS:

Additional Notes Appended? ✓ No O Yes number of pages _____

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
2B1	In culvert	11.1	1cm/1m



PROJECT #: 05056

MAPPER: LKnight

NAME OF WATERBODY: Indiancreek

CROSSING #: 2

STATION #: 2B

DATE: DD-MMM-YY 12-Oct-11

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▮ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
* * * Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
/////// Eroded Bank

XXX Riprap / Other Stabilization

⊂⊃ Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree

├► Seep/Spring
------ Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
└┘ Culvert

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
650560	Britannia EA	12	Oct	11

Is STREAM REALIGNMENT required for this section:

O Yes O No ✓ Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
C Lorenz, L Knight	Overcast, rainy	11:20	11:30

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
18°C	—	—

PHOTO NUMBERS AND DESCRIPTIONS: See habitat mapping

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
Indian Creek	L.ON	3	35

LOCATION OF CROSSING: Britannia Rd, west of 1st Line.

GPS COORDINATES:	MTO CHAINAGE:
0593335E 4814352N ±5m	—
TOWNSHIP: Milton	**MNR DISTRICT:** Aurora

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:
Ag, Res, rans.	Roads, Agriculture

EXISTING STRUCTURE TYPE

Bridge O	Box Culvert O	Open Foot Culvert ✓	CSP O	N/A O

Other O Describe:

Size (w x h) m^2 5.2 x 0.71

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (include on habitat map)
351	In Culvert

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	✓	O	O	O	✓	—

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):
19	—

SUB-SECTION(S)	Run	Pool	Riffle	Flats	Inside culvert	Other
	O	O	O	O	✓	1
Percentage of area					100	—
Mean depth wetted (m)					—	—
Mean width wetted (m)					5.2	—
Mean bankfull width (m)					5.2	—
Mean bankfull depth(m)					—	—
Substrate					Cl/Sa.	—

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	✓	O	O	O
Right Upstream Bank	✓	O	O	O

HABITAT

IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris / Instream / Overhanging	Organic debris	Vascular Macrophytes / Instream / Overhanging	None
100% CULVERT							100

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	✓	O	O	O	O

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
Predominant Species				100

MIGRATORY OBSTRUCTIONS:	None	Seasonal	Permanent

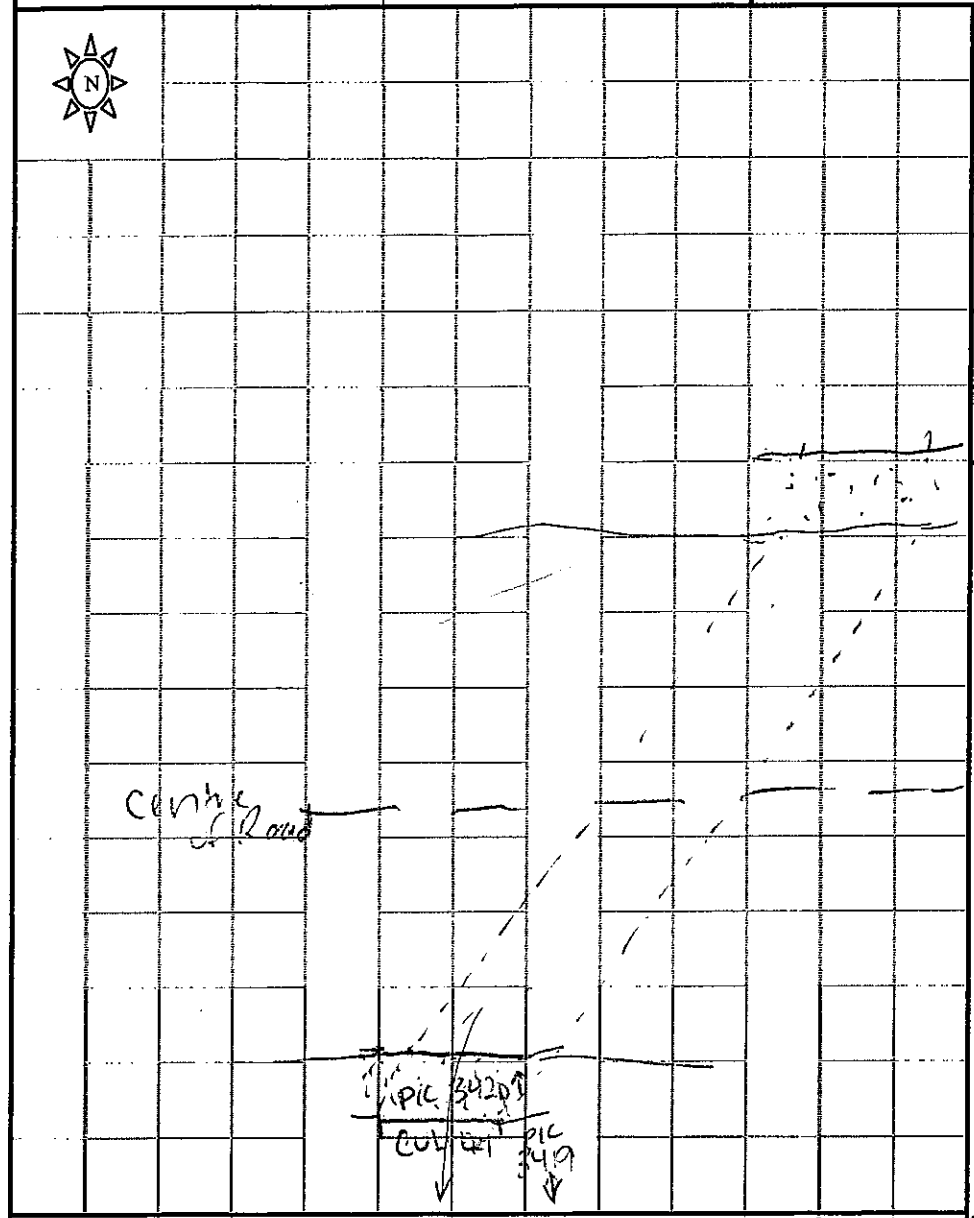
POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other

POTENTIAL ENHANCEMENT OPPORTUNITIES:

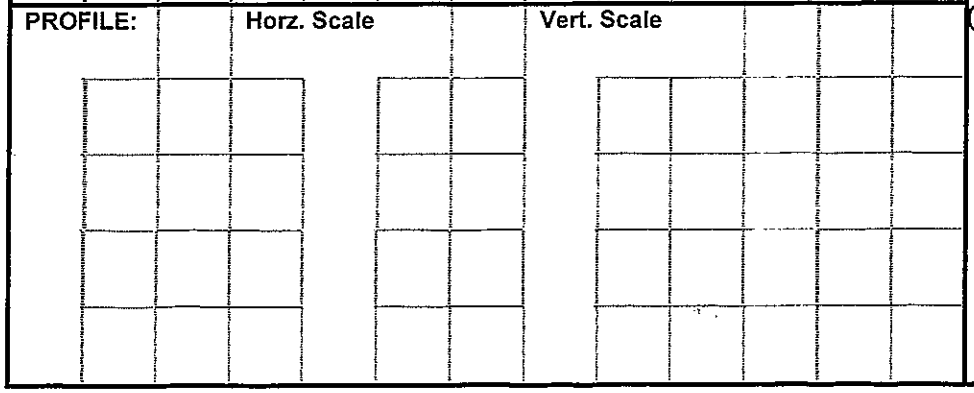
COMMENTS:

Additional Notes Appended? O No O Yes number of pages _____

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
3B1	IN CULVERT	19	1cm / 3m



PROFILE: Horz. Scale Vert. Scale



PROJECT #: 650560

MAPPER: L Knight

NAME OF WATERBODY: Indian Creek

CROSSING #: 3

STATION #: 3B

DATE: DD-MMM-YY 12-Oct-11

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▓ Island/Bar

⁘ Fine Substrate
Gravel Substrate
oOooO Cobble /Boulder
* * * Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
//////// Eroded Bank

XXX Riprap / Other Stabilization

⊂⊃ Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree

├▶ Seep/Spring
-------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
└┘ Culvert

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
650524	Britannia EA	12	Oct	11

Is STREAM REALIGNMENT required for this section:

O Yes O No ✓ Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
C Lorenz L Knight	overcast, drizzling	11:00	11:15

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
18°C	—	—

PHOTO NUMBERS AND DESCRIPTIONS: See habitat mapping

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
Indian Cr.	L. ON	3	3C

LOCATION OF CROSSING: Britannia Rd, west of 1st Line

GPS COORDINATES:	MTO CHAINAGE:
5093348 1435E, N	—
TOWNSHIP: Milton	**MNR DISTRICT:** Aurora

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:
Ag, Res, Trans	Ag, Trans

EXISTING STRUCTURE TYPE

Bridge O	Box CulvertO	Open Foot Culvert ✓	CSP O	N/A O

Other O Describe:

Size (w x h) m² 5.2 m x 0.7 m

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (include on habitat map)
3C1	DS detailed

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	✓	O	O	O	✓	—

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):
50m	—

SUB-SECTION(S)	Run	Pool	Riffle	Flats	Inside culvert	Other
	O	O	O	O	O	Dry Channel
Percentage of area						100%
Mean depth wetted (m)						
Mean width wetted (m)						
Mean bankfull width (m)						0.75
Mean bankfull depth(m)						0.14
Substrate						Cl/Si

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	✓	O	O	O
Right Upstream Bank	✓	O	O	O

HABITAT

IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris	Organic debris	Vascular Macrophytes	None
	0	0	0	Instream 0 Overhanging 0	0	Instream 50 Overhanging 50	0

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	O	✓	O	O	O

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
	0	0	100	
Predominant Species	—	—	Gr, Herbs, Catt.	0

MIGRATORY OBSTRUCTIONS:	None	Seasonal	Permanent
	—	✓ Eph.	—

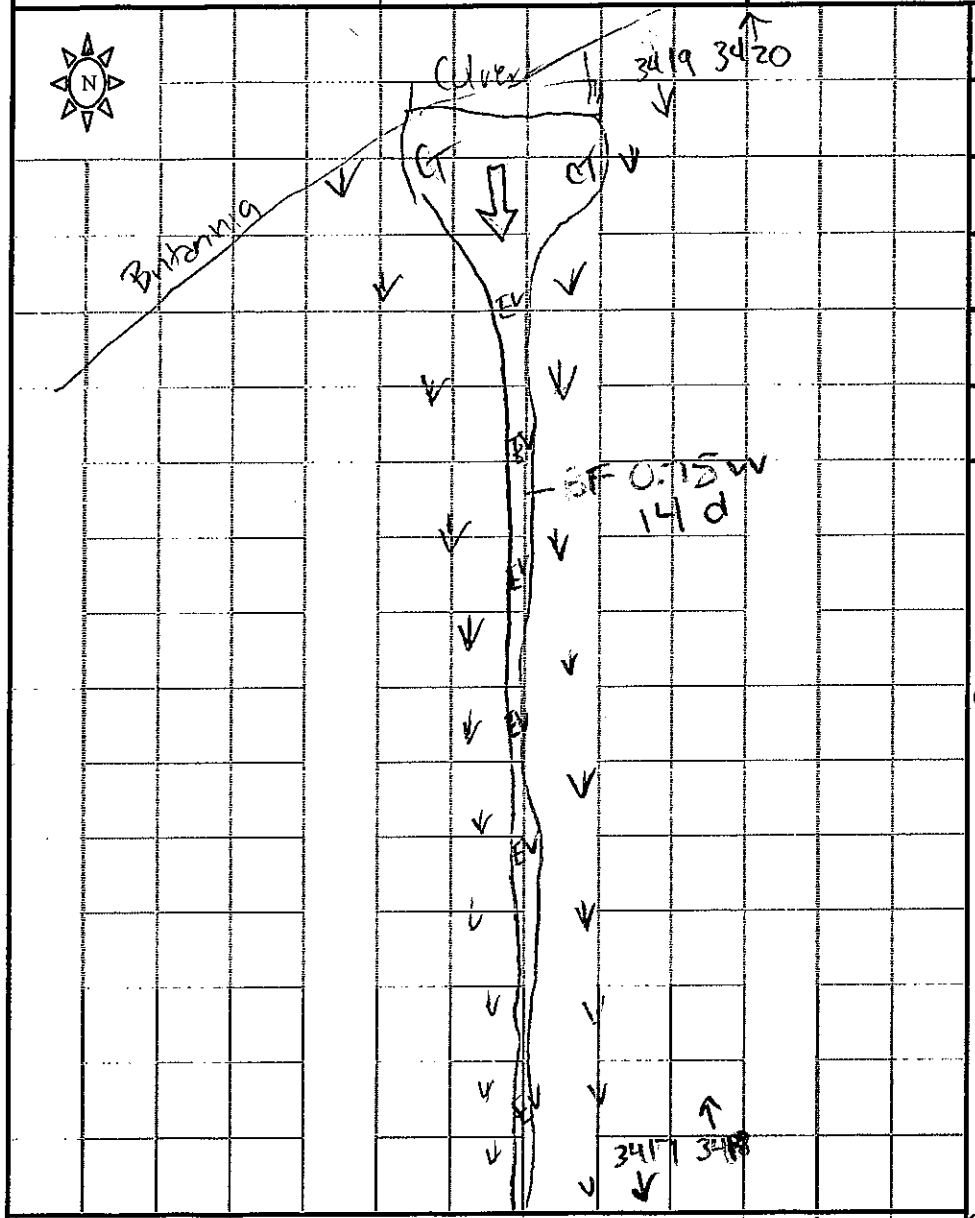
POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other
	—	—	✓

POTENTIAL ENHANCEMENT OPPORTUNITIES:

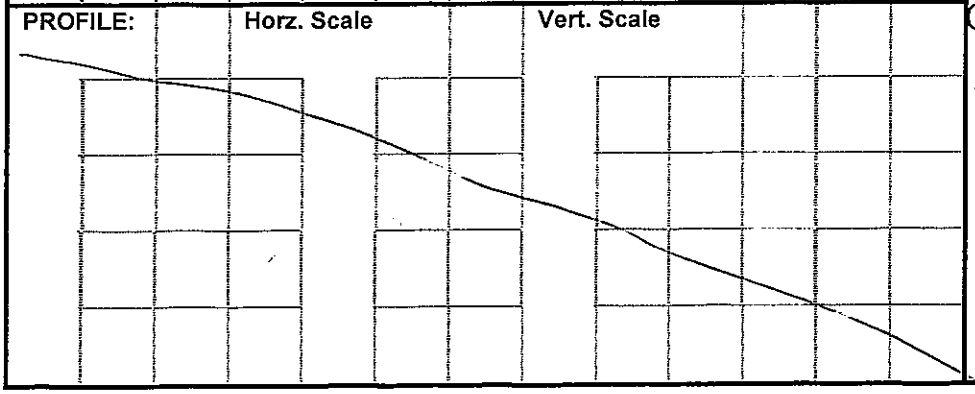
COMMENTS:

Additional Notes Appended? O No O Yes number of pages _____

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
3C1	DSDETAILED	50 m	1cm / 3m



PROFILE: Horz. Scale Vert. Scale



PROJECT #:	6505b
MAPPER:	LKnight
NAME OF WATERBODY:	Indian Cr.
CROSSING #:	3
STATION #:	3C
DATE: DD-MMM-YY	12-Oct-11

LEGEND

10d depth (cm)
6w width (m)

➡ Riffle
⇨ Run/Glide
⬭ Pool
▓ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** * *** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
/////// Eroded Bank

XXX Riprap / Other Stabilization

⊂⊃ Instream Log/Tree
^^^ Dam/Weir/Obstruction

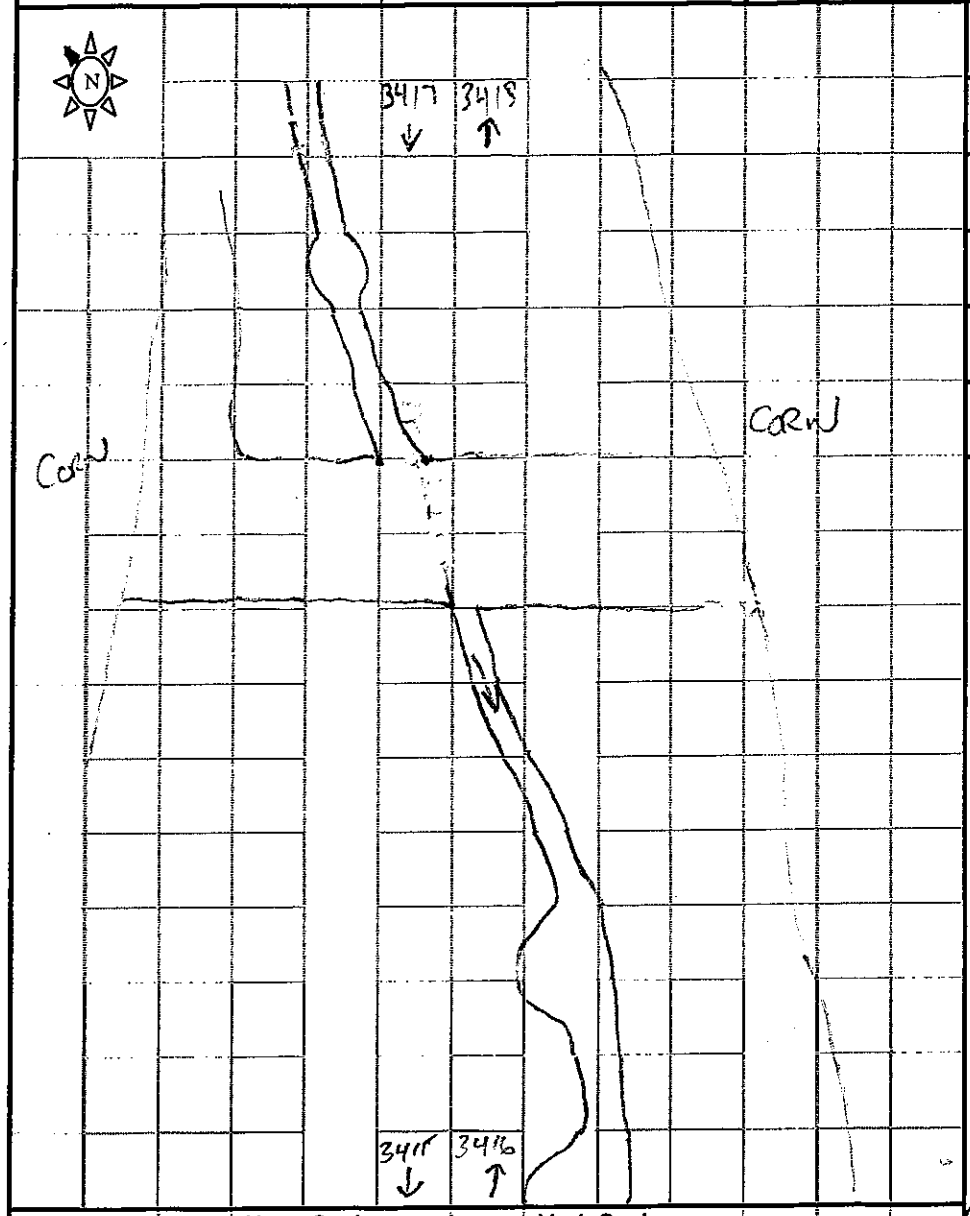
® Riparian Tree

├▶ Seep/Spring
-------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
└┘ Culvert

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
3C2	DS GENERAL (US END)	75 m	1cm/5m



PROFILE: Horz. Scale Vert. Scale

PROJECT #:	65056
MAPPER:	C. LORENZ
NAME OF WATERBODY:	
CROSSING #:	3
STATION #:	3C
DATE: DD-MMM-YY	12-Oct-11

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▓ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
/////// Eroded Bank

XXX Riprap / Other Stabilization

⊂⬭ Instream Log/Tree
^^^ Dam/Weir/Obstruction

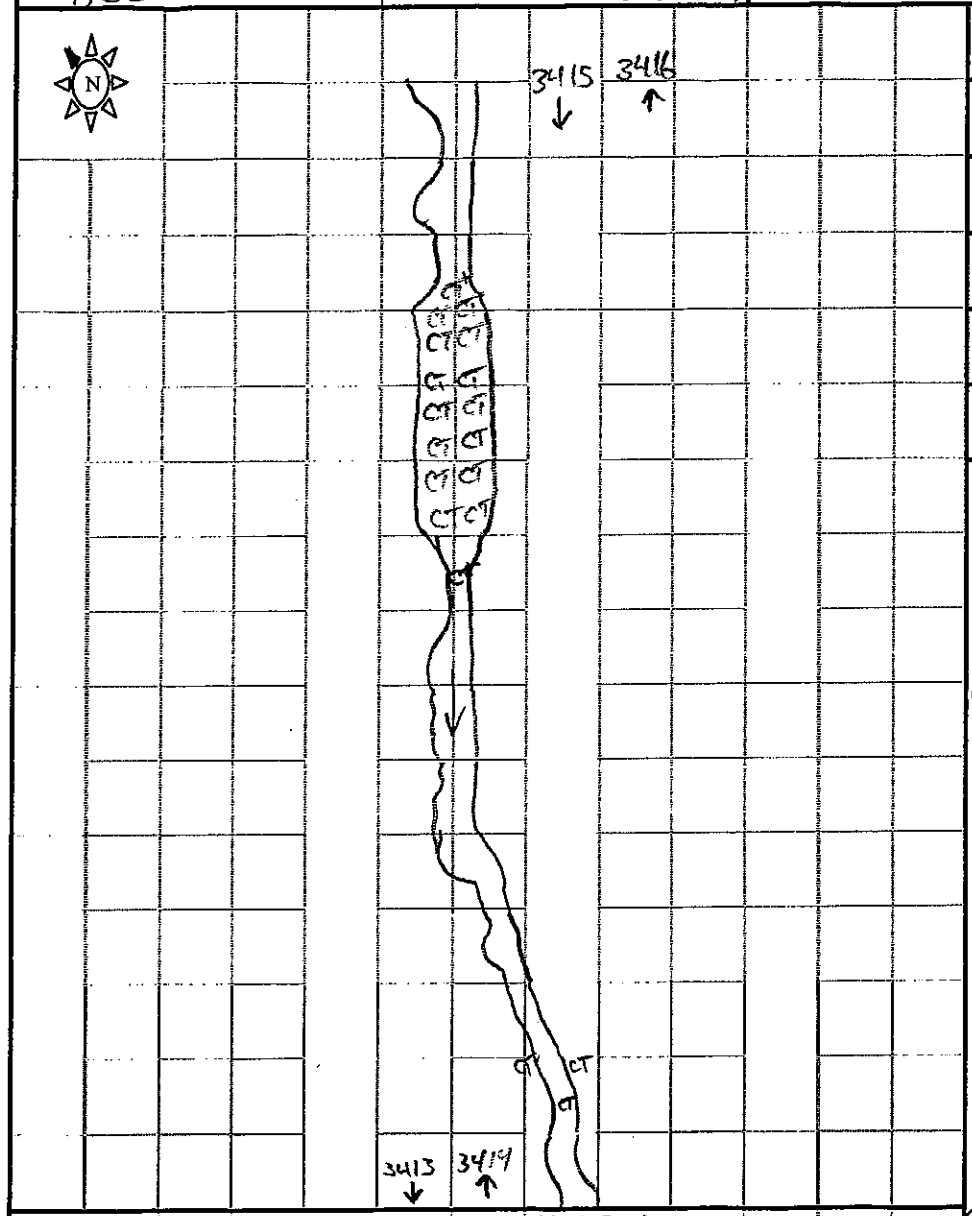
® Riparian Tree

├► Seep/Spring
------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
⊔ Culvert

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
3C3	DS GENERAL (DS END)	75m	1 cm / 5m



PROFILE: Horz. Scale Vert. Scale

PROJECT #:

MAPPER:

NAME OF WATERBODY:

CROSSING #: 3

STATION #: 3C

DATE: DD-MMM-YY

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▓ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
* * * Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
//////// Eroded Bank

XXX Riprap / Other Stabilization

⬭ Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree

|▶ Seep/Spring
-------- Undercut Bank

▬ Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
└┘ Culvert

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
60505601	Britannia EA	1	Nov	2011

Is STREAM REALIGNMENT required for this section:

O Yes O No ✓ Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
C. Lorenz, L. Knight	Overcast	10:50	11:02

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
7°C	5°C	—

PHOTO NUMBERS AND DESCRIPTIONS: See habitat map

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
16 Mile	L. Ontario	4	4A

LOCATION OF CROSSING: Britannia Rd, east of 1st Line

GPS COORDINATES:	MTO CHAINAGE:
593594E 4814702N ± 4m	—
TOWNSHIP: Milton	**MNR DISTRICT:** Aurora

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:
Transportation, Agriculture	Roads, Farms

EXISTING STRUCTURE TYPE

Bridge O	Box CulvertO	Open Foot Culvert O	CSP ✓	N/A O

Other O Describe: Size (w x h) m^2 45 cm CSP

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (Include on habitat map)
4A1	US detailed

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	✓	O	O	✓	O	

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):
20	0.01

SUB-SECTION(S)	Run ✓	Pool O	Riffle O	Flats O	Inside culvert O	Other
Percentage of area	100					
Mean depth wetted (m)	0.26					
Mean width wetted (m)	1.5					
Mean bankfull width (m)	1.7					
Mean bankfull depth(m)	0.32					
Substrate	Cl					

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	✓	O	O	O
Right Upstream Bank	✓	O	O	O

HABITAT

IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris	Organic debris	Vascular Macrophytes	None
	0	0	0	Instream 0 Overhanging 0	0	Instream 30 Overhanging 30	40

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	O	O	✓	O	O

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
	0	0	60	40
Predominant Species	0	0	grass, cattails	

MIGRATORY OBSTRUCTIONS:	None	Seasonal	Permanent
	—	Intermittent	—

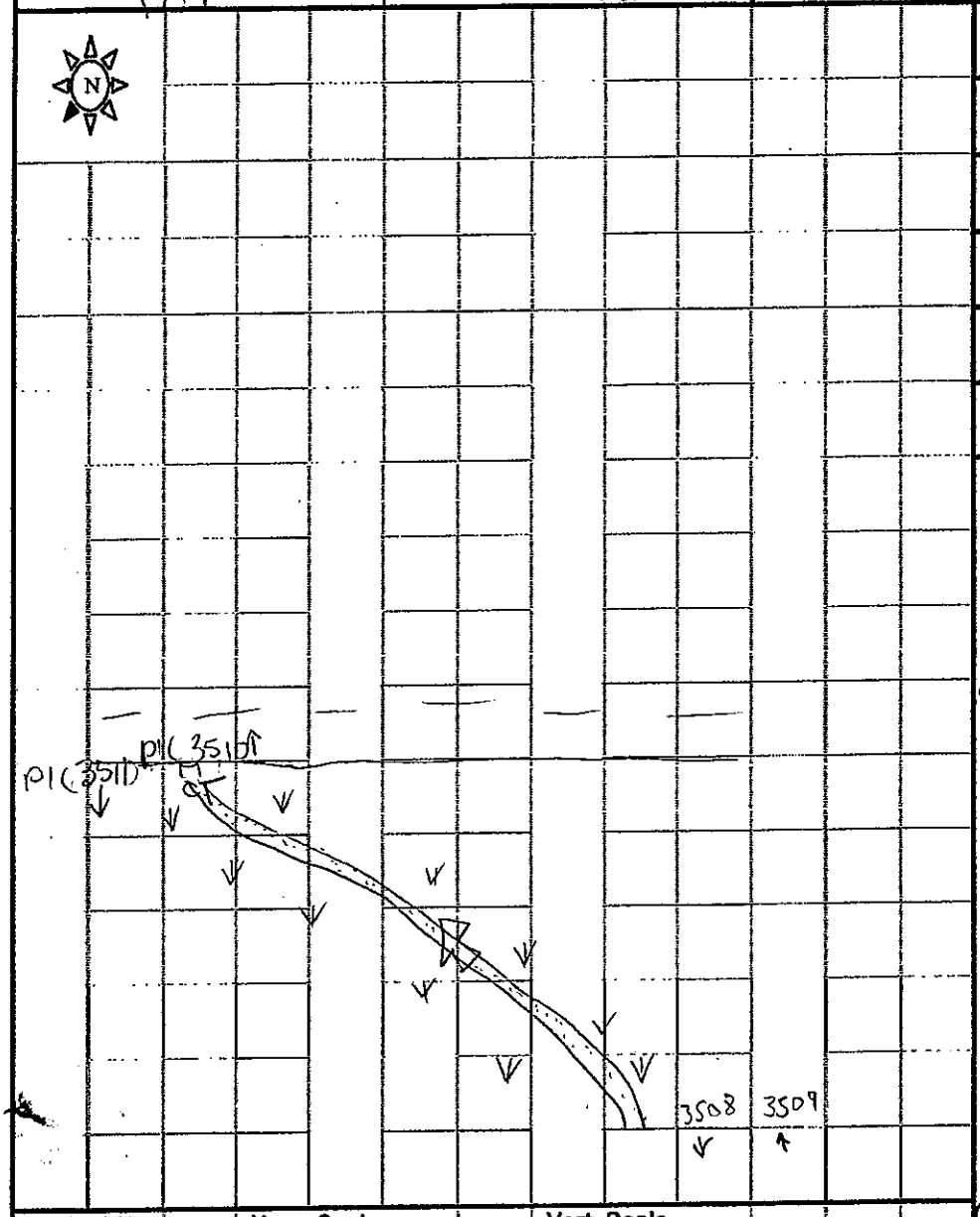
POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other
	—	—	—

POTENTIAL ENHANCEMENT OPPORTUNITIES:

COMMENTS:

Additional Notes Appended? O No O Yes number of pages _____

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
4A1	US detailed	20m	1cm/3m



PROFILE: Horz. Scale Vert. Scale

PROJECT #: 650560

MAPPER: L Knight

NAME OF WATERBODY: 16 Mile

CROSSING #: 4

STATION #: 4A

DATE: DD-MMM-YY 01-Nov-11

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▇ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** * *** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
////// Eroded Bank

XXX Riprap / Other Stabilization

⊂⬭ Instream Log/Tree
^^^ Dam/Weir/Obstruction

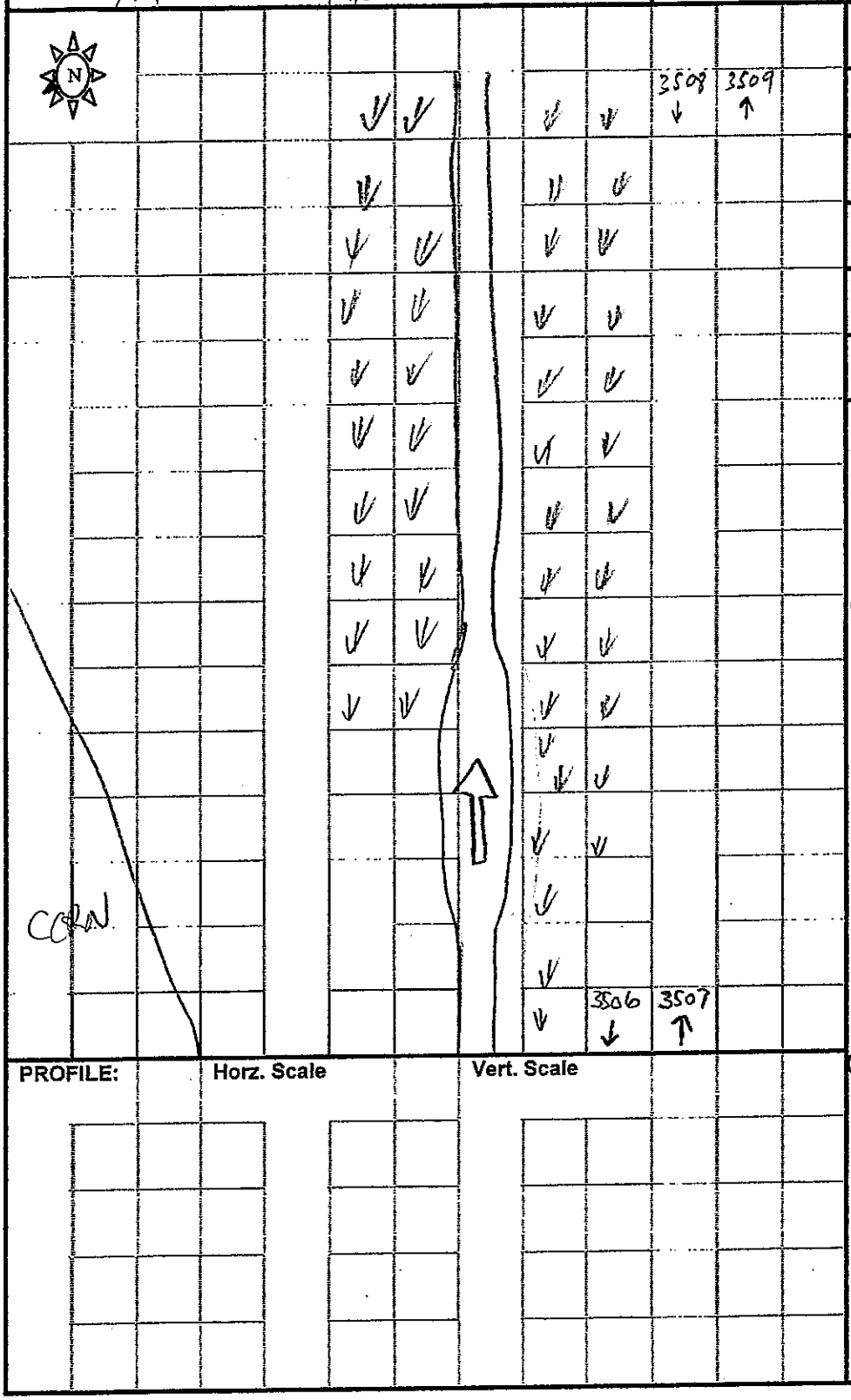
® Riparian Tree

⊢▶ Seep/Spring
-------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
└┘ Culvert

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
4A2	u/s General	30m	1/2



PROFILE: Horz. Scale Vert. Scale

PROJECT #: 450Jp

MAPPER: C. LORENZ

NAME OF WATERBODY: 16 MILE

CROSSING #: 4

STATION #: 4A

DATE: DD-MMM-YY 01-NOV-11

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▇ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
* * * Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
/////// Eroded Bank

XXX Riprap / Other Stabilization

⊂⊃ Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree

├► Seep/Spring
-------- Undercut Bank

▬ Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
└┘ Culvert

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
605086	Britannia EA	01	NOV	2011

Is STREAM REALIGNMENT required for this section:

O Yes O No ✓ Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
C. LORENZ, C. KNIGHT	overcast	10:20	10:30

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
1°C	5°C	

PHOTO NUMBERS AND DESCRIPTIONS: See habitat map

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
16 Mile	L. Ontario	4	4B

LOCATION OF CROSSING: Britannia, east of 1st Line

GPS COORDINATES:	MTO CHAINAGE:
593544E 4814702N ±4m	—
TOWNSHIP: Milton	**MNR DISTRICT:** Aurora

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:
Transportation, Agriculture	Road, Farms

EXISTING STRUCTURE TYPE

Bridge O	Box Culvert O	Open Foot Culvert O	CSP ✓	N/A O

Other O Describe: Size (w x h) m^2 45cm CSP

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (include on habitat map)
4B1	In culvert

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	✓	O	O	✓	O	—

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):
11.35	0.1

SUB-SECTION(S)	Run	Pool	Riffle	Flats	Inside culvert	Other
	✓	O	O	O	O	
Percentage of area	100					
Mean depth wetted (m)	0.15					
Mean width wetted (m)	0.45					
Mean bankfull width (m)	0.45					
Mean bankfull depth(m)	0.21					
Substrate	Gr					

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	0	O	O	O
Right Upstream Bank	0	O	O	O

HABITAT

IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris / Instream / Overhanging	Organic debris	Vascular Macrophytes / Instream / Overhanging	None
							100

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	O	O	O	O	O

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
Predominant Species	—	—	—	100

MIGRATORY OBSTRUCTIONS:	None	Seasonal	Permanent
	—	Intermit	—

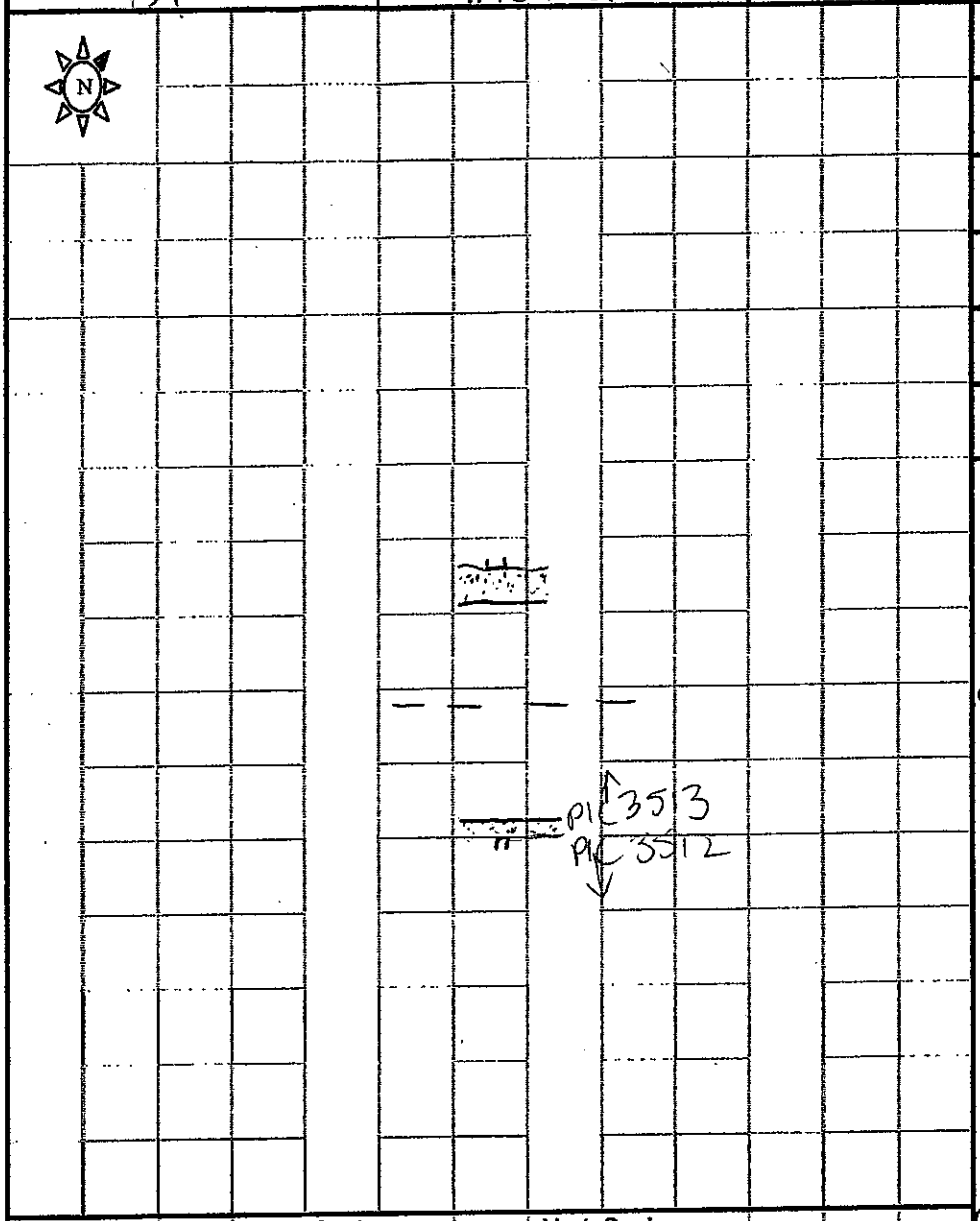
POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other
	—	—	—

POTENTIAL ENHANCEMENT OPPORTUNITIES:

COMMENTS:

Additional Notes Appended? O No O Yes number of pages _____

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
4B1	HA Culvert	11.35	1cm 1.3m



PROFILE: Horz. Scale Vert. Scale

PROJECT #: 05063

MAPPER: L KNIGHT

NAME OF WATERBODY: 16 mile

CROSSING #: 4

STATION #: 4B

DATE: DD-MMM-YY 01-Nov-11

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▇ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** * *** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
//////// Eroded Bank

XXX Riprap / Other Stabilization

⊂⬭ Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree

├► Seep/Spring
-------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
└┘ Culvert

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
650516	BRITANNIA EA	1	NOV	2011

Is STREAM REALIGNMENT required for this section:

O Yes O No ✓ Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
LK NIGHT, CLORENZ	Overcast	10:00	10:30

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
7°C	5°C	—

PHOTO NUMBERS AND DESCRIPTIONS: See habitat mapping

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
16 Mile	L. Ontario	4	4C

LOCATION OF CROSSING: Britannia, east of 1st Line.

GPS COORDINATES:	MTO CHAINAGE:
5935946E 4819702N ±4m	—
TOWNSHIP: Milton	**MNR DISTRICT:** Aurora

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:
Transportation, Agriculture	Roads, Farms

EXISTING STRUCTURE TYPE

Bridge O	Box Culvert O	Open Foot Culvert O	CSP ✓	N/A O

Other O Describe: Size (w x h) m^2 45cm CSP

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (Include on habitat map)
4C1	DS detailed

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	✓	O	O	✓	O	—

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):
50m	0.1

SUB-SECTION(S)	Run	Pool	Riffle	Flats	Inside culvert	Other
	✓	O	O	O	O	
Percentage of area	100					
Mean depth wetted (m)	0.24					
Mean width wetted (m)	0.60					
Mean bankfull width (m)	0.80					
Mean bankfull depth(m)	0.43					
Substrate	Sa/Cl					

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	O	O✓	O	O
Right Upstream Bank	O	O✓	O	O

HABITAT

IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris	Organic debris	Vascular Macrophytes	None
	5	0	0	Instream 0 Overhanging 0	10	Instream 20 Overhanging 15	50

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	O	O✓	O	O	O

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
	O	O	35	65
Predominant Species			grass, herbaceous, cattails	

MIGRATORY OBSTRUCTIONS:	None	Seasonal	Permanent
	—	Intermittent	—

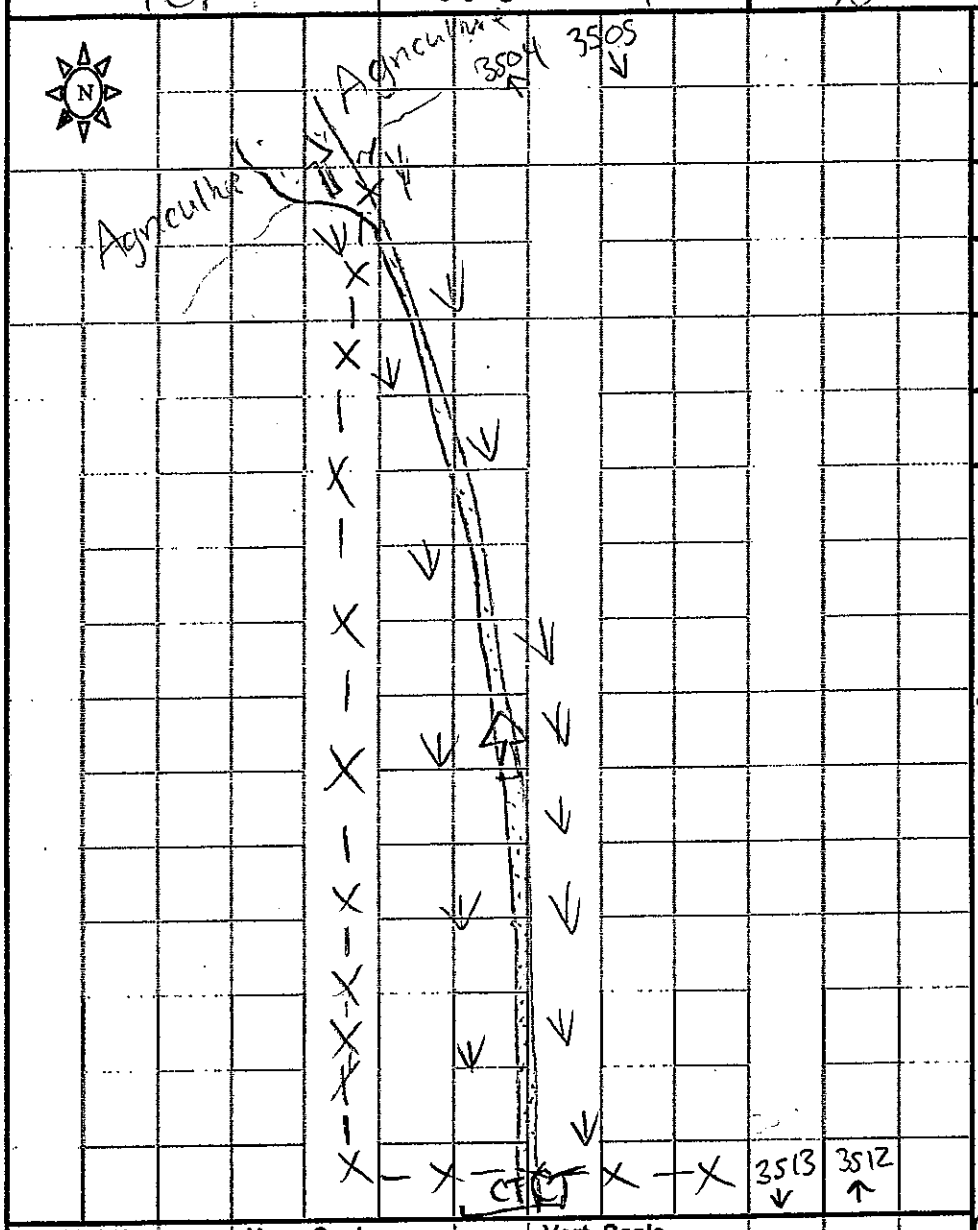
POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other
	—	—	—

POTENTIAL ENHANCEMENT OPPORTUNITIES:

COMMENTS:

Additional Notes Appended? O No O Yes number of pages _____

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
4C1	DS detailed	50	1cm/3m



PROFILE: Horz. Scale Vert. Scale

PROJECT #:	05052
MAPPER:	L KNIGHT
NAME OF WATERBODY:	16 Mile
CROSSING #:	4
STATION #:	4C
DATE: DD-MMM-YY	01-Nov-11

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▮ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
//////// Eroded Bank

XXX Riprap / Other Stabilization

⊂⊃ Instream Log/Tree
^^^ Dam/Weir/Obstruction

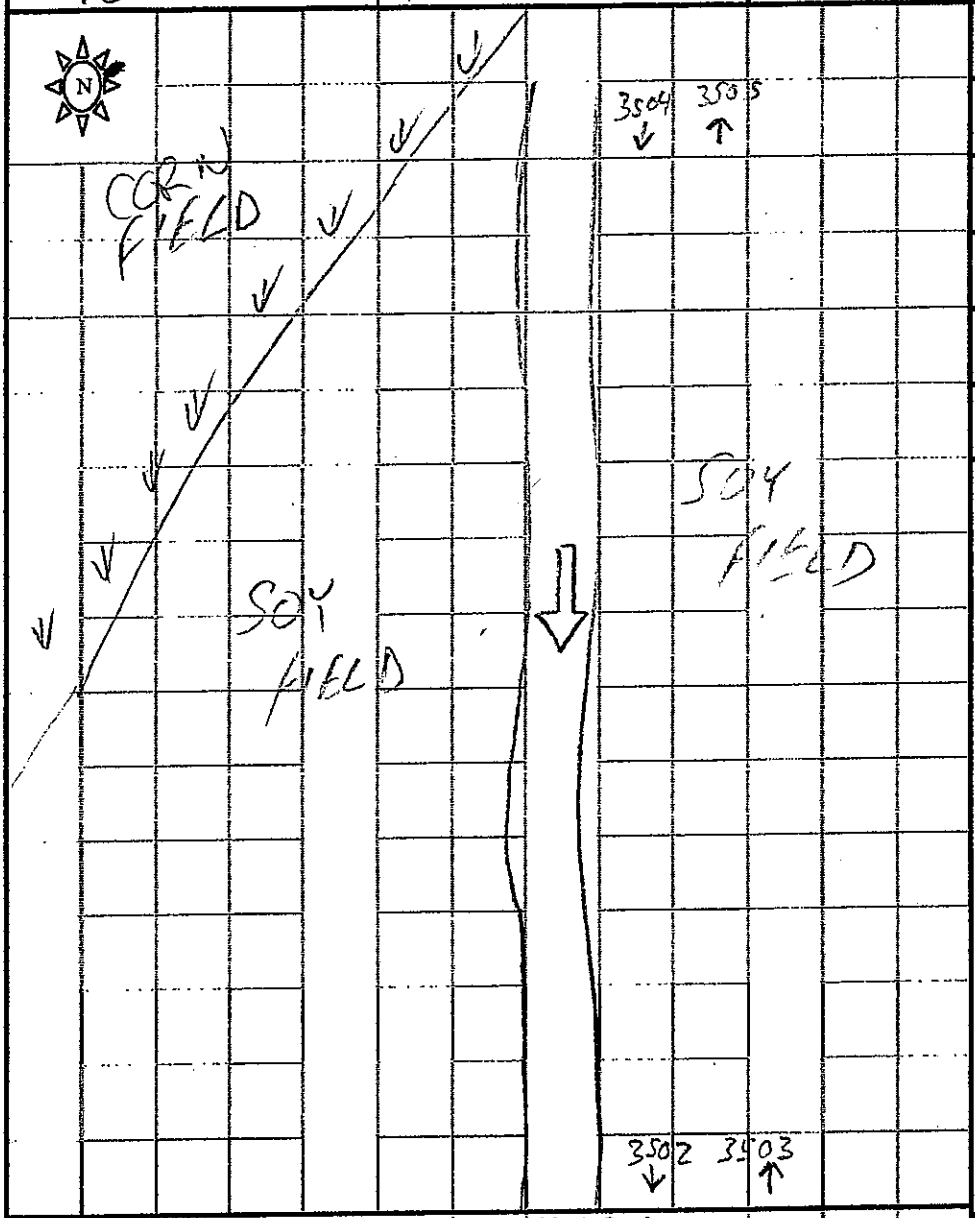
® Riparian Tree

├▶ Seep/Spring
-------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
└┘ Culvert

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
4C2	d/s Culvert (u/stream)	75	1/5



PROJECT #:	650560
MAPPER:	C. LORENZ
NAME OF WATERBODY:	16 MILE
CROSSING #:	4
STATION #:	4C
DATE: DD-MMM-YY	01-NOV-11

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▇ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** * *** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
//////// Eroded Bank

XXX Riprap / Other Stabilization

⊂⊃ Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree

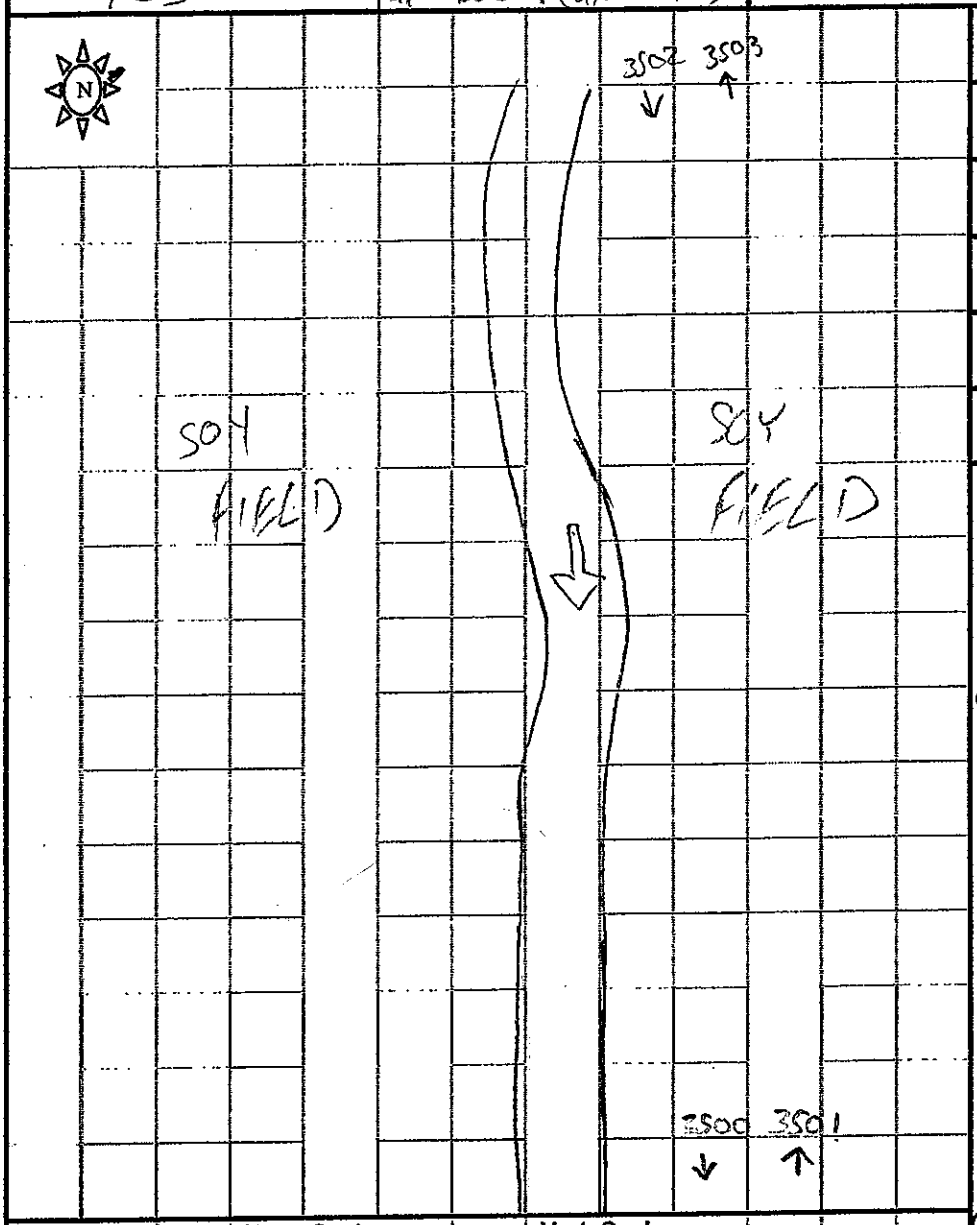
├► Seep/Spring
------- Undercut Bank

▬ Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
└┘ Culvert

PROFILE: Horz. Scale Vert. Scale

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
4C3	d/s General (d/s half)	75 m	1/5



PROFILE: Horz. Scale Vert. Scale

PROJECT #:	050516
MAPPER:	C. Lorenz
NAME OF WATERBODY:	16 MILE
CROSSING #:	4
STATION #:	4C
DATE: DD-MMM-YY	01-NOV-11

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▮ Island/Bar

▒ Fine Substrate
Gravel Substrate
oOooO Cobble /Boulder
*** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
/////// Eroded Bank

XXX Riprap / Other Stabilization

⊂⊃ Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree

├▶ Seep/Spring
-------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
└┘ Culvert

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
650516	BRITANNIA EA	12	Oct	2011

Is STREAM REALIGNMENT required for this section:

O Yes O No O Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
C LORENZ L KNIGHT	Overcast, Rainy	12:30	12:40

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
16°C	15°C	—

PHOTO NUMBERS AND DESCRIPTIONS: See habitat mapping

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
16 Mile Creek	L. Ontario	5	5A

LOCATION OF CROSSING: Britannia Rd, midway btwn 1st Line + Reg Rd 25

GPS COORDINATES:	MTO CHAINAGE:
593774E 17T ±4m (Halton)	—

TOWNSHIP:	MNR DISTRICT:
Milton	Aurora

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:
Agriculture, Residential, Transportation	Road, Agriculture

EXISTING STRUCTURE TYPE

Bridge O	Box Culvert O	Open Foot Culvert ✓	CSP O	N/A O

Other O Describe: Size (w x h) m^2 1.5m x 2.5m

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (include on habitat map)
5A1	upstream detailed

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	✓	O	O	O	✓	—

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):
20	—

SUB-SECTION(S)	Run O	Pool ✓	Riffle O	Flats O	Inside culvert O	Other DRY RUN
Percentage of area	80	15	—	—	—	15%
Mean depth wetted (m)	—	0.35	—	—	—	0.5
Mean width wetted (m)	—	4.5	—	—	—	0.35
Mean bankfull width (m)	0.9	5.4	—	—	—	0.9
Mean bankfull depth(m)	0.5	0.45	—	—	—	0.35
Substrate	Sa/Si	Cl/Sa	—	—	—	Sa/Si

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	O	✓	O	O
Right Upstream Bank	O	✓	O	O

HABITAT

IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris	Organic debris	Vascular Macrophytes	None
	O	O	O	Instream O Overhanging O	O	Instream 20 Overhanging 30	50

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	O	O	✓	O	O

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
	—	—	50	50
Predominant Species	—	—	grasses, cattails	

MIGRATORY OBSTRUCTIONS:	None	Seasonal	Permanent
	—	Intermittent	—

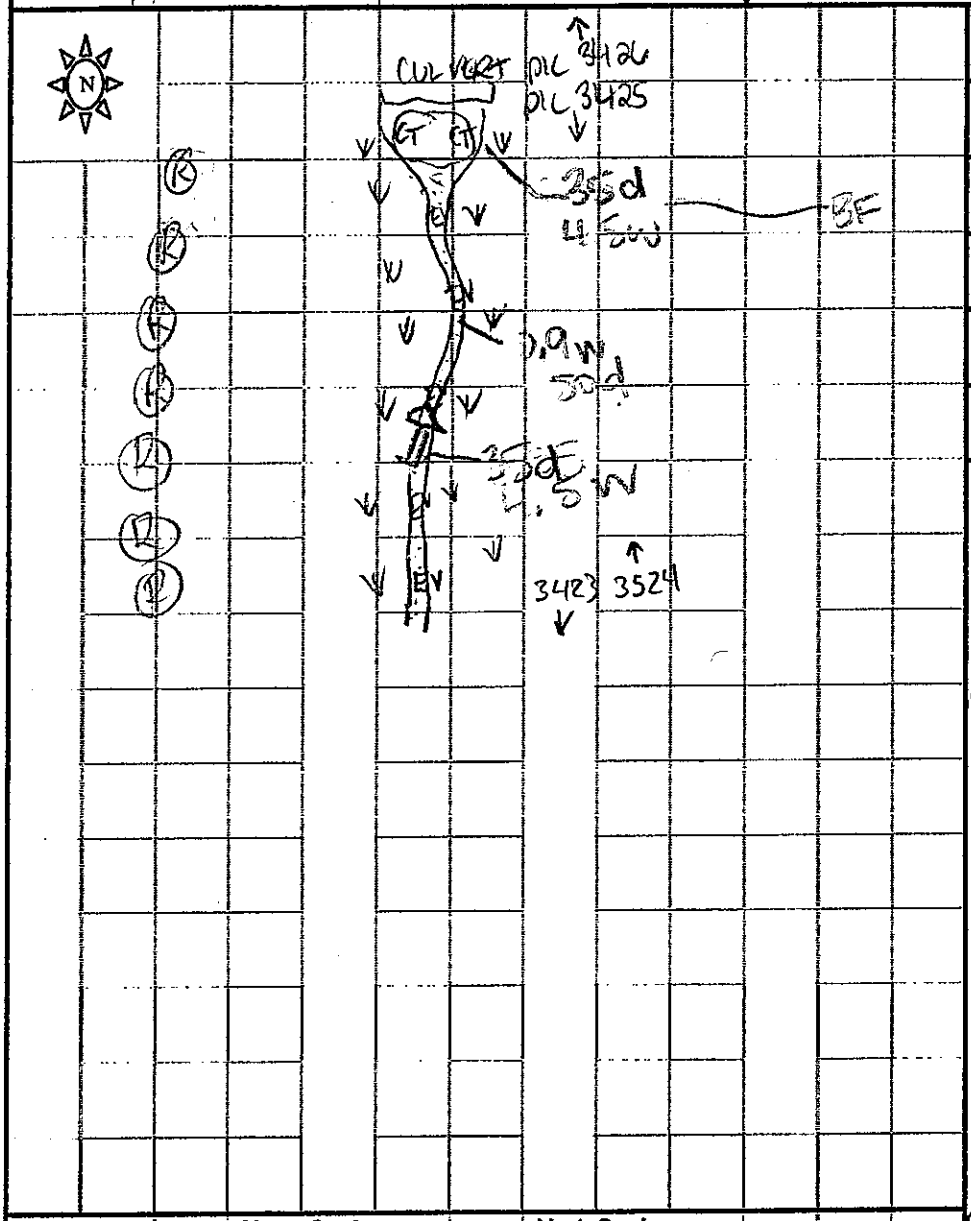
POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other
	—	—	—

POTENTIAL ENHANCEMENT OPPORTUNITIES:

COMMENTS:

Additional Notes Appended? O No O Yes number of pages _____

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
5A1	US detailed	20	1cm / 3m



PROFILE: Horz. Scale Vert. Scale

PROJECT #: 650560

MAPPER: L Knight

NAME OF WATERBODY: 16 Mile Creek

CROSSING #: 5

STATION #: 5A

DATE: DD-MMM-YY 12-Oct-11

LEGEND

10d depth (cm)
6w width (m)

➡ Riffle
⇨ Run/Glide
⬭ Pool
▮ Island/Bar

▒ Fine Substrate
Gravel Substrate
oOooO Cobble /Boulder
*** * *** Debris

CT Cattail
SV/FV Submerg/Float Veg
EV Emergent Vegetation
W Watercress
Fe Iron Staining
//////// Eroded Bank
XXX Riprap / Other Stabilization

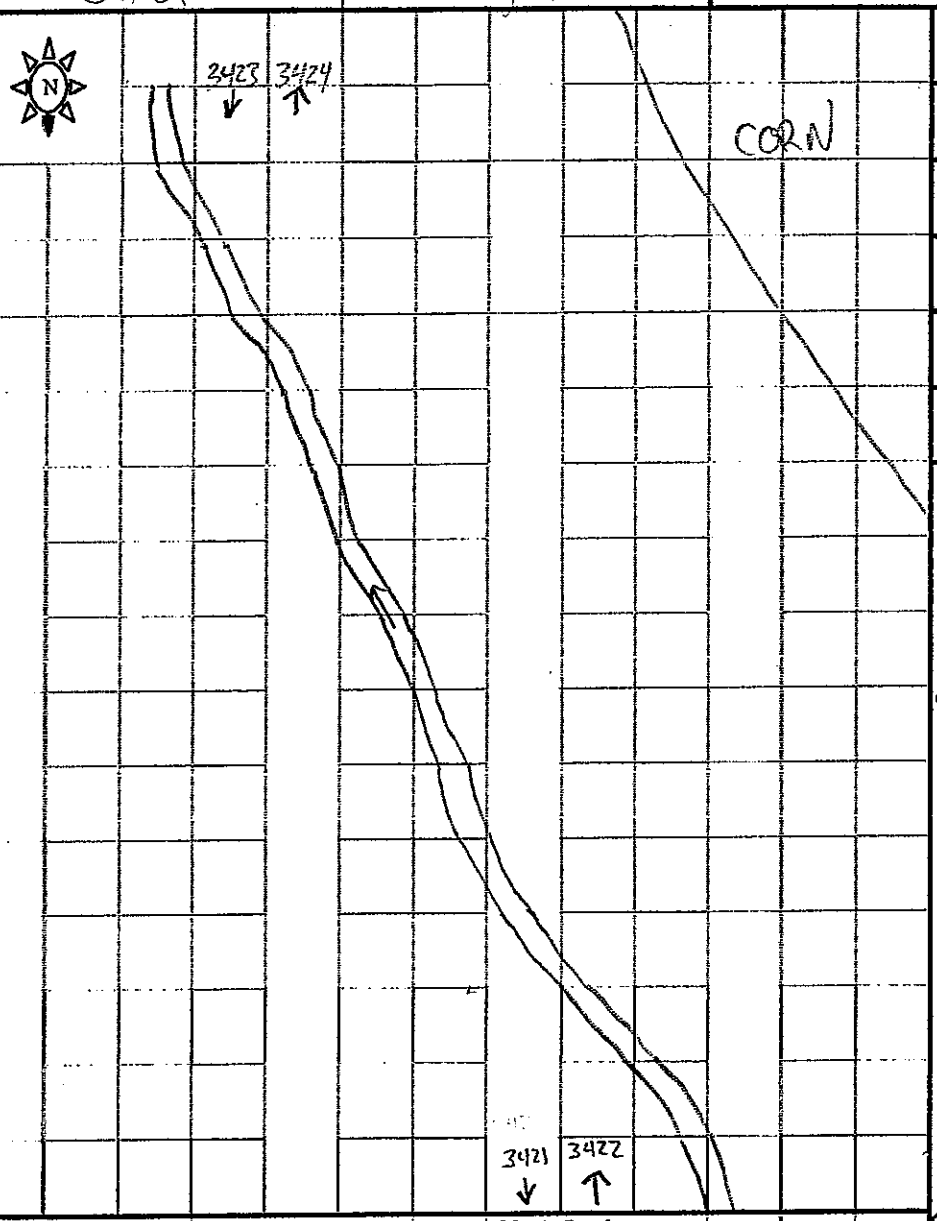
⊂⊃ Instream Log/Tree
^^^ Dam/Weir/Obstruction
Ⓡ Riparian Tree

├▶ Seep/Spring
------- Undercut Bank

▬ Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
└┘ Culvert

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
5A2	US general	30	1 cm / 2m



PROFILE: Horz. Scale Vert. Scale

PROJECT #: 650564
MAPPER: C. Lorenz
NAME OF WATERBODY: 16 Mile
CROSSING #: 5
STATION #: 5A
DATE: DD-MMM-YY: 12-Oct-11

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▓ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** * *** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
/////// Eroded Bank

XXX Riprap / Other Stabilization

⊂⊃ Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree

⊢► Seep/Spring
------- Undercut Bank

▬ Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
⊔ Culvert

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
650564	Britannia EA	12	Oct	2011

Is STREAM REALIGNMENT required for this section:

O Yes O No ⊘ Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
C. Lorenz, L. Knight	Overcast Rainy	10:50	1:00

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
16°C	15°C	—

PHOTO NUMBERS AND DESCRIPTIONS: See habitat mapping

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
16 Mile Cr.	L. Ontario	5	5B

LOCATION OF CROSSING: Britannia Rd, midway bhs 1st Line + Reg Rd 25

GPS COORDINATES:	MTO CHAINAGE:
593787E 4814983N ±5m 17T	—

TOWNSHIP:	MNR DISTRICT:
Milton	Aurora

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:
Agriculture, Residential, Transportation	Agriculture, Road

EXISTING STRUCTURE TYPE

Bridge O	Box Culvert O	Open Foot Culvert ✓	CSP O	N/A O

Other O Describe: Size (w x h) m² 1.5 x 2.5 m

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (include on habitat map)
5B1	In culvert

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	✓	O	O	O	✓	—

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):
19.45	—

SUB-SECTION(S)	Run	Pool	Riffle	Flats	Inside culvert	Other
	O	O	O	O	✓	
Percentage of area	—	—	—	—	100	—
Mean depth wetted (m)	—	—	—	—	0.4	—
Mean width wetted (m)	—	—	—	—	2.5	—
Mean bankfull width (m)	—	—	—	—	2.5	—
Mean bankfull depth(m)	—	—	—	—	0.5	—
Substrate		—	—	—	Cl/Sa	—

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	Ø	O	O	O
Right Upstream Bank	Ø	O	O	O

HABITAT

IN-STREAM COVER (% surface area): 100%	Undercut banks	Boulders	Cobble	Woody Debris Instream Overhanging	Organic debris	Vascular Macrophytes Instream Overhanging	None 100

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	Ø	O	O	O	O

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
Predominant Species				100

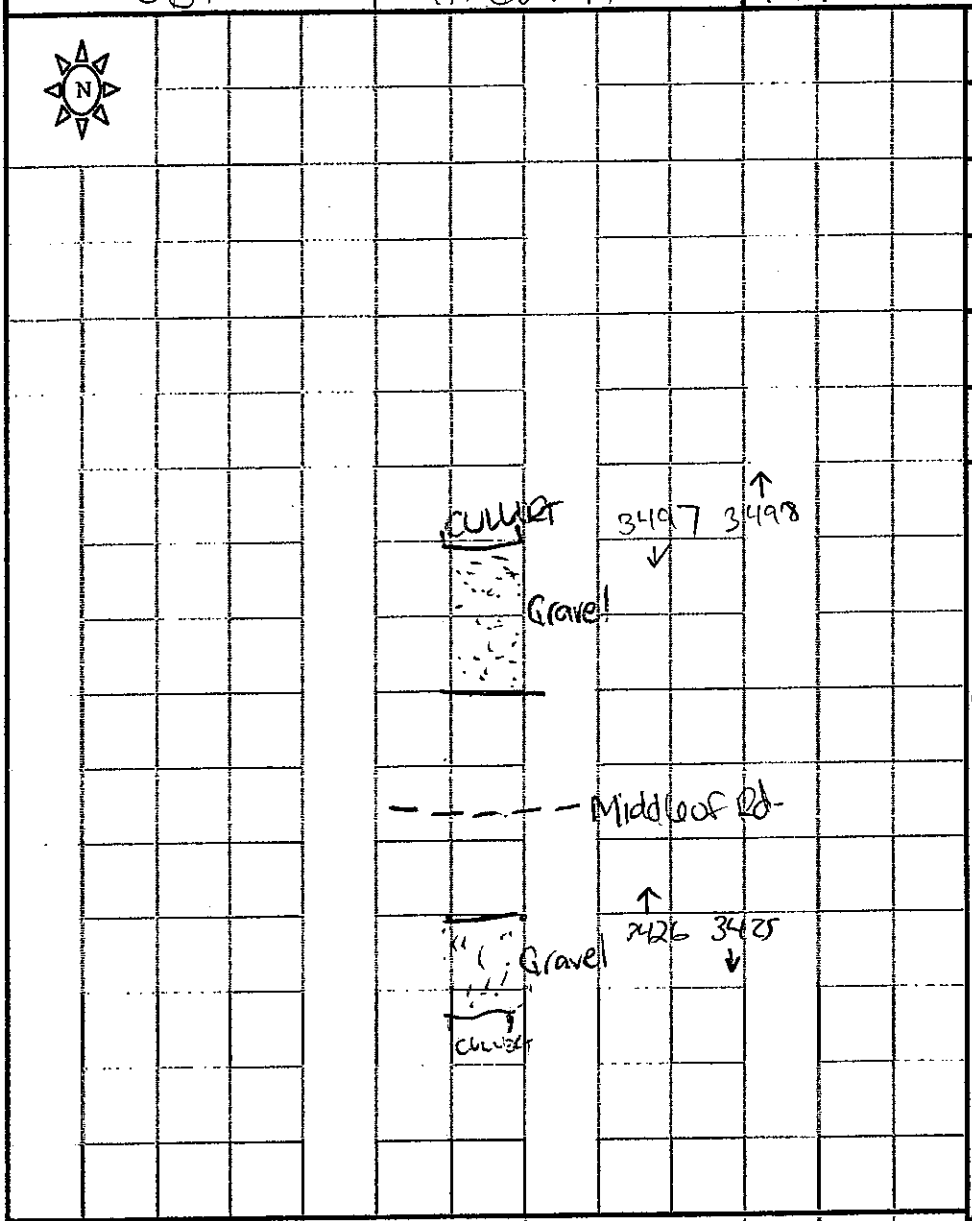
MIGRATORY OBSTRUCTIONS:	None	Seasonal	Permanent
POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other

POTENTIAL ENHANCEMENT OPPORTUNITIES:

COMMENTS:

Additional Notes Appended? Ø No O Yes number of pages _____

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
5B1	In Culvert	19,45	1cm/3m



PROFILE: Horz. Scale Vert. Scale

PROJECT #: 05026

MAPPER: L. Knight

NAME OF WATERBODY: 16 mile

CROSSING #: 5

STATION #: 5B

DATE: DD-MMM-YY 12-Oct-11

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▮ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** * *** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
/////// Eroded Bank

XXX Riprap / Other Stabilization

⊂⊃ Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree

├▶ Seep/Spring
-------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
└┘ Culvert

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
1650561.1	Britannia EA	1	Nov	2011

Is STREAM REALIGNMENT required for this section:

O Yes O No ☑ Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
K. KNIGHT, C. LOREM	SLIGHTLY OVERCAST	10:00	10:40

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
7°C	4°C	—

PHOTO NUMBERS AND DESCRIPTIONS: See habitat map.

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
16 Mile	L. Ontario	5	5C

LOCATION OF CROSSING: Britannia Rd, midway btw 1st Line & Reg. Rd 25

GPS COORDINATES:	MTO CHAINAGE:
593800E 4814971N ±3m	—
TOWNSHIP: Milton	**MNR DISTRICT:** Aurora

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:
Transportation, Residential, Agriculture	Farms, Roads

EXISTING STRUCTURE TYPE

Bridge O	Box Culvert O	Open Foot Culvert ☑	CSP O	N/A O

Other O Describe: Size (w x h) m² 1.5m x 2.5m

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (Include on habitat map)
5C1	DS detailed

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	☑	O	O	☑	O	—

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):
50m	~ 0.1 m/s

SUB-SECTION(S)	Run ☑	Pool ☑	Riffle O	Flats O	Inside culvert O	Other
Percentage of area	85	15				
Mean depth wetted (m)	0.25	0.28				
Mean width wetted (m)	1.80	2.84				
Mean bankfull width (m)	1.80	3.4				
Mean bankfull depth(m)	0.52	0.34				
Substrate	Cl	Sa				

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	✓	O	O	O
Right Upstream Bank	✓	O	O	O

HABITAT

IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris	Organic debris	Vascular Macrophytes	None
	0	0	0	Instream 0 Overhanging 0	5	Instream 85 Overhanging 10	5

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	O	O	✓	O	O

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
	0	0	95	5
Predominant Species	—	—	grass, cattails, herbaceous	

MIGRATORY OBSTRUCTIONS:	None	Seasonal	Permanent
	—	Intermittent	—

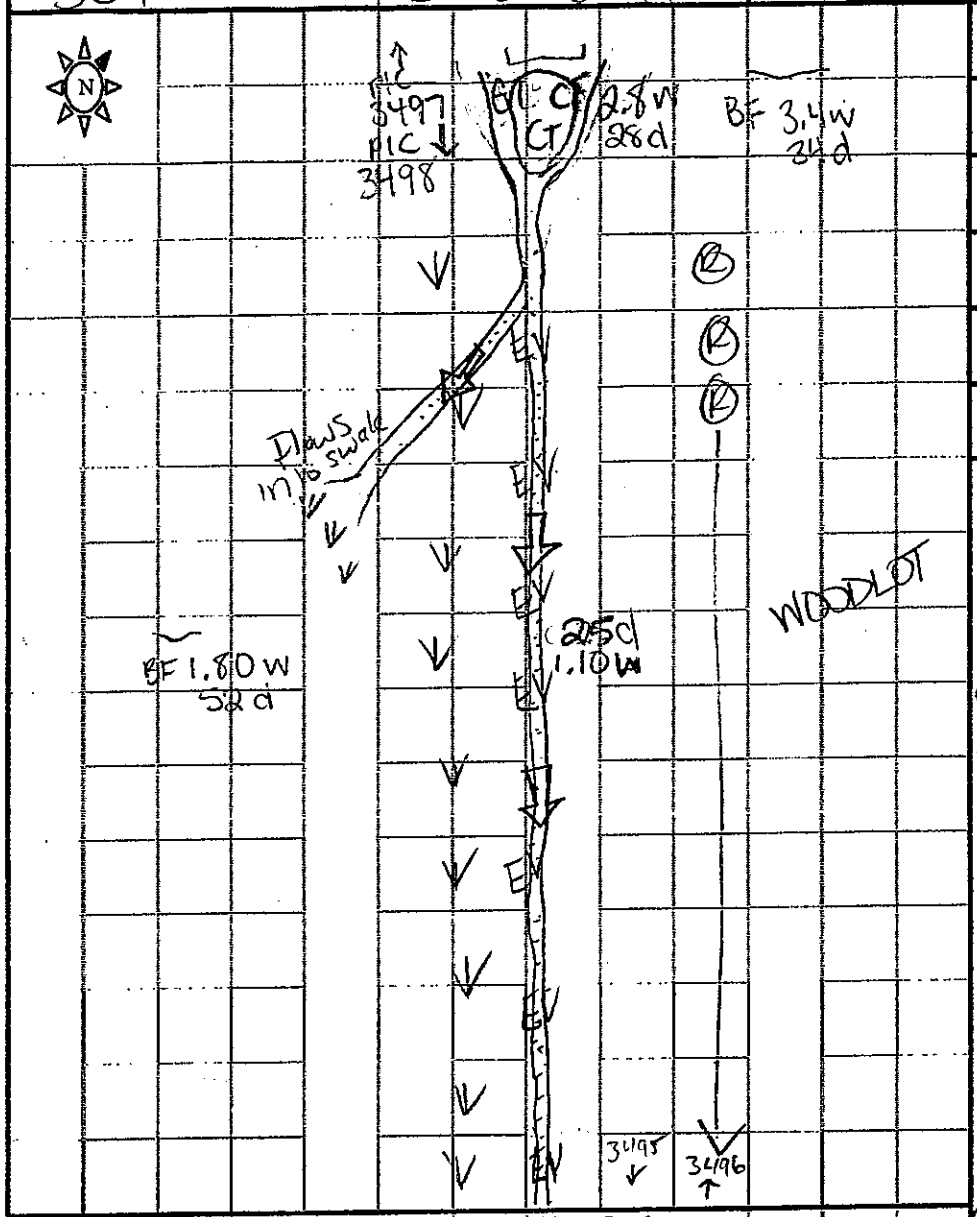
POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other
	—	—	—

POTENTIAL ENHANCEMENT OPPORTUNITIES:

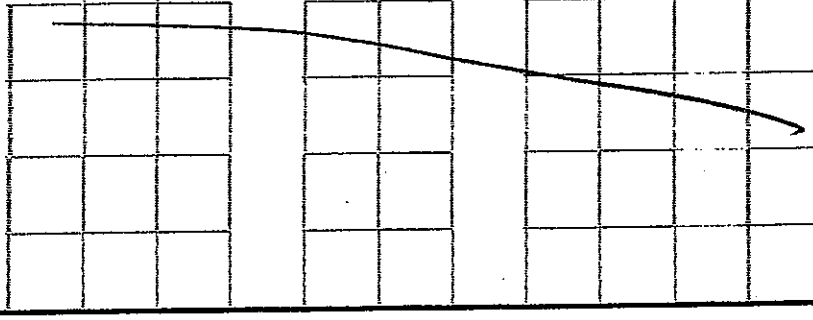
COMMENTS:

Additional Notes Appended? O No O Yes number of pages _____

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
5C1	DS detailed	50	1cm/3m



PROFILE: Horz. Scale Vert. Scale

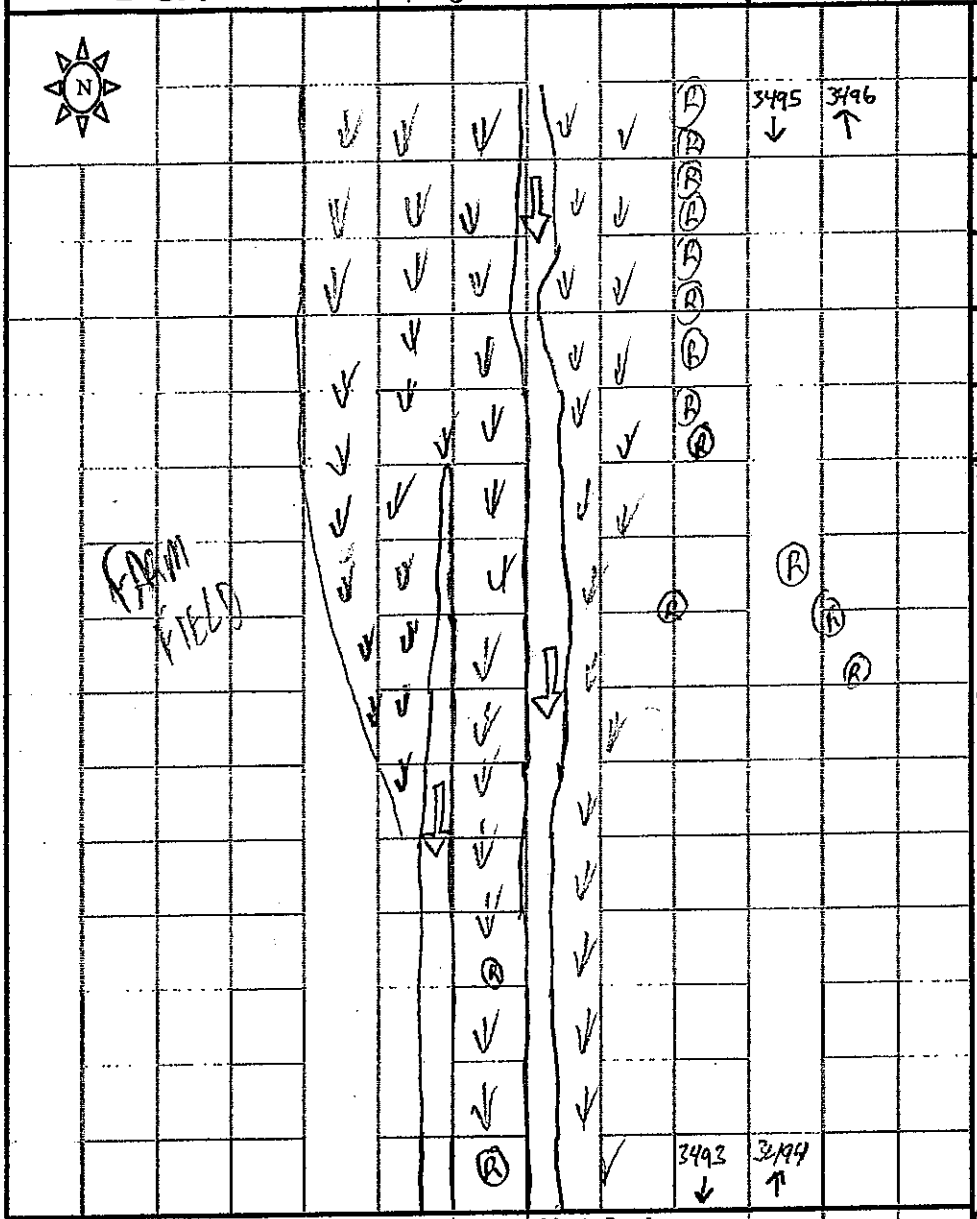


PROJECT #:	06056
MAPPER:	L KNIGHT
NAME OF WATERBODY:	16 Mile
CROSSING #:	5
STATION #:	5C
DATE: DD-MMM-YY	01-NOV-11

LEGEND

- 10d depth (cm)
- 6w width (cm)
- ➡ Riffle
- ⇨ Run/Glide
- ⬭ Pool
- ▓ Island/Bar
- ▒ Fine Substrate
- ### Gravel Substrate
- oOooO Cobble /Boulder
- * * * Debris
- CT Cattail
- SV/FV Submerg/Float Veg
- EV Emergent Vegetation
- W Watercress
- Fe Iron Staining
- /////// Eroded Bank
- XXX Riprap / Other Stabilization
- ⊂⊃ Instream Log/Tree
- ^^^ Dam/Weir/Obstruction
- Ⓡ Riparian Tree
- ⊢▶ Seep/Spring
- ------- Undercut Bank
- — Barrier to Fish Movement
- -S- Seasonal Barrier
- -x--x- Fence line
- ⊔ Culvert

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
5C2	d/s General (u/s half)	75	1/5



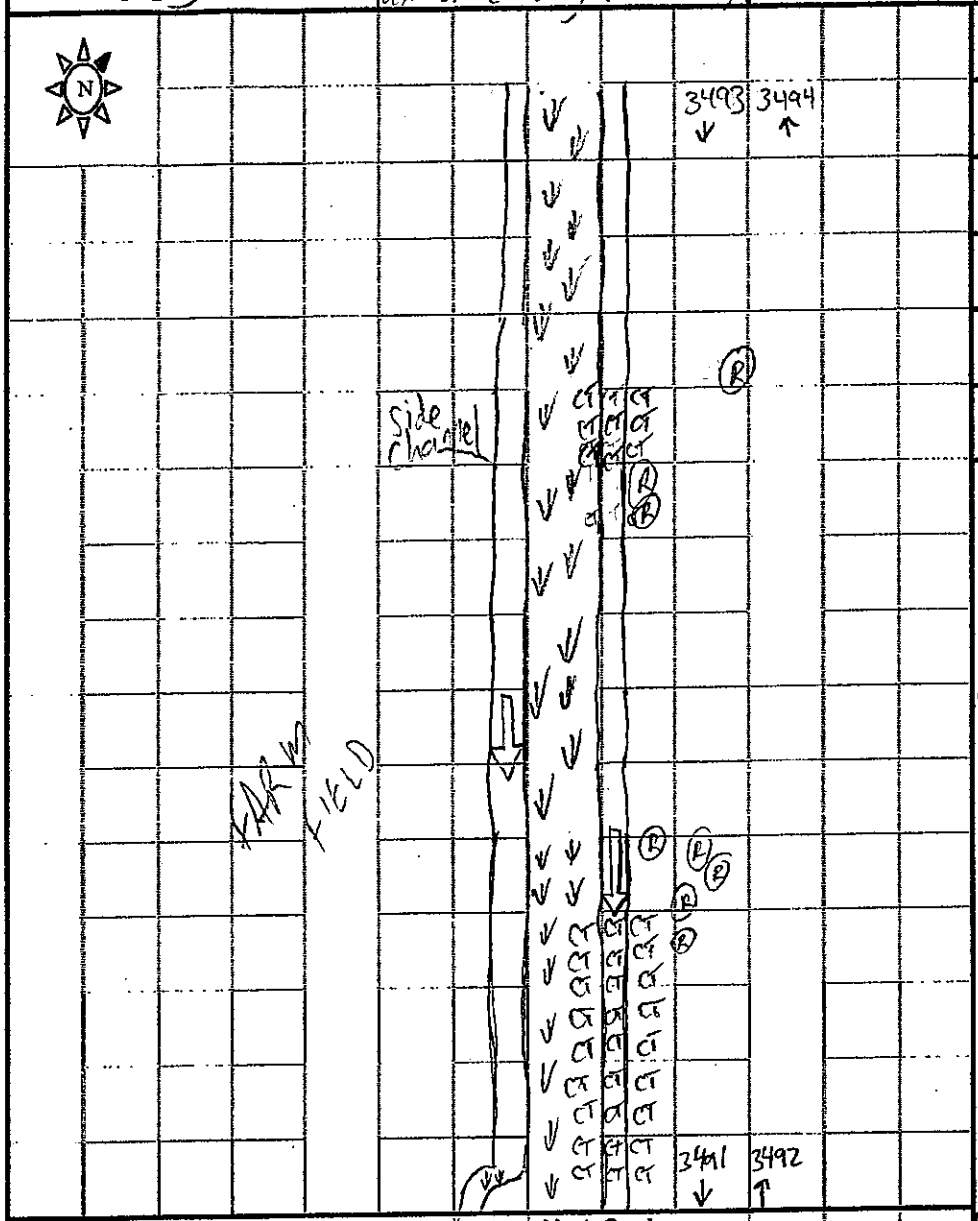
PROFILE: Horz. Scale Vert. Scale

PROJECT #:	650560
MAPPER:	C. Lorenz
NAME OF WATERBODY:	16 MILE
CROSSING #:	5
STATION #:	5C
DATE: DD-MMM-YY	01-NOV-11

LEGEND

- **10d** depth (cm)
- **6w** width
- ➡ Riffle
- ⇨ Run/Glide
- ⬭ Pool
- ▮ Island/Bar
- ▒ Fine Substrate
- **###** Gravel Substrate
- **oOooO** Cobble /Boulder
- *** * *** Debris
- **CT** Cattail
- **SV/FV** Submerg/Float Veg
- **EV** Emergent Vegetation
- **W** Watercress
- **Fe** Iron Staining
- **//////** Eroded Bank
- **XXX** Riprap / Other Stabilization
- ⊂⊃ Instream Log/Tree
- **^^^** Dam/Weir/Obstruction
- **®** Riparian Tree
- ├► Seep/Spring
- **--------** Undercut Bank
- **—** Barrier to Fish Movement
- **-S-** Seasonal Barrier
- **-x--x-** Fence line
- ⊔ Culvert

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
5C3	d/s of Crossing (d/s Section)	75m	1/5



PROFILE: Horz. Scale Vert. Scale

PROJECT #:

MAPPER: C. LORENZ

NAME OF WATERBODY: 16 MILE

CROSSING #: 5

STATION #: 5C

DATE: DD-MMM-YY: 01-NOV-11

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▇ Island/Bar

▒ Fine Substrate
Gravel Substrate
oOooO Cobble /Boulder
* * * Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
/////// Eroded Bank

XXX Riprap / Other Stabilization

⊂⊃ Instream Log/Tree
^^^ Dam/Weir/Obstruction

Ⓡ Riparian Tree

├► Seep/Spring
------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
└┘ Culvert

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
050560	Britannia EA	01	Nov	2011

Is STREAM REALIGNMENT required for this section:

O Yes O No ✓ Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
C. LORENZ, L. KNIGHT	SUNNY	2:00	2:15

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
10°C	7°C	—

PHOTO NUMBERS AND DESCRIPTIONS: See habitat mapping

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
16 Mile	L. Ontario	6	6A

LOCATION OF CROSSING: Britannia Rd, West of Reg Rd 25

GPS COORDINATES:	MTO CHAINAGE:
594185E 4815468N	—

TOWNSHIP:	MNR DISTRICT:
Milton	Aurora

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:
Transportation, Agriculture	Roads, Farms

EXISTING STRUCTURE TYPE

Bridge O	Box Culvert O	Open Foot Culvert O	CSP O	N/A O

Other ✓ Describe: 2 plastic culverts — Size (w x h) m^2: 0.91 m

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (include on habitat map)
6A1	U/S detailed

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	✓	O	O	✓	O	—

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):
20 m	0.4 m/s

SUB-SECTION(S)	Run ✓	Pool O	Riffle O	Flats O	Inside culvert O	Other
Percentage of area	100					
Mean depth wetted (m)	0.25					
Mean width wetted (m)	1.6					
Mean bankfull width (m)	4.6					
Mean bankfull depth(m)	0.62					
Substrate	Cl/Si					

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	✓	0	0	0
Right Upstream Bank	✓	0	0	0

HABITAT

IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris	Organic debris	Vascular Macrophytes	None
	0	0	0	Instream 0 Overhanging 0	5	Instream 50 Overhanging 20	25

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	0	✓	0	0	0

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
	—	—	70	30
Predominant Species	—	—	grasses, cattails	

MIGRATORY OBSTRUCTIONS:	None	Seasonal	Permanent
	—	Intermittent	—

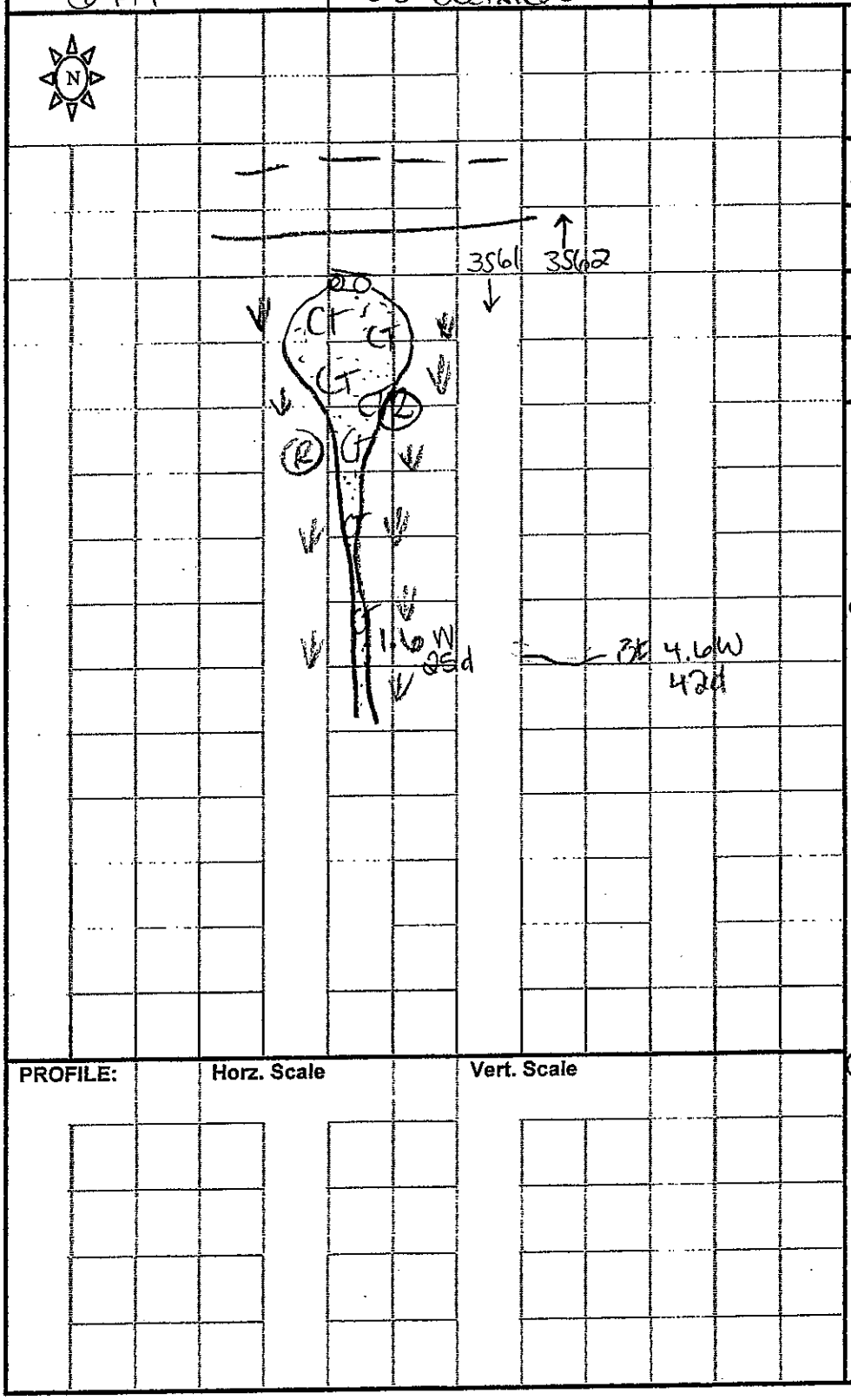
POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other
	—	—	—

POTENTIAL ENHANCEMENT OPPORTUNITIES:

COMMENTS:

Additional Notes Appended? O No O Yes number of pages _____

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
6 A1	US detailed	80m	1cm / 3m



PROFILE: Horz. Scale Vert. Scale

PROJECT #: 605056

MAPPER: L Knight

NAME OF WATERBODY: 16 Mile

CROSSING #: 6

STATION #: 6A

DATE: DD-MMM-YY 01-Nov-11

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▇ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
* * * Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
//////// Eroded Bank

XXX Riprap / Other Stabilization

⊂⊃ Instream Log/Tree
^^^ Dam/Weir/Obstruction

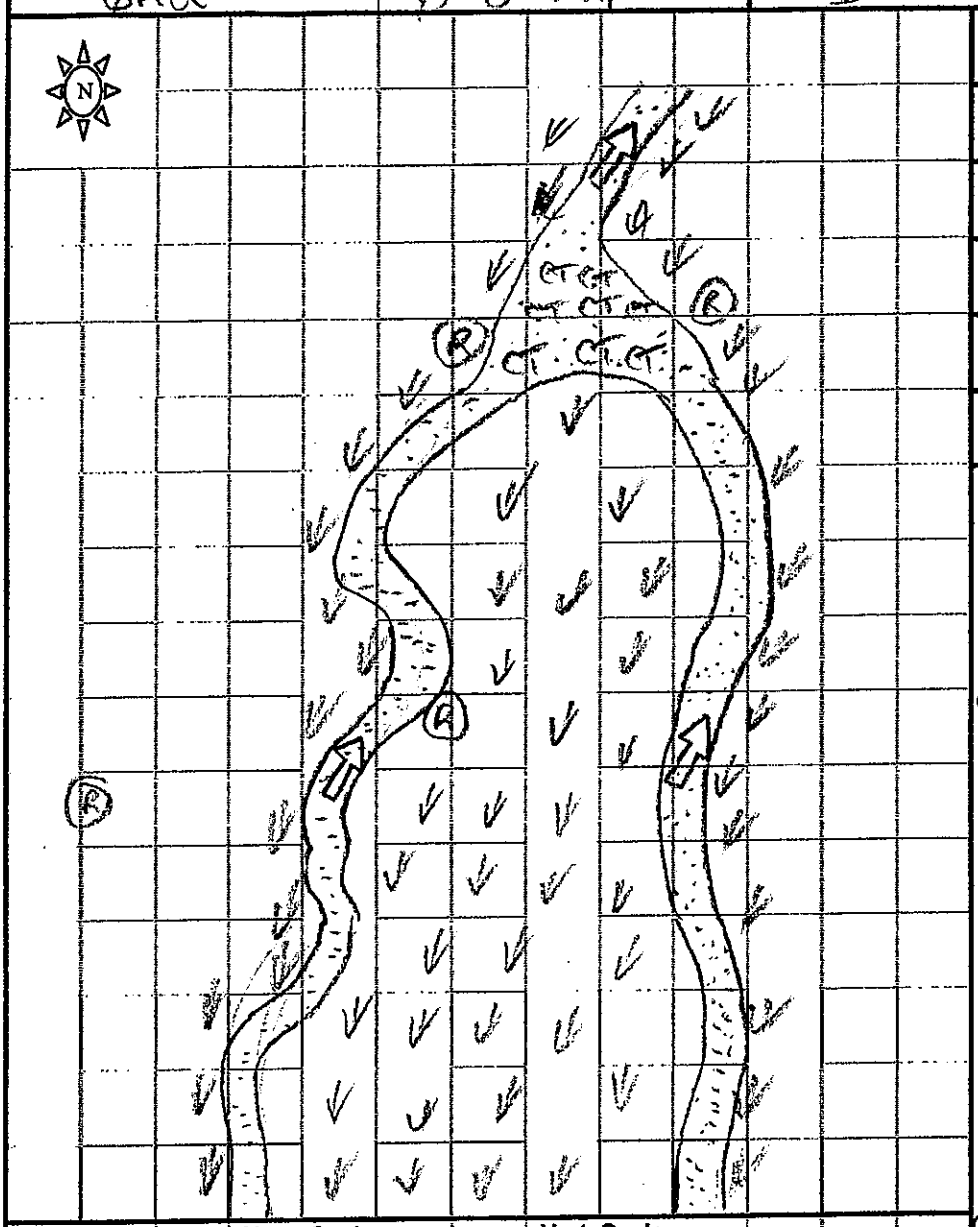
® Riparian Tree

├► Seep/Spring
-------- Undercut Bank

▬ Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
└┘ Culvert

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
6A2	U/S General	30	1/2



PROFILE: Horz. Scale Vert. Scale

PROJECT #: 05056

MAPPER: C. LORENZ

NAME OF WATERBODY: 16 MILE

CROSSING #: 6

STATION #: 6A

DATE: DD-MMM-YY: 01-NOV-11

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▇ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** * *** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
////// Eroded Bank

XXX Riprap / Other Stabilization

⊂⊃ Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree

├► Seep/Spring
------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
└┘ Culvert

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
65026	Britannia EA	01	Nov	2011

Is STREAM REALIGNMENT required for this section:
O Yes O No O Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
C. Lorenz, L. Knight	Sunny	12:50	12:59

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
5°C	7°C	—

PHOTO NUMBERS AND DESCRIPTIONS: See habitat map

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
16 Mile	L. Ontario	6	6B

LOCATION OF CROSSING: Britannia Rd, west of Reg Rd 25

GPS COORDINATES:	MTO CHAINAGE:
594 185E 4815410S N	—
TOWNSHIP: Milton	MNR DISTRICT: Aurora

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:
Transportation, Agriculture	Roads, Farms

EXISTING STRUCTURE TYPE

Bridge O	Box CulvertO	Open Foot Culvert O	CSP O	N/A O

Other ✓ Describe: 2 plastic culverts Size (w x h) m²: 0.91 m²

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (Include on habitat map)
6B.1	In culverts

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	✓	O	O	✓	O	—

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):
15.9	0.01

SUB-SECTION(S)	Run	Pool	Riffle	Flats	Inside culvert	Other
	O	O	O	O	✓	
Percentage of area	100	—	—	—	100	—
Mean depth wetted (m)	0.305	—	—	—	0.305	—
Mean width wetted (m)	0.91	—	—	—	0.91	—
Mean bankfull width (m)	0.91	—	—	—	0.91	—
Mean bankfull depth(m)	0.49	—	—	—	0.49	—
Substrate	Si	—	—	—	Si	—

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	✓	O	O	O
Right Upstream Bank	✓	O	O	O

HABITAT

IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris Instream Overhanging	Organic debris	Vascular Macrophytes Instream Overhanging	None
							100

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	✓	O	O	O	O

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
Predominant Species	—	—	—	100

MIGRATORY OBSTRUCTIONS:	None	Seasonal	Permanent
	—	Intermittent	—

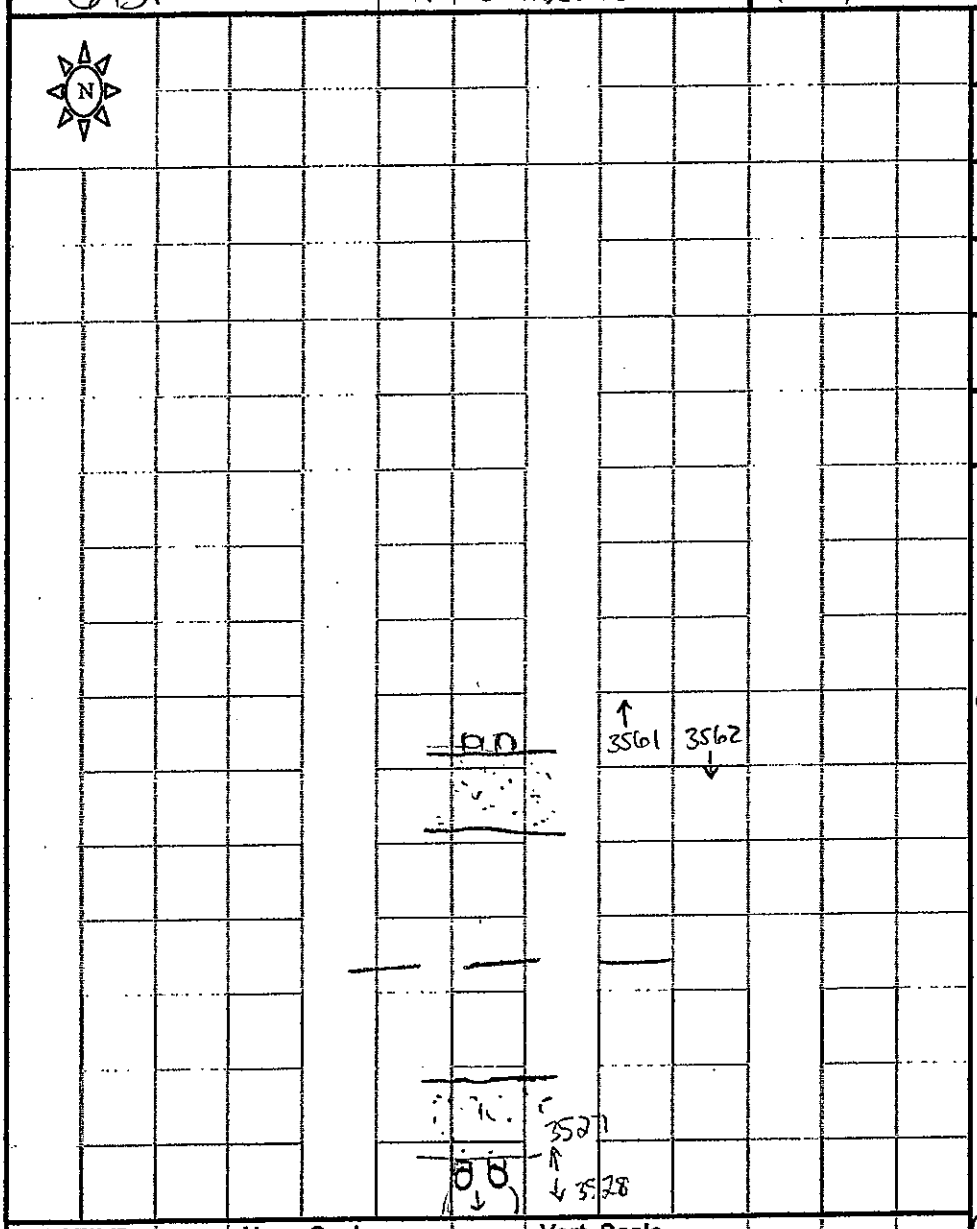
POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other
	—	—	—

POTENTIAL ENHANCEMENT OPPORTUNITIES:

COMMENTS:

Additional Notes Appended? O No O Yes number of pages _____

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
6B1	In culverts	15.9	1cm/3m



PROFILE: Horz. Scale Vert. Scale

PROJECT #: 050056

MAPPER: L. Knight

NAME OF WATERBODY: 16 Mile

CROSSING #: 6

STATION #: 6B

DATE: DD-MMM-YY: 01-Nov-11

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▇ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** * *** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
////// Eroded Bank

XXX Riprap / Other Stabilization

⬭ Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree

⊢► Seep/Spring
-------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
└─┘ Culvert

11.6
4.25
0.8

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
105056	Britannia EA	01	Nov	2011

Is STREAM REALIGNMENT required for this section:

O Yes O No ✓ Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
C. Lorenz, L. Knight	Sunny	12:10	12:35

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
15°C	7°C	

PHOTO NUMBERS AND DESCRIPTIONS: see habitat map.

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
16 Mile	L. Ontario	6	6C

LOCATION OF CROSSING: Britannia Rd, west of Reg Rd 25

GPS COORDINATES:	MTO CHAINAGE:
594185E 4854168N	—

TOWNSHIP:	MNR DISTRICT:
Milton	Aurora

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:
Transportation, Agriculture	Road, Farm

EXISTING STRUCTURE TYPE

Bridge O	Box Culvert O	Open Foot Culvert O	CSP O	N/A O

Other ✓ Describe: 2 plastic culverts — Size (w x h) m^2: 0.91 m

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (include on habitat map)
6C1	DS detailed

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	✓	O	O	✓	O	—

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):
50 m	~0.1 m/s

SUB-SECTION(S)	Run	Pool	Riffle	Flats	Inside culvert	Other
	✓	O	O	O	O	
Percentage of area	100					
Mean depth wetted (m)	0.26					
Mean width wetted (m)	0.75					
Mean bankfull width (m)	1.85					
Mean bankfull depth(m)	0.53					
Substrate	Cl/Si					

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	✓	0	0	0
Right Upstream Bank	✓	0	0	0

HABITAT

IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris	Organic debris	Vascular Macrophytes	None
	0	0	0	Instream 0 Overhanging 0	0	Instream 40 Overhanging 50	10

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	0	✓	0	0	0

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
	0	0	90	10
Predominant Species	—	—	Grasses, herbaceous, cattails	

MIGRATORY OBSTRUCTIONS:	None	Seasonal	Permanent
	—	Intermittent	—

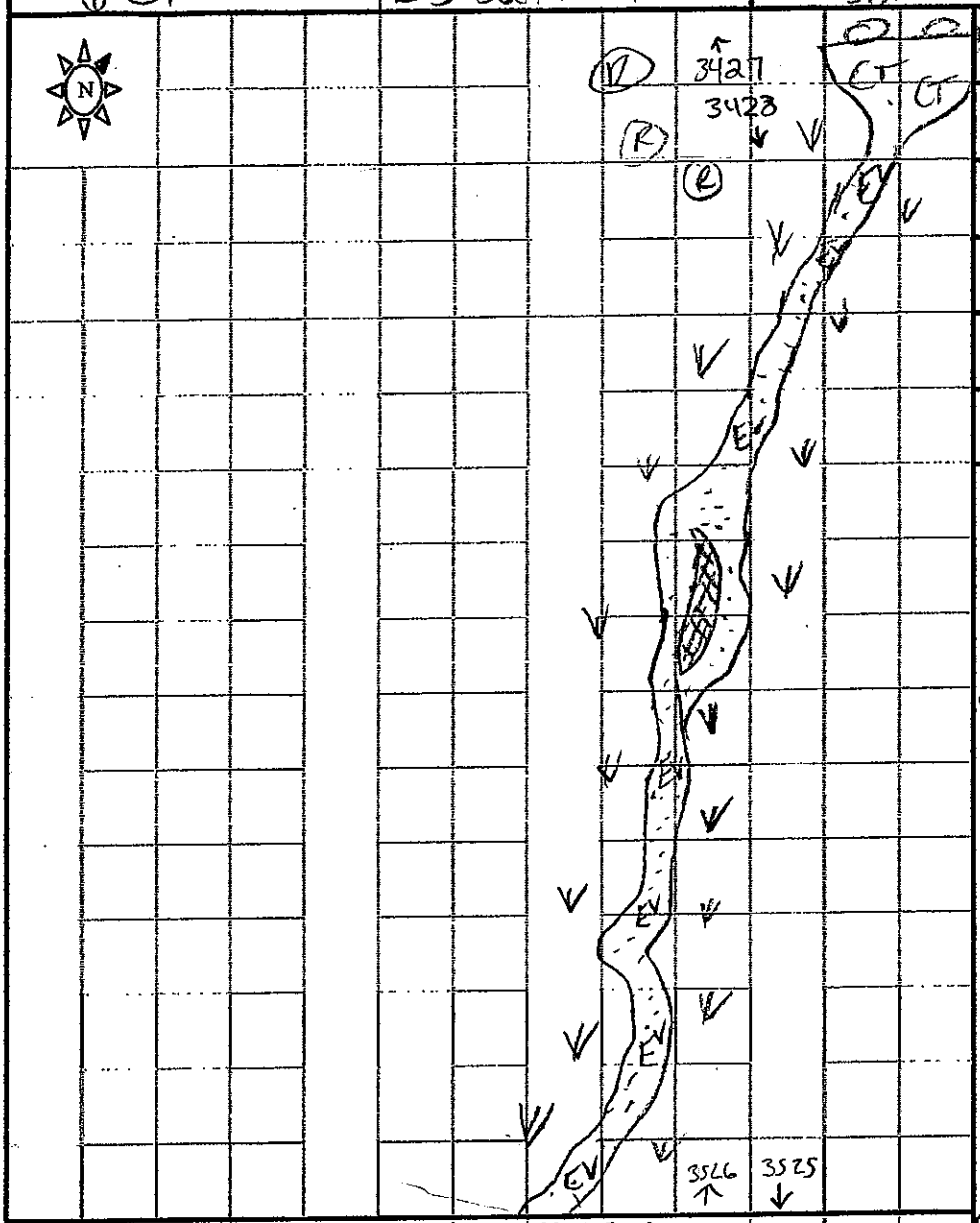
POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other
	—	—	—

POTENTIAL ENHANCEMENT OPPORTUNITIES:

COMMENTS:

Additional Notes Appended? O No O Yes number of pages _____

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
16 C1	DS detailed	50m	1cm/3m



PROFILE: Horz. Scale Vert. Scale

PROJECT #:	605056
MAPPER:	L Knight
NAME OF WATERBODY:	16 Mile
CROSSING #:	6
STATION #:	6C
DATE: DD-MMM-YY	01-Nov-11

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▓ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** * *** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
////// Eroded Bank

XXX Riprap / Other Stabilization

Instream Log/Tree
^^^ Dam/Weir/Obstruction

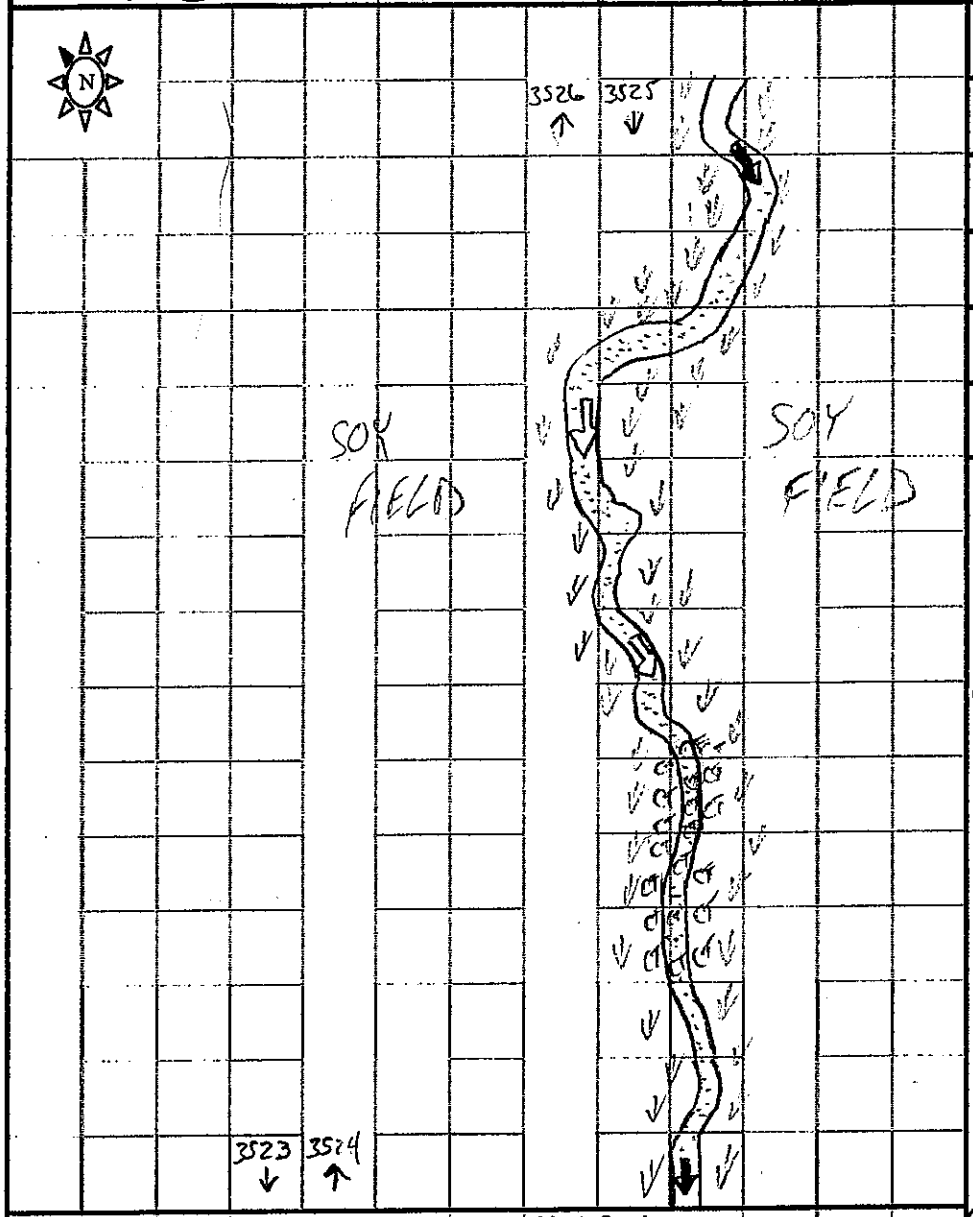
® Riparian Tree

Seep/Spring
------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
Culvert

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
6C2	d/s General (u/s half)	75 m	1/5



PROFILE: Horz. Scale Vert. Scale

PROJECT #:	05056
MAPPER:	C. LORENZ
NAME OF WATERBODY:	16 MILE
CROSSING #:	6
STATION #:	6C
DATE: DD-MMM-YY	01-NOV-11

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▮ Island/Bar

▒ Fine Substrate
Gravel Substrate
oOooO Cobble /Boulder
* * * Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
/////// Eroded Bank

XXX Riprap / Other Stabilization

⊂⊃ Instream Log/Tree
^^^ Dam/Weir/Obstruction

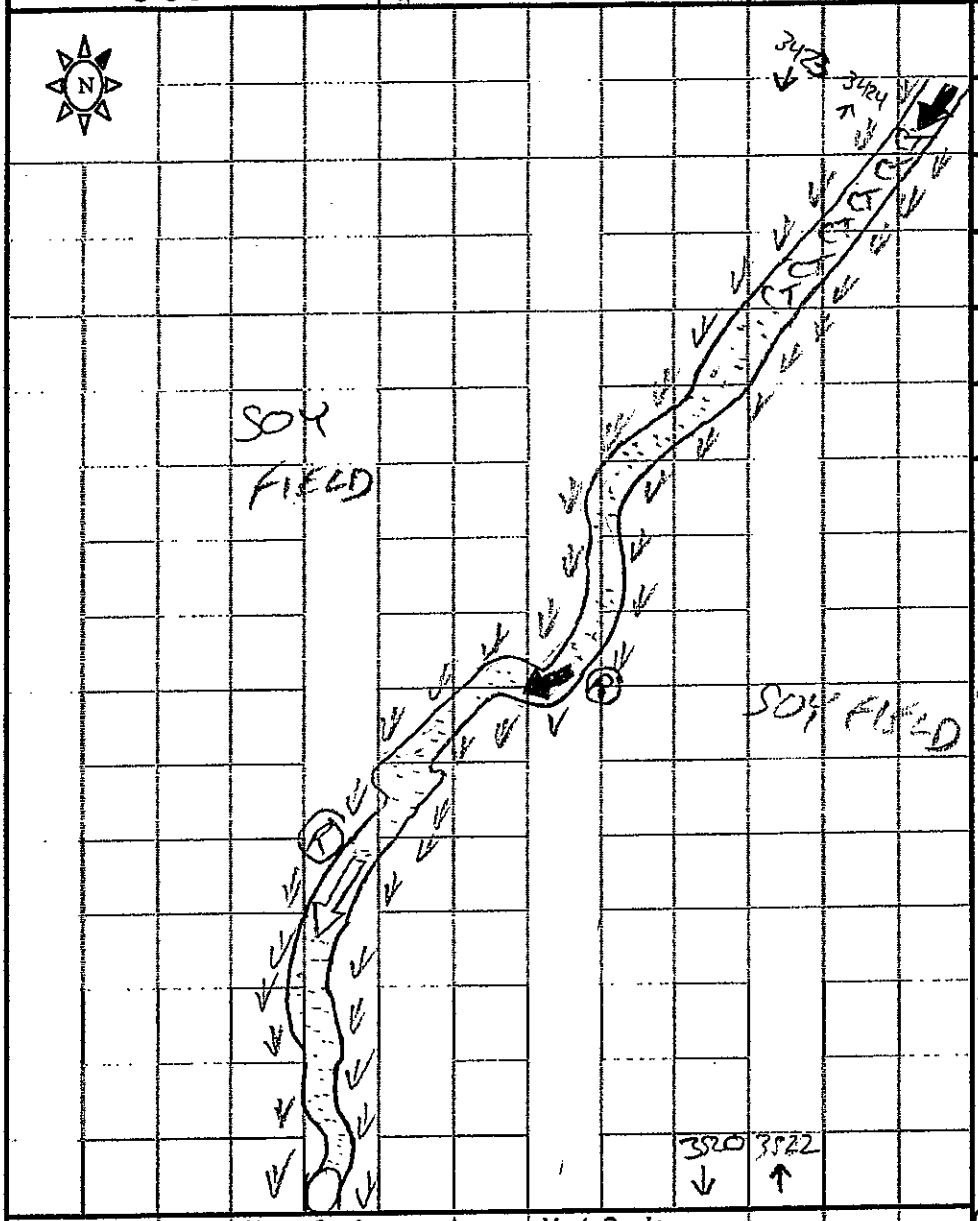
® Riparian Tree

├► Seep/Spring
------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
└┘ Culvert

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
6C3	d/s General (d/s half)	75 m	1/5



PROFILE: Horz. Scale Vert. Scale

PROJECT #: 650590
MAPPER: C. Lorenz
NAME OF WATERBODY: 16 MILE
CROSSING #: 6
STATION #: 63
DATE: DD-MMM-YY: 01-NOV-11

LEGEND

- **10d** depth (cm)
- **6w** width
- ➡ Riffle
- ⇨ Run/Glide
- ⬭ Pool
- ▓ Island/Bar
- ▒ Fine Substrate
- **###** Gravel Substrate
- **oOooO** Cobble /Boulder
- *** * *** Debris
- **CT** Cattail
- **SV/FV** Submerg/Float Veg
- **EV** Emergent Vegetation
- **W** Watercress
- **Fe** Iron Staining
- **//////** Eroded Bank
- **XXX** Riprap / Other Stabilization
- ⊂⊃ Instream Log/Tree
- **^^^** Dam/Weir/Obstruction
- Ⓡ Riparian Tree
- ⊢► Seep/Spring
- **-------** Undercut Bank
- ▬ Barrier to Fish Movement
- **-S-** Seasonal Barrier
- **-x--x-** Fence line
- ⌴ Culvert

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
650576	BRITANNIA RD EA	17	AUGUST	2011

Is STREAM REALIGNMENT required for this section:

O Yes O No ✓ Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
AQUAFOR BEECH L. KNIGHT, C. LORENZ	SUNNY, CLEAR	10:32	11:28

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
23°C	21°C	N/A

PHOTO NUMBERS AND DESCRIPTIONS: see habitat map

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
16 MILE CREEK	LAKE ONTARIO	7	7A

LOCATION OF CROSSING: Britannia, permanent stream east of Reg Rd 25

GPS COORDINATES:	MTO CHAINAGE:
594616E 4816029 N ± 7m	N/A
TOWNSHIP: MILTON	**MNR DISTRICT:** AURORA

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:
TRANSPORTATION, MEADOW, AGRICULTURE	AGRICULTURE, ROAD CROSSING

EXISTING STRUCTURE TYPE

Bridge ✓	Box Culvert O	Open Foot Culvert O	CSP O	N/A O

Other O Describe:

11.6 x 19.4 Size (w x h) m^2 31.2

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (include on habitat map)
7A1	UPSTREAM END OF BRIDGE TO 20m UPSTREAM

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	✓	O	✓	O	O	NO

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):
20m	1.3 m/s

SUB-SECTION(S)	Run ✓	Pool ✓	Riffle ✓	Flats O	Inside culvert O	Other
Percentage of area	30	60	10			
Mean depth wetted (m)	0.181	0.56	0.18			
Mean width wetted (m)	10.45	9.0	9.2			
Mean bankfull width (m)	12.5	10.6	11.4			
Mean bankfull depth(m)	0.77	1.00	0.93			
Substrate	Co	Co	Co			

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

12.5
20.0
27.0
17.0
13.0

15.5 25 12
16 22

60 39 31
91 59

23 12
20 4.5
10.5

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	✓	O	O	O
Right Upstream Bank	✓	O	O	O

HABITAT

IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris	Organic debris	Vascular Macrophytes	None
	0	5	55	Instream 2 Overhanging 3	0	Instream 25 Overhanging 10	N/A

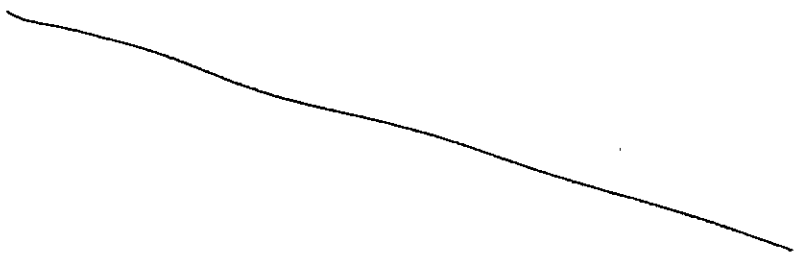
SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	O	O	O	✓	O

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
	90	0	10	N/A
Predominant Species	MOSS	N/A	?	

MIGRATORY OBSTRUCTIONS:	None	Seasonal	Permanent
	✓	N/A	N/A

POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other
	N/A	N/A	N/A

POTENTIAL ENHANCEMENT OPPORTUNITIES:



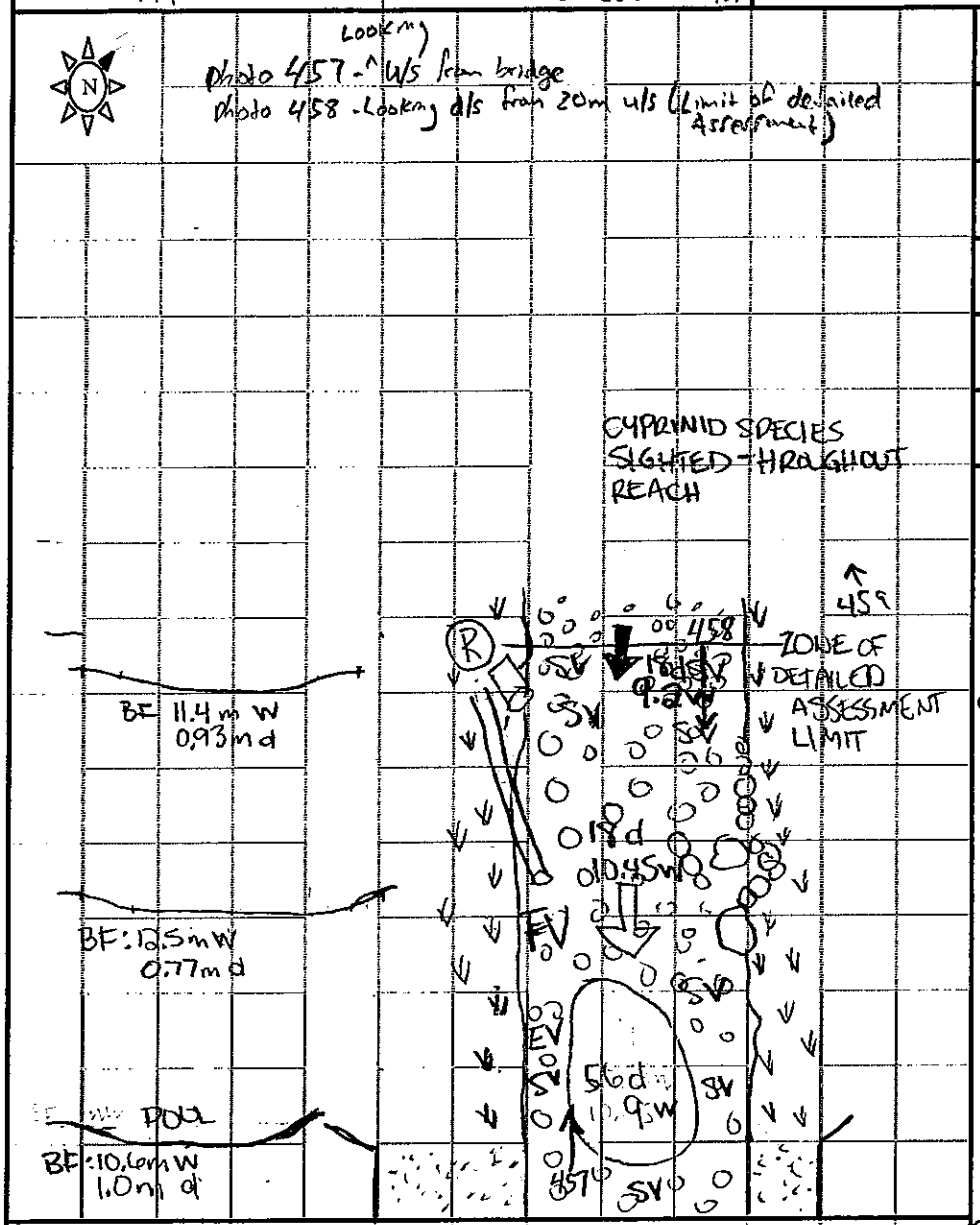
COMMENTS:

INCIDENTAL FISH SIGHTINGS: WHITE SUCKER, CYPRINID SP.

LOTS OF GIANT HOGWEED ON BOTH BANKS

Additional Notes Appended? O No O Yes number of pages _____

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
7A	U/S DETAILED ASSESSMENT	20m	1cm/3m



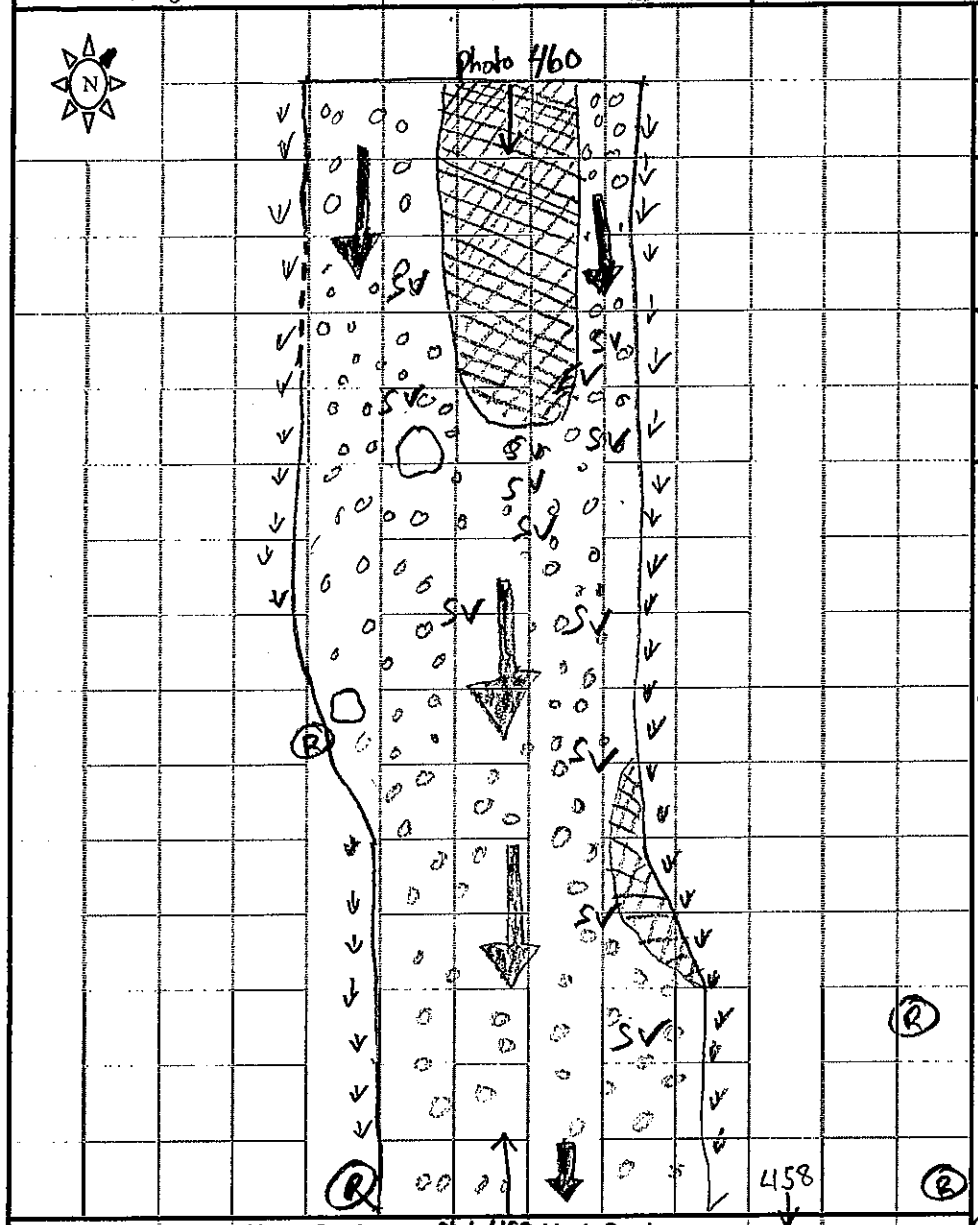
PROFILE: Horz. Scale Vert. Scale

PROJECT #:	65056
MAPPER:	L. KNIGHT
NAME OF WATERBODY:	16 MILE CREEK
CROSSING #:	7
STATION #:	7A
DATE: DD-MMM-YY	17/AUG/11

LEGEND

- BRIDGE
- **10d** depth (cm)
- **6w** width (m)
- ➡ Riffle
- ⇨ Run/Glide
- Pool
- Island/Bar
- Fine Substrate
- ### Gravel Substrate
- **oOooO** Cobble /Boulder
- * * * Debris
- **CT** Cattail
- **SV/FV** Submerg/Float Veg
- **EV** Emergent Vegetation
- **W** Watercress
- **Fe** Iron Staining
- //////// Eroded Bank
- **XXX** Riprap / Other Stabilization
- Instream Log/Tree
- ^^^ Dam/Weir/Obstruction
- ® Riparian Tree
- Riparian Vegetation
- ├► Seep/Spring
- -------- Undercut Bank
- — Barrier to Fish Movement
- **-S-** Seasonal Barrier
- **-x--x-** Fence line
- Culvert

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
7A2	U/S GENERAL ASSESSMENT	30m	1cm = 2m



PROFILE: Horz. Scale Vert. Scale

PROJECT #: 05056

MAPPER: C. LORENZ

NAME OF WATERBODY: 16 MILE CREEK

CROSSING #: 7

STATION #: 7A2

DATE: DD-MMM-YY 17-Aug-11

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▓ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** * *** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
/////// Eroded Bank

XXX Riprap / Other Stabilization

⊂⊃ Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree

├▶ Seep/Spring
-------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
└┘ Culvert

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
05B056	BRITANNIA EA	17	AUGUST	2011

Is STREAM REALIGNMENT required for this section:

O Yes O No ⊘ Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
AQUAFOR BEECH L.KNIGHT, C.LORENZ	SUNNY, CLEAR	11:28	11:47

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
23°C	21°C	N/A

PHOTO NUMBERS AND DESCRIPTIONS: See habitat map

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
16 MILE CREEK	LAKE ONTARIO	7	7B

LOCATION OF CROSSING: Britannia, permanent stream east of Reg Rd 25

GPS COORDINATES:	MTO CHAINAGE:
5946016 E 4816027 N ± 8	

TOWNSHIP:	MNR DISTRICT:
MILTON	AURORA

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:
TRANSPORTATION, AGRICULTURE, MEADOW	ROAD, AGRICULTURE

EXISTING STRUCTURE TYPE

Bridge ⊘	Box Culvert O	Open Foot Culvert O	CSP O	N/A O

Other O Describe:

Size (w x h) m^2 31.2

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (include on habitat map)
7B1	UNDER BRIDGE

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	⊘	O	⊘	O	O	N/A

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):
11.6 m	1.1 m/s

SUB-SECTION(S)	Run	Pool	Riffle	Flats	Inside culvert	Other
	⊘	O	⊘	O	O	
Percentage of area	85	—	15	—	—	—
Mean depth wetted (m)	0.172	—	0.147	—	—	—
Mean width wetted (m)	14.7	—	14.9	—	—	—
Mean bankfull width (m)	19.5	—	19.5	—	—	—
Mean bankfull depth(m)	0.88	—	0.84	—	—	—
Substrate	Co	—	Co	—	—	—

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	✓	0	0	0
Right Upstream Bank	✓	0	0	0

HABITAT

IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris	Organic debris	Vascular Macrophytes	None
	—	—	60	Instream — Overhanging —	—	Instream 40 Overhanging —	—

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	0	✓	0	0	0

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
	100	—	—	—
Predominant Species	Moss	—	—	

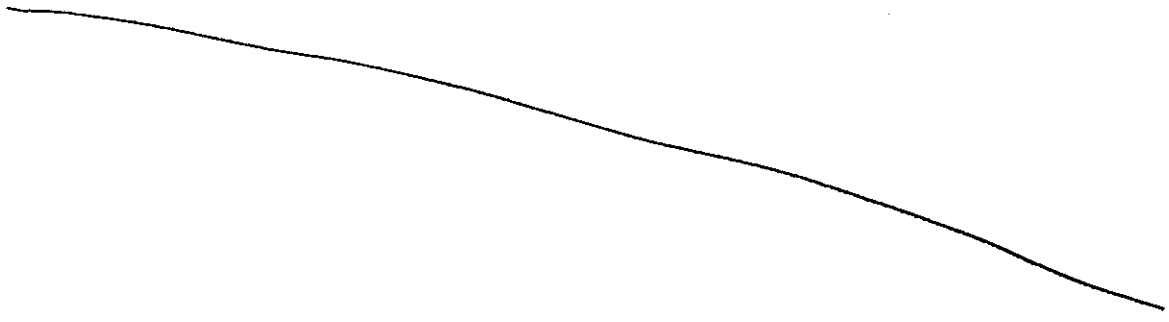
MIGRATORY OBSTRUCTIONS:	None	Seasonal	Permanent
	✓	—	—

POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other
	—	—	—

POTENTIAL ENHANCEMENT OPPORTUNITIES:

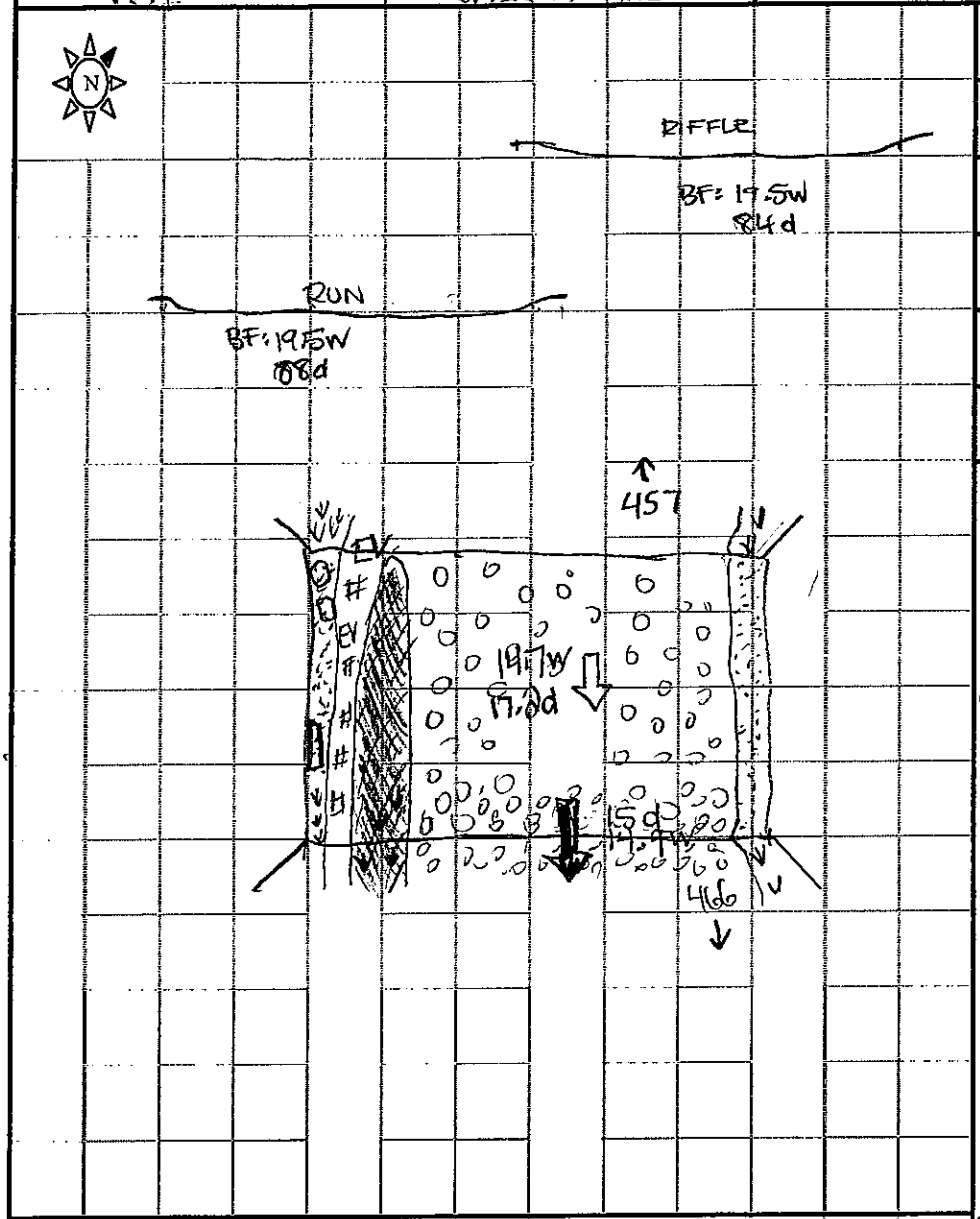
Bridge should be wider to allow flooding of valley walls.

COMMENTS:

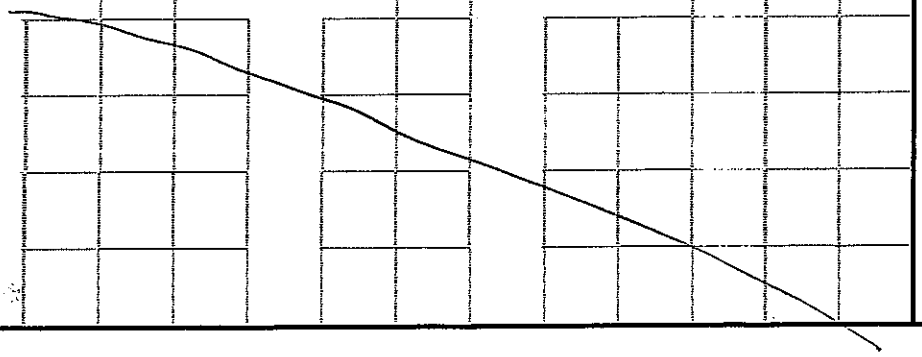


Additional Notes Appended? O No ✓ Yes number of pages —

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
7B1	UNDER BRIDGE	11.6	1 cm / 3m



PROFILE: Horz. Scale Vert. Scale



PROJECT #: 05056

MAPPER: L. KNIGHT

NAME OF WATERBODY: 16 MILE CREEK

CROSSING #: 7

STATION #: 7B1

DATE: DD-MMM-YY 17-AUG-11

LEGEND

10d depth (cm)
6w width (m)

➡ Riffle
⇨ Run/Glide
⬭ Pool
▮ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
* * * Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
//////// Eroded Bank

XXX Riprap / Other Stabilization

⬭ Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree

├► Seep/Spring
-------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
└┘ Culvert

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
050056	BRITANNIA EA	17	AUGUST	2011

Is STREAM REALIGNMENT required for this section:

O Yes O No ✓ Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
AQUAFOR BEECH L.KNIGHT, C.LORENZ	SUNNY, MINOR CLOUDS	11:55	12:18

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
27°C	22°C	—

PHOTO NUMBERS AND DESCRIPTIONS: see habitat map

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
16 MILE CREEK	LAKE ONTARIO	7	7C

LOCATION OF CROSSING: Britannia Rd, permanent stream east of Reg Rd 25.

GPS COORDINATES:	MTO CHAINAGE:
594621E 4811600N ± 6m	—

TOWNSHIP:	MNR DISTRICT:
MILTON	AURORA

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:
TRANSPORTATION, AGRICULTURE, MEADOW	ROAD, AGRICULTURE

EXISTING STRUCTURE TYPE

Bridge ✓	Box Culvert O	Open Foot Culvert O	CSP O	N/A O

Other O Describe: —

Size (w x h) m^2 31.2

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (include on habitat map)
7C1	D/S END OF BRIDGE TO 50m D/S

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	✓	O	✓	O	O	—

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):
50 m	0.5 m/s

SUB-SECTION(S)	Run	Pool	Riffle	Flats	Inside culvert	Other
	✓	O	✓	O	O	RIFFLE
Percentage of area	10	—	30	—	—	60
Mean depth wetted (m)	0.257	—	0.143	—	—	0.214
Mean width wetted (m)	8.3	—	15.7	—	—	10.1
Mean bankfull width (m)	9.6	—	17.9	—	—	11.1
Mean bankfull depth(m)	0.78	—	0.89	—	—	0.57
Substrate	BR + Gr	—	Co	—	—	Co

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

10.1 10.5

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	✓	O	O	O
Right Upstream Bank	O	✓	O	O

HABITAT

IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris	Organic debris	Vascular Macrophytes	None
	5	5	65	Instream 5 Overhanging —	—	Instream 15 Overhanging 5	—

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	O	O	O	✓	O

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
	95	—	5	—
Predominant Species	MOSS, COONTAIL + MISC. MACROPHYTES	—	TERRESTRIAL PLANT	

MIGRATORY OBSTRUCTIONS:	None	Seasonal	Permanent
	✓	—	—

POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other
	—	—	—

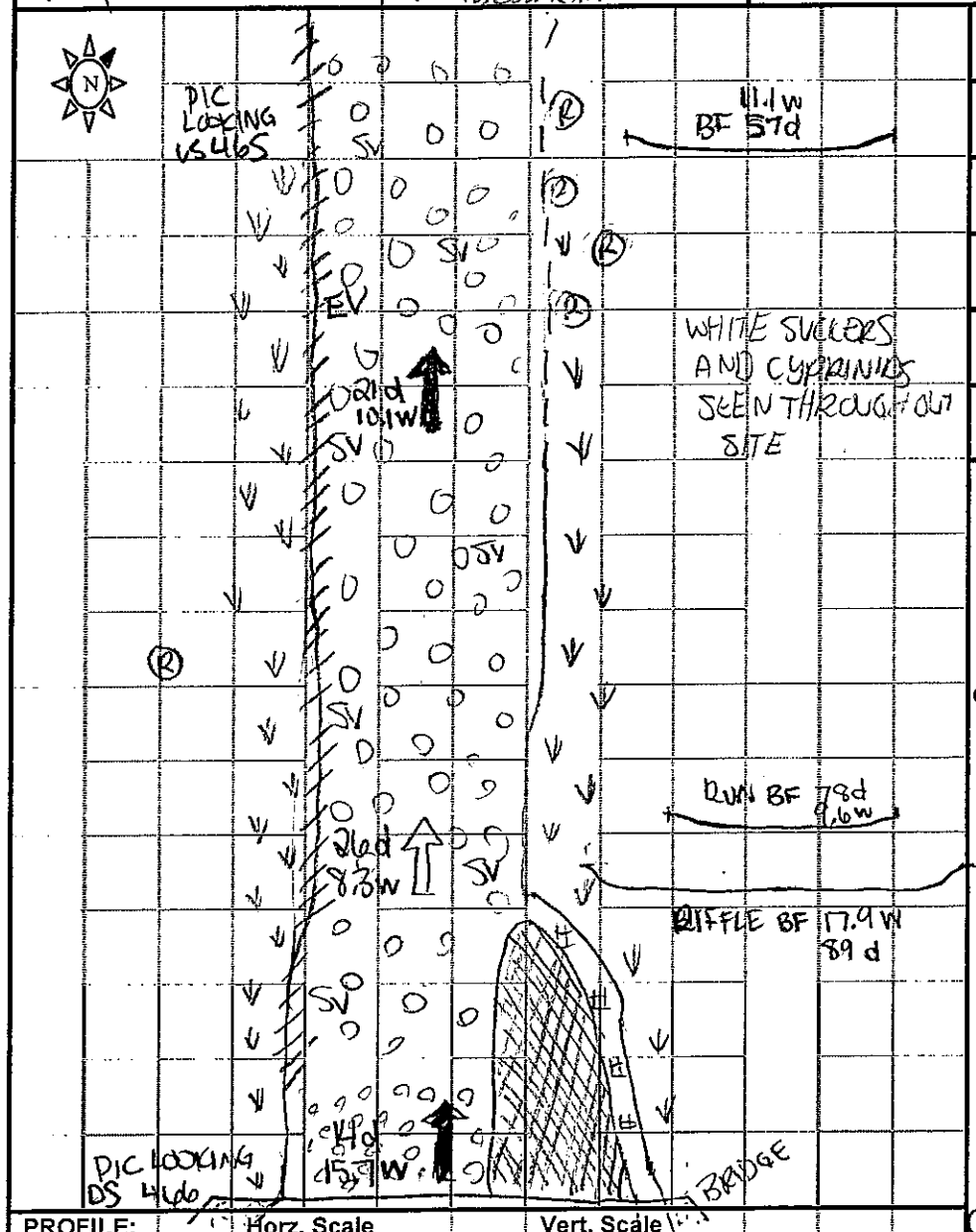
POTENTIAL ENHANCEMENT OPPORTUNITIES:

COMMENTS:

- HOGWEED ON BOTH BANKS
- SUCKERS + CYPRINIDS SIGHTED

Additional Notes Appended? ✓ No O Yes number of pages —

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
7C	DS ZONE OF DETAILED ASSESSMENT	50 m	1 cm / 3 m



PROFILE: Horz. Scale Vert. Scale

PROJECT #: 05056

MAPPER: L KNIGHT

NAME OF WATERBODY: 16 MILE CREEK.

CROSSING #: 7

STATION #: 7C

DATE: DD-MMM-YY 17-AUG-11

LEGEND

V Riparian veg
10d depth (cm)
6w width (m)

➡ Riffle
⇨ Run/Glide
⬭ Pool
▓ Island/Bar

▒ Fine Substrate
Gravel Substrate
oOooO Cobble /Boulder
* * * Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
//////// Eroded Bank

XXX Riprap / Other Stabilization

⊂⊃ Instream Log/Tree
^^^ Dam/Weir/Obstruction

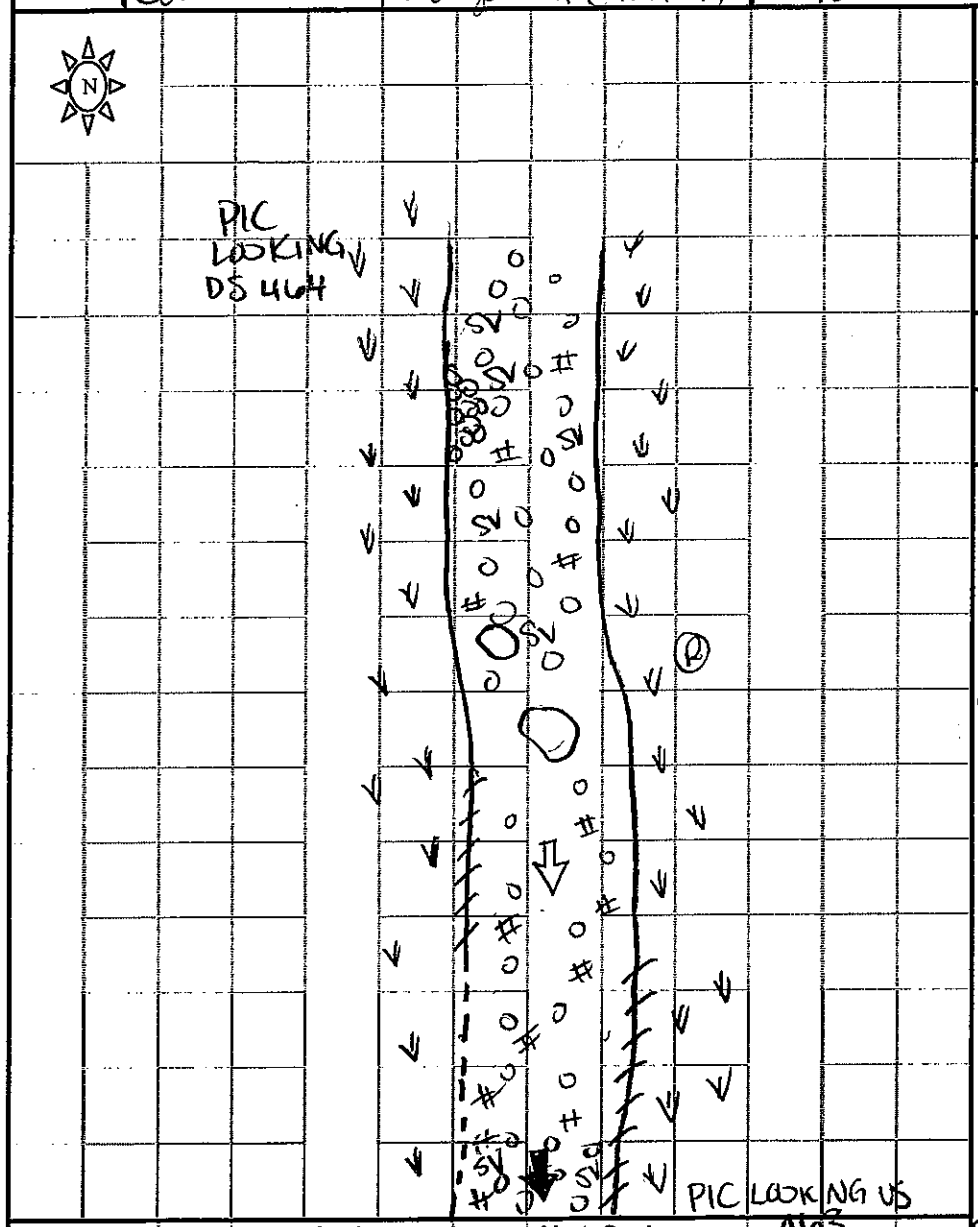
® Riparian Tree

├► Seep/Spring
------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
└┘ Culvert

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
TC2	DS general (US half)	75m	1cm/5m



PROFILE: Horz. Scale Vert. Scale

PROJECT #:	65056
MAPPER:	L. KNIGHT
NAME OF WATERBODY:	16 MILE CREEK
CROSSING #:	7
STATION #:	TC
DATE: DD-MMM-YY	17-AUG-11

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▓ Island/Bar

▒ Fine Substrate
Gravel Substrate
oOooO Cobble /Boulder
*** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
/////// Eroded Bank

XXX Riprap / Other Stabilization

⬭ Instream Log/Tree
^^^ Dam/Weir/Obstruction

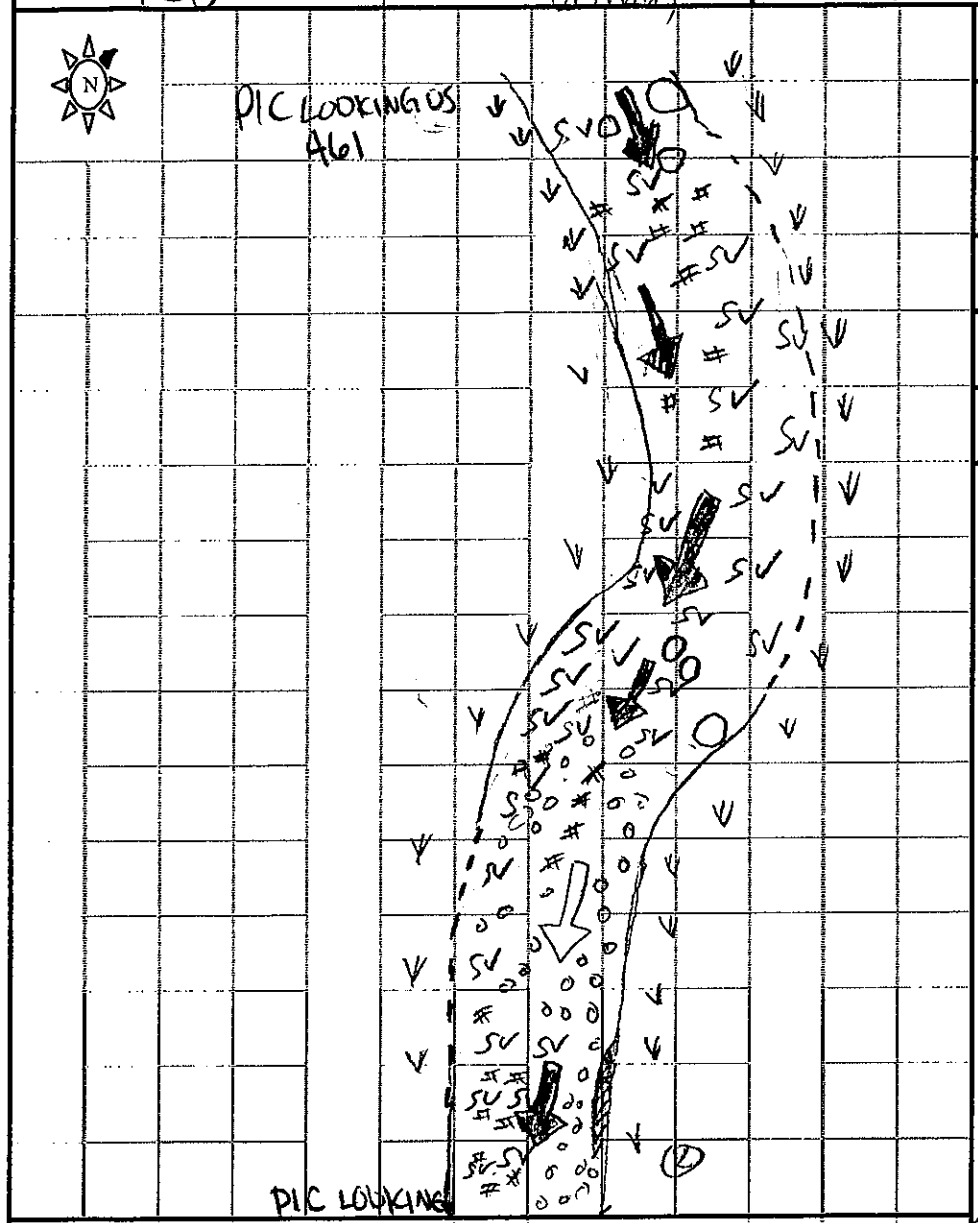
® Riparian Tree

├► Seep/Spring
-------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
└┘ Culvert

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
7C3	DS GENERAL ASSESSMENT (ashalt)	75m	1cm = 5m



PROFILE: Horz. Scale Vert. Scale

PROJECT #: 050560
MAPPER: C. LORENZ
NAME OF WATERBODY: 16 MILE CREEK
CROSSING #: 7
STATION #: 7C3
DATE: DD-MMM-YY 17-AUG-11

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▓ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** * *** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
////// Eroded Bank

XXX Riprap / Other Stabilization

⊂⬭ Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree

├► Seep/Spring
------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
└┘ Culvert

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
05056	BRITANNIA EA	02	NOV	2011

Is STREAM REALIGNMENT required for this section:

O Yes O No ⊘ Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
C. LORENZ, L. KNIGHT	SUNNY	9:50	3:04

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
13°	8°C	—

PHOTO NUMBERS AND DESCRIPTIONS: See habitat map.

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
16 Mile	L. Ontario	11	11A

LOCATION OF CROSSING: Fourth Line + Britannia Rd

GPS COORDINATES:	MTO CHAINAGE:
595962E 4817714N ± 6m	—

TOWNSHIP:	MNR DISTRICT:
Milton	Aurora

LAND USE AND POLLUTION

SURROUNDING LAND USE: Residential, Agricultural, Transportation

SOURCES OF POLLUTION: Road, Farms, homes

EXISTING STRUCTURE TYPE

Bridge O	Box CulvertO	Open Foot Culvert ⊘	CSP O	N/A O

Other O Describe:

Size (w x h) m^2

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (include on habitat map)
11A	US defailed

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	⊘	O	O	⊘	O	—

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):
50 m	Slow

SUB-SECTION(S)	Run	Pool	Riffle	Flats	Inside culvert	Other
	⊘	O	O	O	O	
Percentage of area	100					
Mean depth wetted (m)	0.04					
Mean width wetted (m)	6.0					
Mean bankfull width (m)	8.7					
Mean bankfull depth(m)	0.34					
Substrate	Cl					

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	0	0	0	0
Right Upstream Bank	0	0	0	0

HABITAT

IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris	Organic debris	Vascular Macrophytes	None
	0	0	0	Instream 0 Overhanging 0	0	Instream 60 Overhanging 30	10

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	0	0	0	0	0

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
	0	0	90	
Predominant Species	—	—	cattails, grasses	10

MIGRATORY OBSTRUCTIONS:	None	Seasonal	Permanent
	—	Intermittent	—

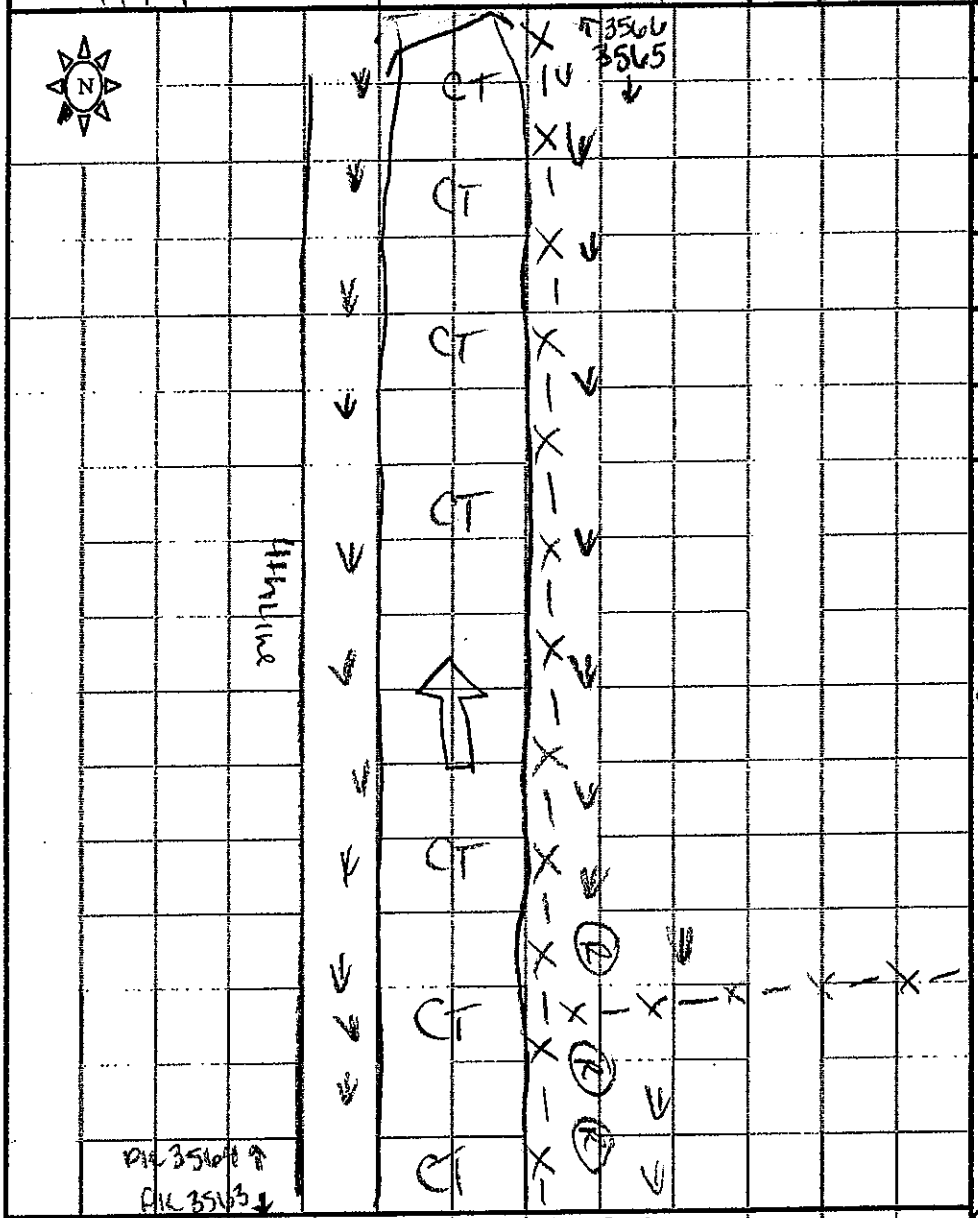
POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other
	—	—	—

POTENTIAL ENHANCEMENT OPPORTUNITIES:

COMMENTS:

Additional Notes Appended? O No O Yes number of pages _____

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
11A1	US detailed	50m	1cm/3m



PROFILE: Horz. Scale Vert. Scale

PROJECT #:	050560
MAPPER:	L. Knight
NAME OF WATERBODY:	16 Mile
CROSSING #:	11
STATION #:	11A
DATE: DD-MMM-YY	02-Nov-11

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▓ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** * *** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
////// Eroded Bank

XXX Riprap / Other Stabilization

⊂⊃ Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree

├▶ Seep/Spring
------- Undercut Bank

▬ Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
└┘ Culvert

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
650516	Britannia Rd Ea	12	Oct	2011

Is STREAM REALIGNMENT required for this section:

O Yes O No ✓ Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
C. LORENZ L KNIGHT	Overcast, rainy	250	300

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
17°C	15°C	—

PHOTO NUMBERS AND DESCRIPTIONS: See Habitat mapping

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
16 Mile	Lomond	11	11B

LOCATION OF CROSSING: Britannia Rd + Fourth Line

GPS COORDINATES:	MTO CHAINAGE:
595962E 4817714N ±6m 17T	—

TOWNSHIP:	MNR DISTRICT:
Milton	Aurora

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:
Ag, Trans, Res	Road, Ag

EXISTING STRUCTURE TYPE

Bridge O	Box CulvertO	Open Foot Culvert ✓	CSP O	N/A O

Other O Describe: Size (w x h) m^2

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (include on habitat map)
11B1	In Culvert

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	✓	O	O	✓	O	—

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):
24m	0

SUB-SECTION(S)	Run	Pool	Riffle	Flats	Inside culvert	Other
	O	O	O	O	✓	
Percentage of area	—	—	—	—	100	—
Mean depth wetted (m)	—	—	—	—	—	—
Mean width wetted (m)	—	—	—	—	—	—
Mean bankfull width (m)	—	—	—	—	—	—
Mean bankfull depth(m)	—	—	—	—	—	—
Substrate	—	—	—	—	Cl	—

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	✓	O	O	O
Right Upstream Bank	✓	O	O	O

HABITAT

IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris Instream Overhanging	Organic debris	Vascular Macrophytes Instream Overhanging	None 100

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	✓	O	O	O	O

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
				100
Predominant Species				

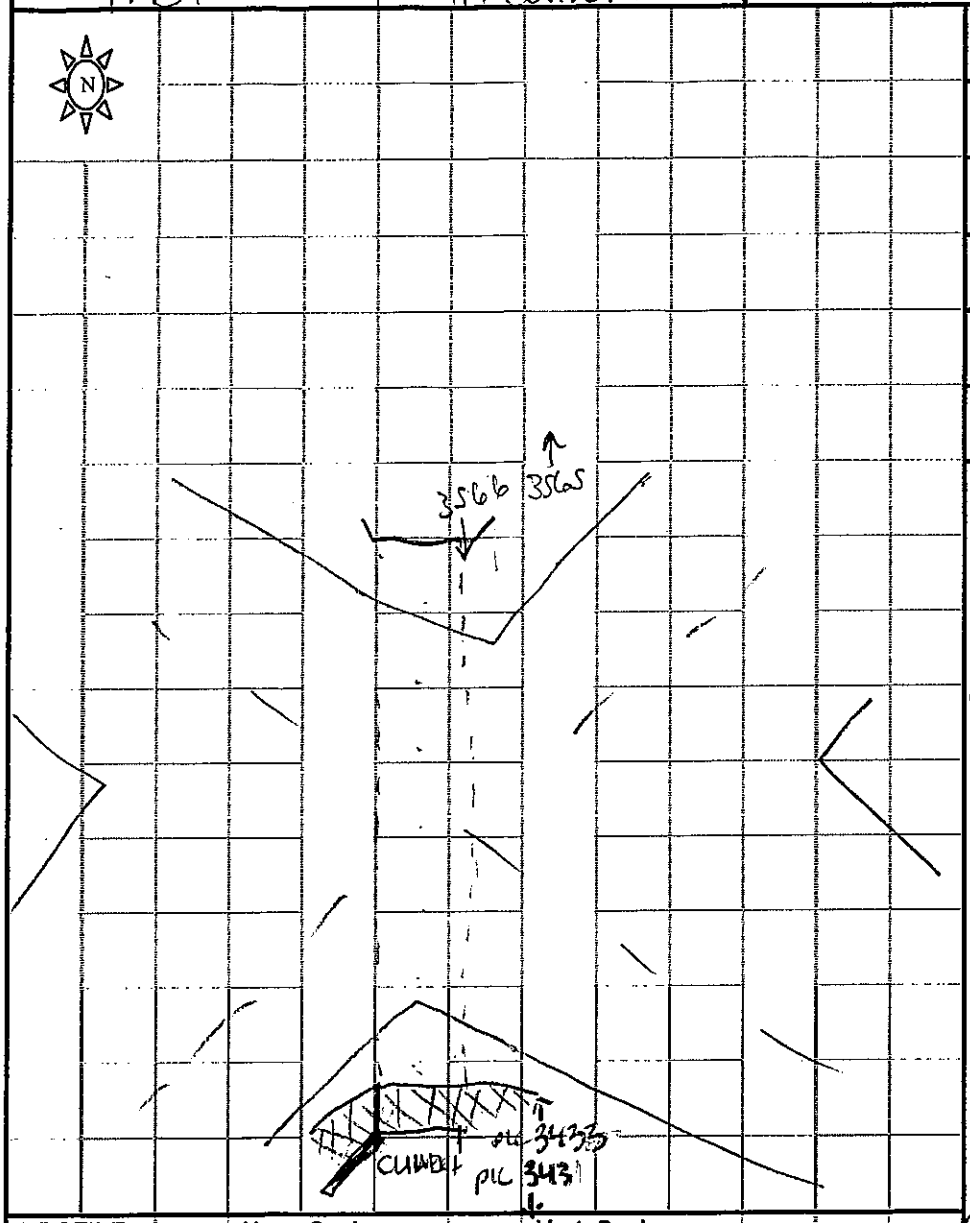
MIGRATORY OBSTRUCTIONS:	None	Seasonal Intermittent flows.	Permanent
POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other

POTENTIAL ENHANCEMENT OPPORTUNITIES:

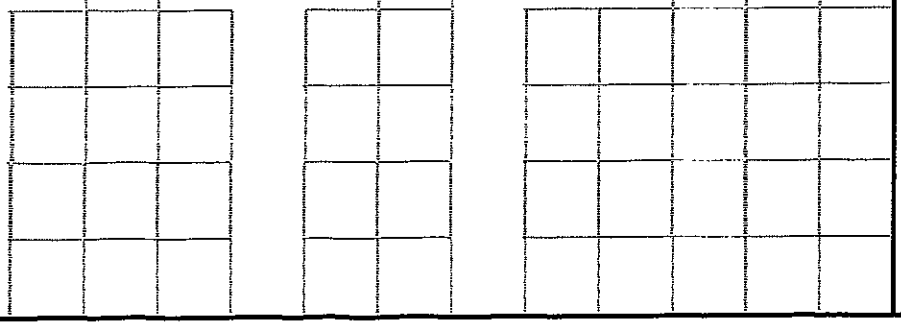
COMMENTS:

Additional Notes Appended? ✓ No O Yes number of pages _____

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
11B1	In Culvert	24m	1cm/3m



PROFILE: Horz. Scale Vert. Scale



PROJECT #: 650Z6

MAPPER: L KNIGHT

NAME OF WATERBODY: 16 Mile creek

CROSSING #: 11

STATION #: 11B

DATE: DD-MMM-YY 12-Oct-11

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▓ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** * *** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
/////// Eroded Bank

XXX Riprap / Other Stabilization

⊂⊃ Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree

⊢▶ Seep/Spring
-------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
└┘ Culvert

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
650526	BRITANNIA RD EA	12	OCT	2011

Is STREAM REALIGNMENT required for this section:

O Yes O No Ø Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
CLORENZ + KNIGHT	OVERCAST, RAINY	2:30	2:40

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
17°		—

PHOTO NUMBERS AND DESCRIPTIONS: See hab. mapping

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
16 Mile	L-ONTario	11	11 C

LOCATION OF CROSSING: Fourth Line + Britannia Rd

GPS COORDINATES:	MTO CHAINAGE:
5a 597182E 4817714N ± 5m 17T	—

TOWNSHIP:	MNR DISTRICT:
Milton	Aurora

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:
Ag, Res, Trans	Ag, Roads

EXISTING STRUCTURE TYPE

Bridge O	Box CulvertO	Open Foot Culvert Ø	CSP O	N/A O

Other O Describe: Size (w x h) m^2

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (include on habitat map)
11C1	DS detailed

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	Ø	O	O	Ø	O	NA

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):
50m	Ø

SUB-SECTION(S)	Run O	Pool Ø	Riffle O	Flats O	Inside culvert O	Other DRY
Percentage of area	—	60	—	—	—	40
Mean depth wetted (m)	—	0.20	—	—	—	—
Mean width wetted (m)	—	4.1	—	—	—	—
Mean bankfull width (m)	—	5.2	—	—	—	1.2
Mean bankfull depth(m)	—	0.65	—	—	—	0.2
Substrate	—	Cl/Sa		—	—	Cl/Sa

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	Ø	O	O	O
Right Upstream Bank	Ø	O	O	O

HABITAT

IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris	Organic debris	Vascular Macrophytes	None
	0	0	0	Instream 0 Overhanging 0	5	Instream 40 Overhanging 40	15

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	O	Ø	O	O	O

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
		10	50	40
Predominant Species		duckweed	Grass, herbaceous, cattails	

MIGRATORY OBSTRUCTIONS:	None	Seasonal	Permanent
	—	Intermittent flow	—

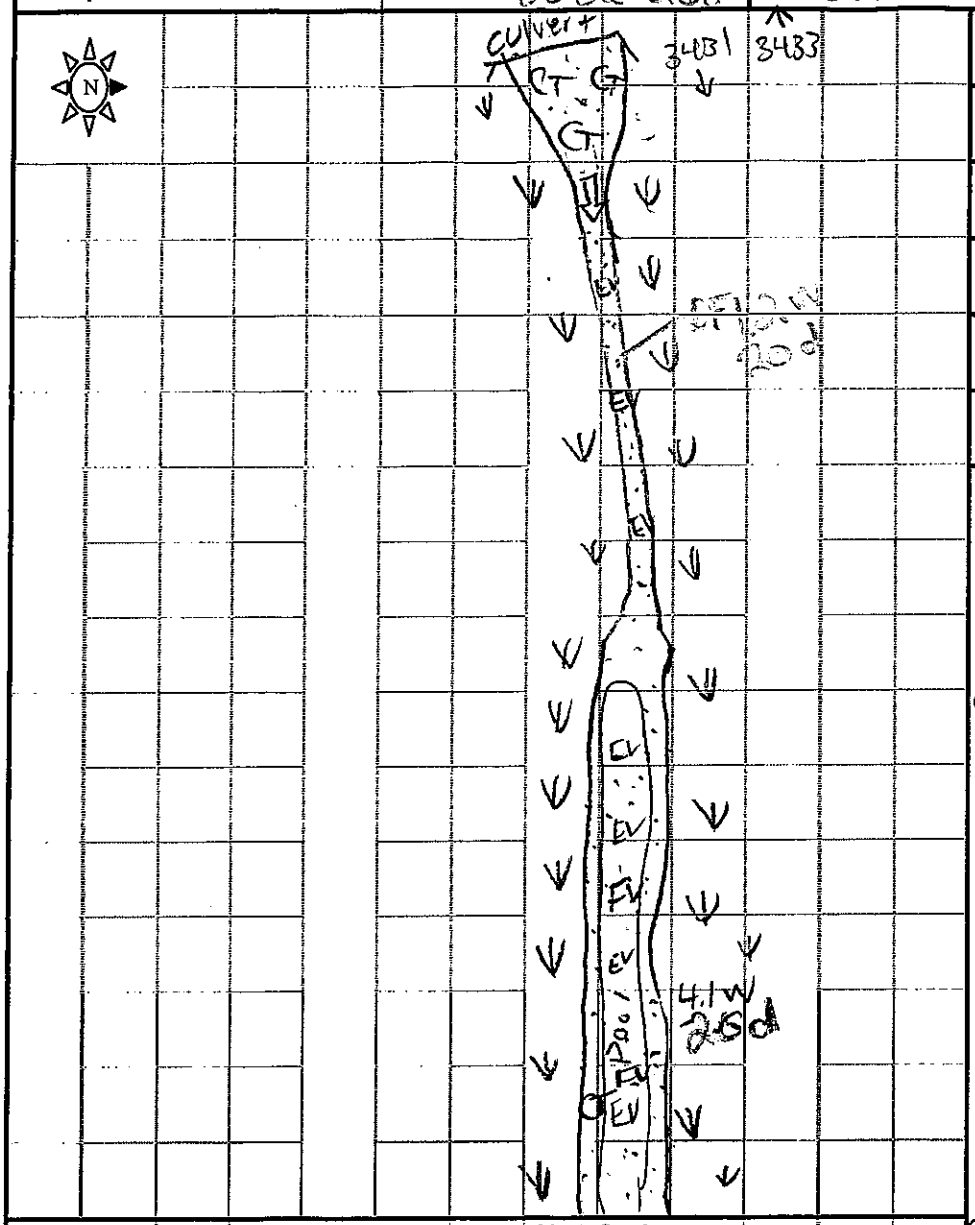
POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other
	—	—	—

POTENTIAL ENHANCEMENT OPPORTUNITIES:

COMMENTS:

Additional Notes Appended? O No O Yes number of pages _____

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
11C1	DS detailed	56m	1cm/1m



PROJECT #: 65059

MAPPER: L Knight

NAME OF WATERBODY: 16mile Cr.

CROSSING #: 11

STATION #: 11C

DATE: DD-MMM-YY 12-Oct-11

LEGEND

10d depth (cm)
6w width (m)

➡ Riffle
⇨ Run/Glide
⬭ Pool
▓ Island/Bar

⁘ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** * *** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
/////// Eroded Bank

XXX Riprap / Other Stabilization

⊂⊃ Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree

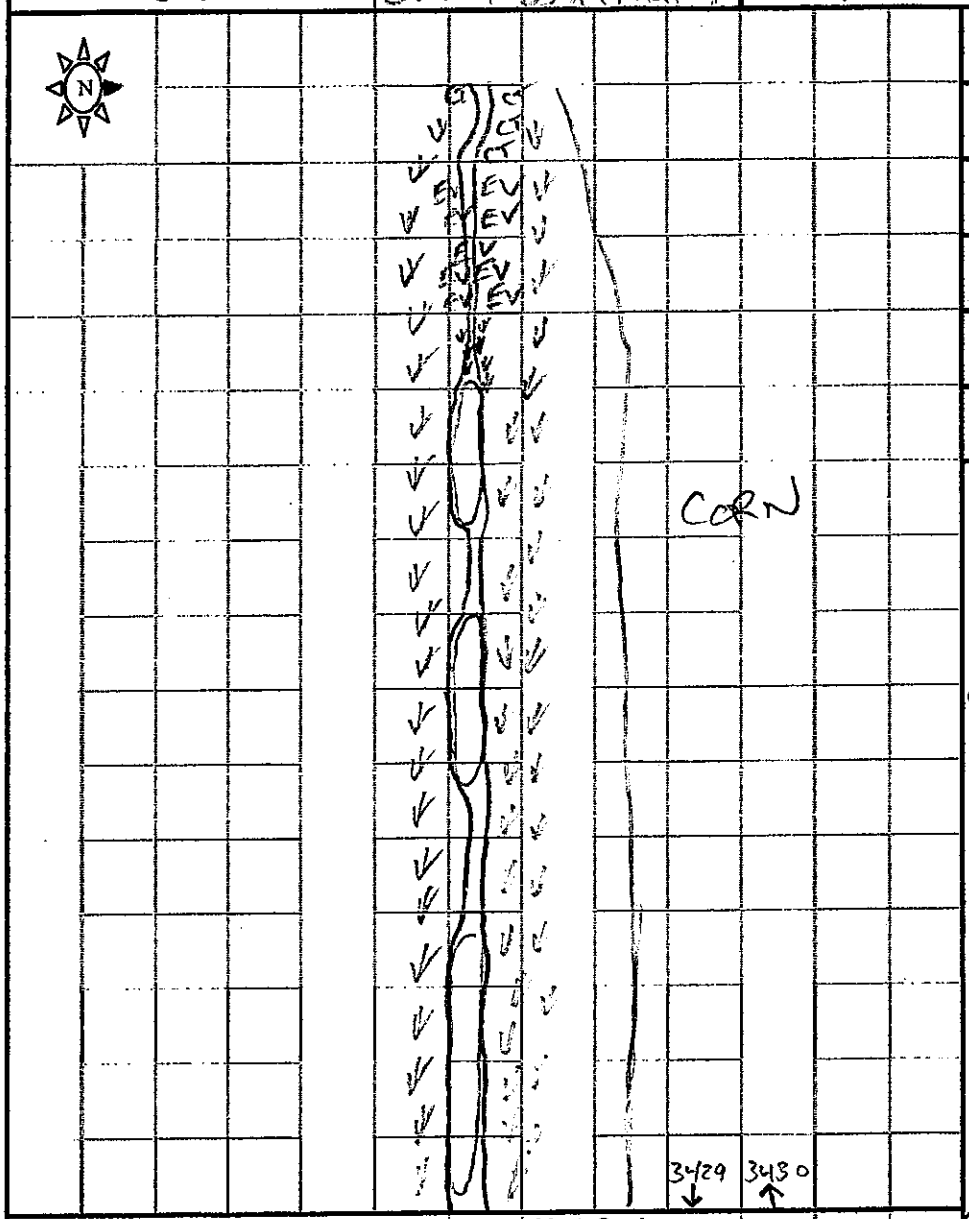
├► Seep/Spring
-------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
└┘ Culvert

PROFILE: Horz. Scale Vert. Scale

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
11 C2	General DS (45 half)	75 m	1cm / 5m



PROFILE: Horz. Scale Vert. Scale

PROJECT #:	05059
MAPPER:	C. LORENZ
NAME OF WATERBODY:	16 mile
CROSSING #:	11
STATION #:	11C
DATE: DD-MMM-YY	12-OCT-11

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▮ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** * *** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
////// Eroded Bank

XXX Riprap / Other Stabilization

Instream Log/Tree
^^^ Dam/Weir/Obstruction

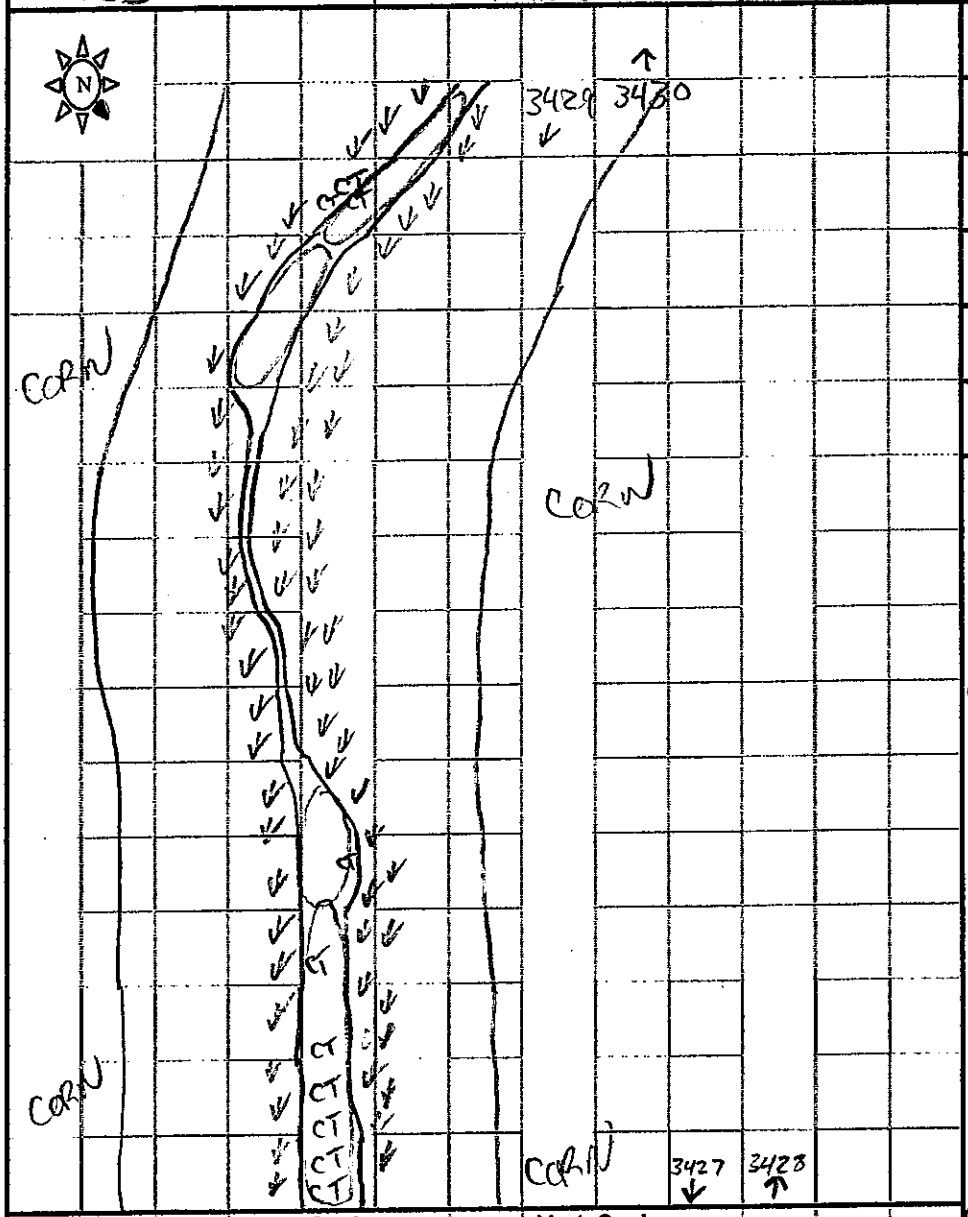
® Riparian Tree

Seep/Spring
Undercut Bank

Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
Culvert

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
11C3	General d/s (ds half)	75 m	1 cm / 5 m



PROFILE: Horz. Scale Vert. Scale

PROJECT #:	605056
MAPPER:	C LORENZ
NAME OF WATERBODY:	16 MILE
CROSSING #:	11
STATION #:	11C
DATE: DD-MMM-YY	12-OCT-11

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▮ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** * *** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
//////// Eroded Bank

XXX Riprap / Other Stabilization

⊂⬭ Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree

├▶ Seep/Spring
------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
└┘ Culvert

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
650560	BRITANNIA RD EA	02	NOV	2011

Is STREAM REALIGNMENT required for this section:

O Yes O No ✓ Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
C. LORENZ, L. KNIGHT	SUNNY	1:15	1:30

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
18°C	18°C	—

PHOTO NUMBERS AND DESCRIPTIONS: Sc habitat map

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
16 Mile	L. Ontario	12	12B

LOCATION OF CROSSING: Britannia Rd, near James Snow Pkwy

GPS COORDINATES:	MTO CHAINAGE:
43° 26' 36.71" N 79° 48' 32.50" W	—

TOWNSHIP:	MNR DISTRICT:
Milton	Aurora

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:
Agriculture, Road	Farm, Agriculture

EXISTING STRUCTURE TYPE

Bridge O	Box Culvert O	Open Foot Culvert O	CSP ✓	N/A O

Other O Describe: Size (w x h) m^2 60 cm

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (Include on habitat map)
12B1	In culvert

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	✓	O	O	✓	O	—

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):
25.2	0

SUB-SECTION(S)	Run O	Pool O	Riffle O	Flats O	Inside culvert O	Other
Percentage of area					100	—
Mean depth wetted (m)					3cm	—
Mean width wetted (m)					23 cm	—
Mean bankfull width (m)					54 cm	~
Mean bankfull depth(m)					15 cm	~
Substrate						~

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	✓	O	O	O
Right Upstream Bank	✓	O	O	O

HABITAT

IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris Instream Overhanging	Organic debris	Vascular Macrophytes Instream Overhanging	None
							100

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	✓	O	O	O	O

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
Predominant Species				100

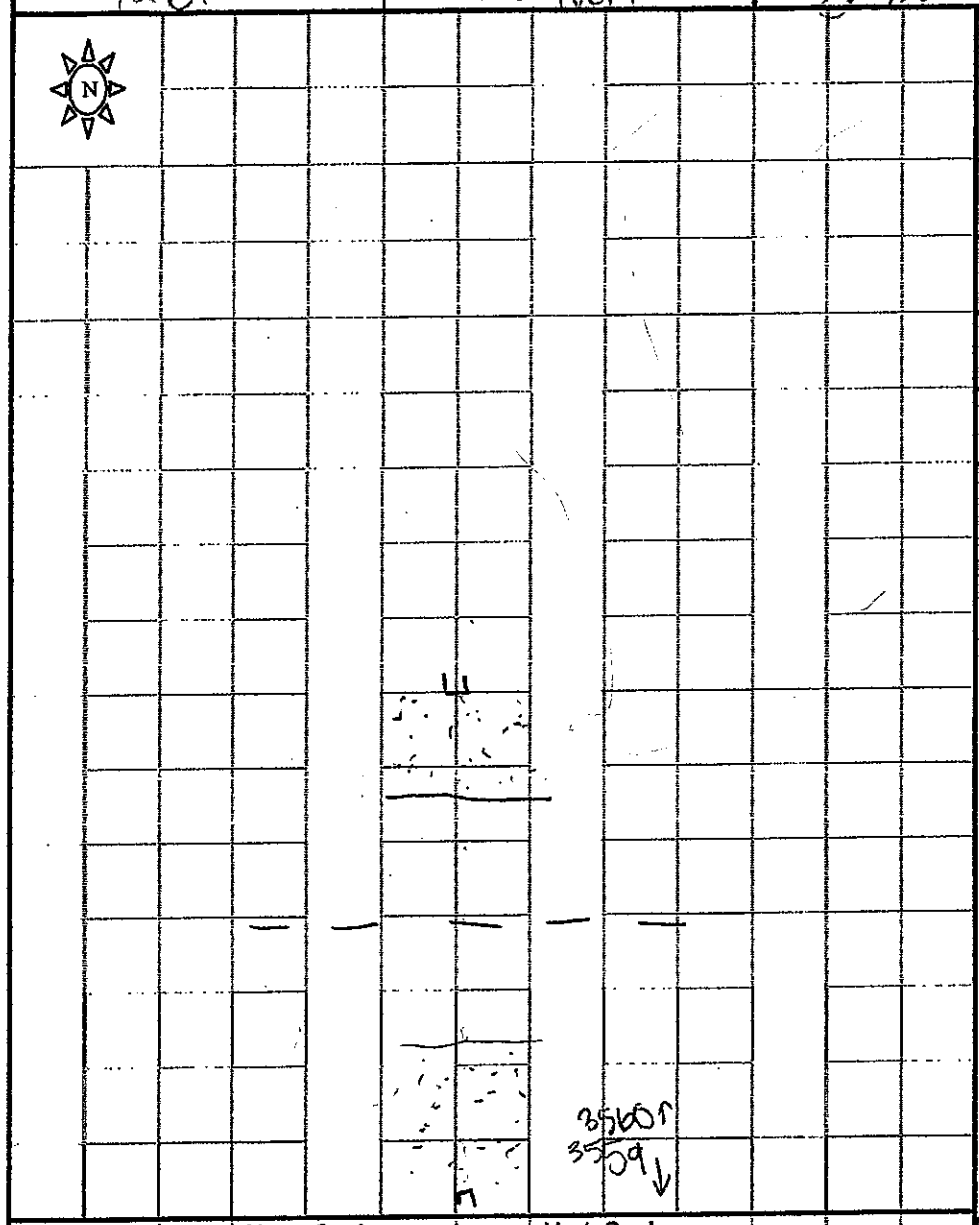
MIGRATORY OBSTRUCTIONS:	None —	Seasonal Intermittent	Permanent —
POTENTIAL CRITICAL HABITAT LIMITING:	Spawning —	Evidence of Groundwater —	Other —

POTENTIAL ENHANCEMENT OPPORTUNITIES:

COMMENTS:

Additional Notes Appended? O No O Yes number of pages _____

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
12B1	In Culvert	25.2	1cm/3m



25.2
18.5

PROFILE: Horz. Scale Vert. Scale

PROJECT #:	65056
MAPPER:	L Knight
NAME OF WATERBODY:	16 Mile
CROSSING #:	12
STATION #:	12B
DATE: DD-MMM-YY	02-Nov-2011

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▓ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** * *** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
////// Eroded Bank

XXX Riprap / Other Stabilization

⊂⊃ Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree

⊢► Seep/Spring
------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
⊔ Culvert

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
65056	BRITANNIA SA	02	NOV	2011

Is STREAM REALIGNMENT required for this section:

O Yes O No ✓ Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
C. Lorenz, L. Knight	Sunny	2:00	2:45

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
18°C	18°C	—

PHOTO NUMBERS AND DESCRIPTIONS: See habitat morning

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
16 Mile	L. Ontario	12	12C

LOCATION OF CROSSING: Britannia Rd, near James Snow Pkwy

GPS COORDINATES:	MTO CHAINAGE:
43° 36' 36.71"N 79° 48' 32.50"W	—
TOWNSHIP: Milton	MNR DISTRICT: Aurora

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:
Agriculture, Road	Agriculture, Road

EXISTING STRUCTURE TYPE

Bridge O	Box CulvertO	Open Foot Culvert O	CSP ✓	N/A O

Other O Describe: Size (w x h) m^2 60 cm

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (include on habitat map)
12C1	DS detailed

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	✓	O	O	✓	O	—

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):
50 m	~0.2 m/s

SUB-SECTION(S)	Run ✓	Pool O	Riffle O	Flats O	Inside culvert O	Other
Percentage of area	100					
Mean depth wetted (m)	0.36					
Mean width wetted (m)	0.60					
Mean bankfull width (m)	1.00					
Mean bankfull depth(m)	0.47					
Substrate	Gr/Cl					

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	O	O	✓	O
Right Upstream Bank	O	O	✓	O

HABITAT

IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris Instream Overhanging	Organic debris	Vascular Macrophytes Instream Overhanging	None
							100

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	O	O	O	O	✓

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
Predominant Species				100

MIGRATORY OBSTRUCTIONS:	None	Seasonal	Permanent
	—	intermittent	—

POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other
	—	—	—

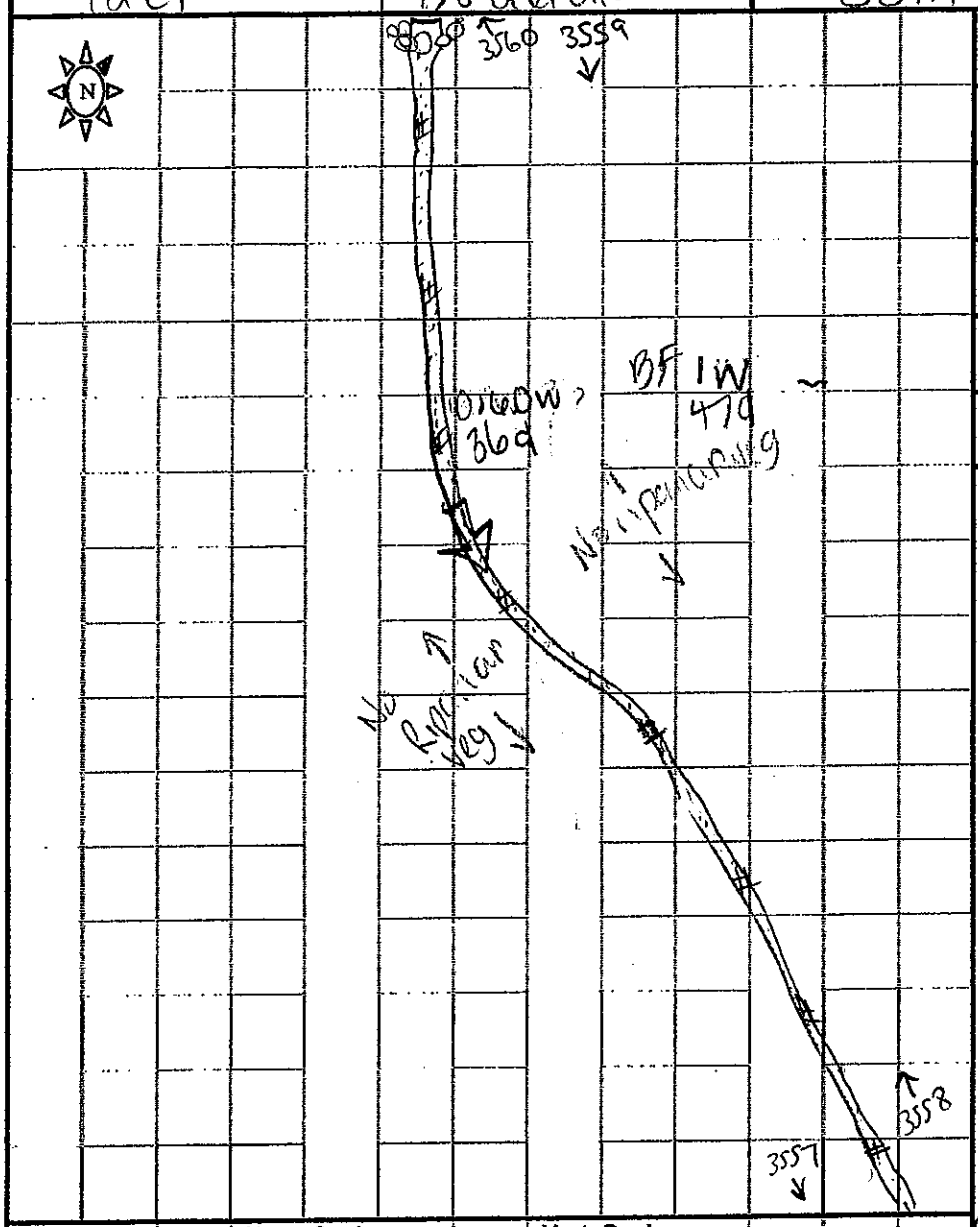
POTENTIAL ENHANCEMENT OPPORTUNITIES:

NO riparian veg.

COMMENTS:

Additional Notes Appended? O No O Yes number of pages _____

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
12C1	DS detailed	50m	1cm/3m



PROFILE: Horz. Scale Vert. Scale

PROJECT #: 05D5

MAPPER: L Knight

NAME OF WATERBODY: No name

CROSSING #: 12

STATION #: 12C

DATE: DD-MMM-YY 02-Nov-11

LEGEND

10d depth (cm)
6w width (m)

➡ Riffle
⇨ Run/Glide
⬭ Pool
▇ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** * *** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
////// Eroded Bank

XXX Riprap / Other Stabilization

⬭ Instream Log/Tree
^^^ Dam/Weir/Obstruction

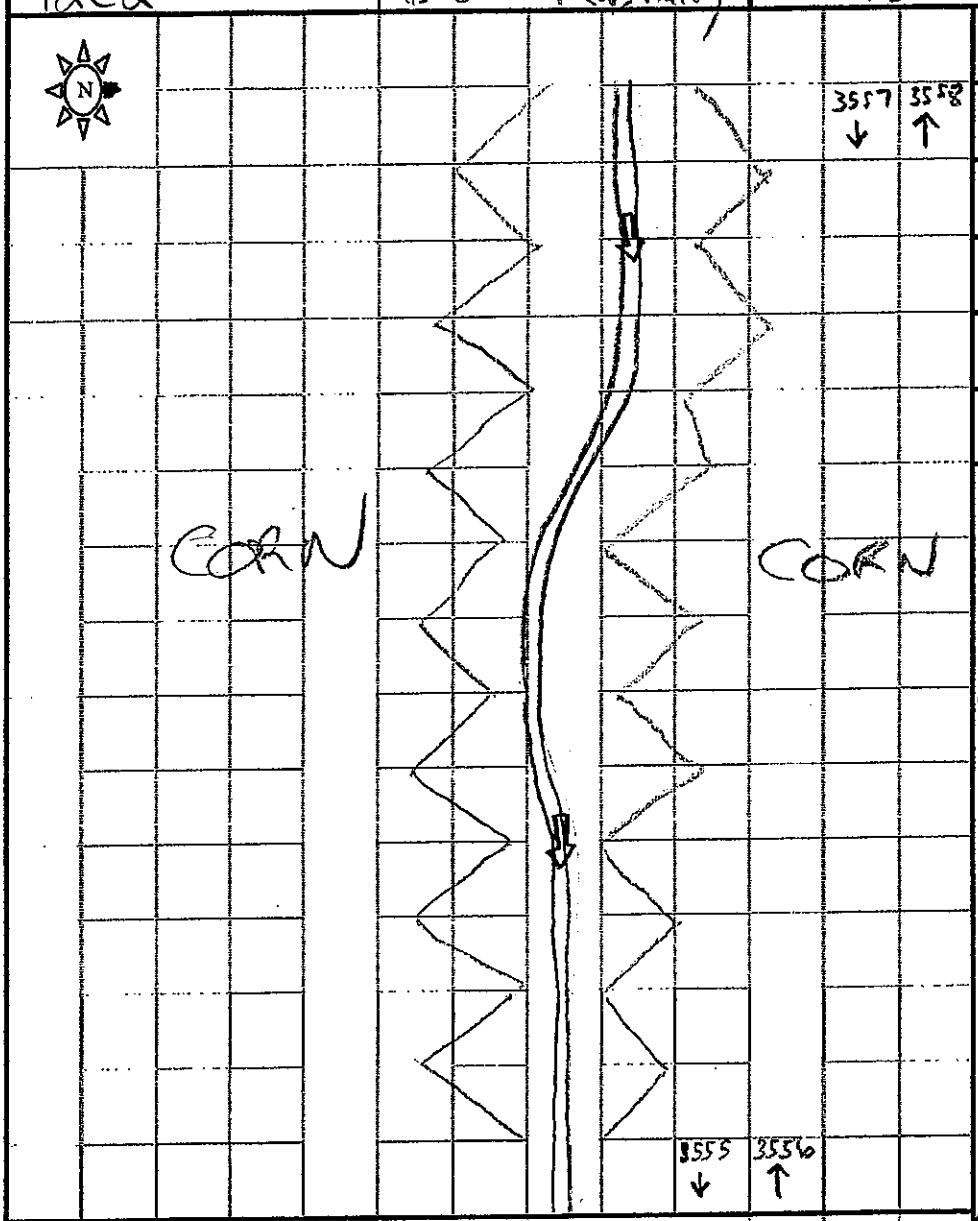
® Riparian Tree

⊢► Seep/Spring
-------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
└─┘ Culvert

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
12C2	d/s General (u/s half)	75	1/5



PROFILE: Horz. Scale Vert. Scale

PROJECT #:	650560
MAPPER:	C. LORENZ
NAME OF WATERBODY:	16 MILE
CROSSING #:	12
STATION #:	2C
DATE: DD-MMM-YY	02-NOV-11

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▓ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** * *** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
/////// Eroded Bank

XXX Riprap / Other Stabilization

⊂⊃ Instream Log/Tree
^^^ Dam/Weir/Obstruction

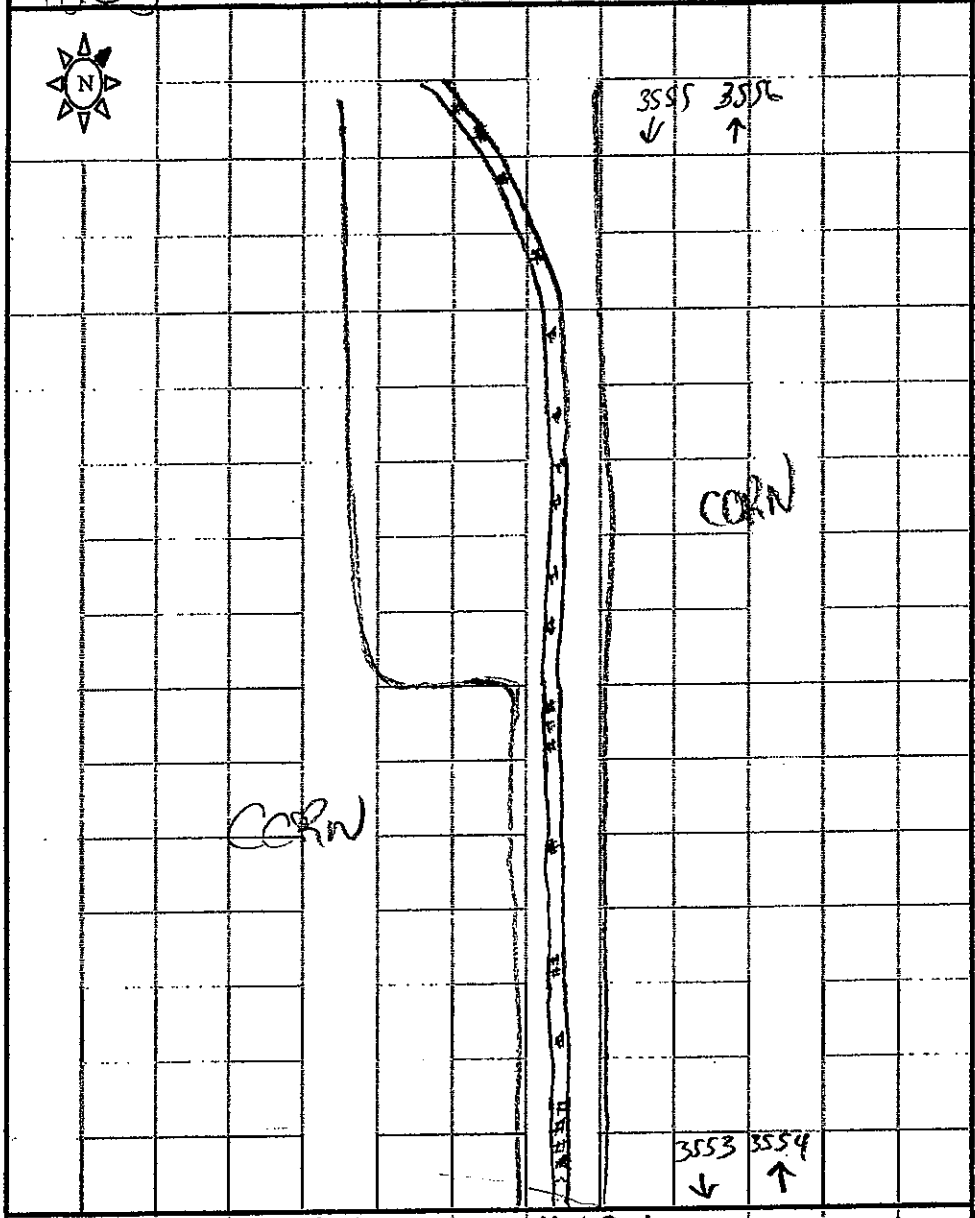
® Riparian Tree

⊢▶ Seep/Spring
-------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
⊔ Culvert

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
12C3	d/s General (d/s half)	75 m	1/5



PROFILE: Horz. Scale Vert. Scale

PROJECT #: 05050

MAPPER: C. LORENZ

NAME OF WATERBODY: 16 MILE

CROSSING #: 12

STATION #: 12C

DATE: DD-MMM-YY: 02-NOV-11

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▇ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** * *** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
////// Eroded Bank

XXX Riprap / Other Stabilization

⊂⬭ Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree

⊢► Seep/Spring
------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
⊔ Culvert

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
050956	BRITANNIA EA	02	NOV	2011

Is STREAM REALIGNMENT required for this section:

O Yes O No ⊘ Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
C. LORENZI, L. KNIGHT	SUNNY	9:00	9:12

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
		—

PHOTO NUMBERS AND DESCRIPTIONS: See habitat maps

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
16 Mile	L. Ontario	14	A

LOCATION OF CROSSING: Britannia Rd, west of 6th Line

GPS COORDINATES:	MTO CHAINAGE:
5975255E 4819796N ±4m	—

TOWNSHIP:	MNR DISTRICT:
Milton	Aurora

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:
Transportation, Residential, Agricultural	Houses, Road, Farms

EXISTING STRUCTURE TYPE

Bridge O	Box CulvertO	Open Foot Culvert ⊘	CSP O	N/A O

Other O Describe:

Size (w x h) m^2 1.9x0.9m

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (include on habitat map)
14A1	US detailed

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	⊘	O	O	⊘	O	—

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):
20m	~0.15 m/s

SUB-SECTION(S)	Run	Pool	Riffle	Flats	Inside culvert	Other
	⊘	O	O	O	O	
Percentage of area	100					
Mean depth wetted (m)	0.12					
Mean width wetted (m)	2.45					
Mean bankfull width (m)	4.2					
Mean bankfull depth(m)	0.23					
Substrate	Cl					

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	✓	0	0	0
Right Upstream Bank	✓	0	0	0

HABITAT

IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris	Organic debris	Vascular Macrophytes	None
	0	0	0	Instream 0 Overhanging 0	0	Instream 95 Overhanging 5	0

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	0	✓	0	0	0

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
	0	0	100	0
Predominant Species	—	—	grasses	

MIGRATORY OBSTRUCTIONS:	None	Seasonal	Permanent
	—	Intermittent	—

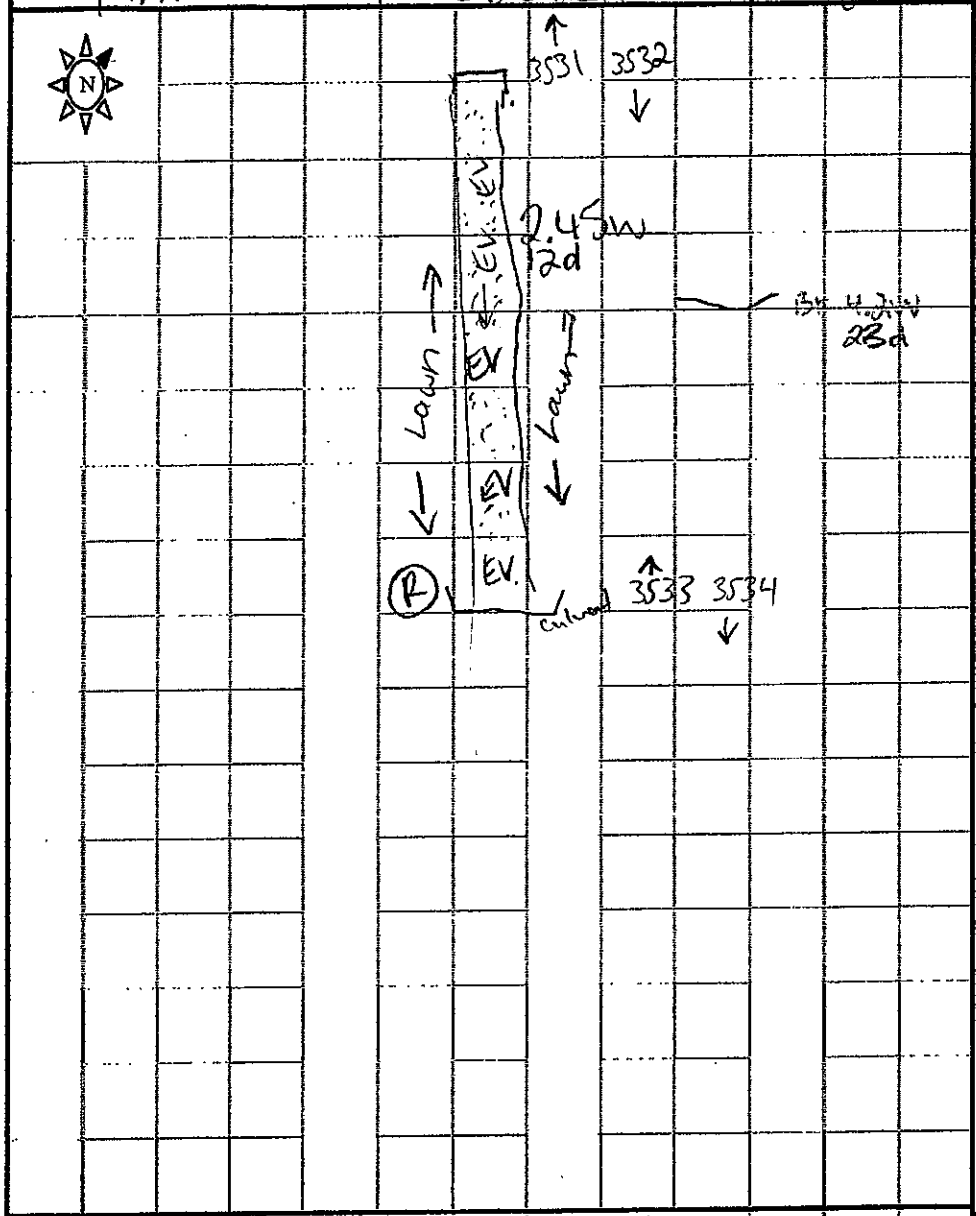
POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other
	—	—	—

POTENTIAL ENHANCEMENT OPPORTUNITIES:

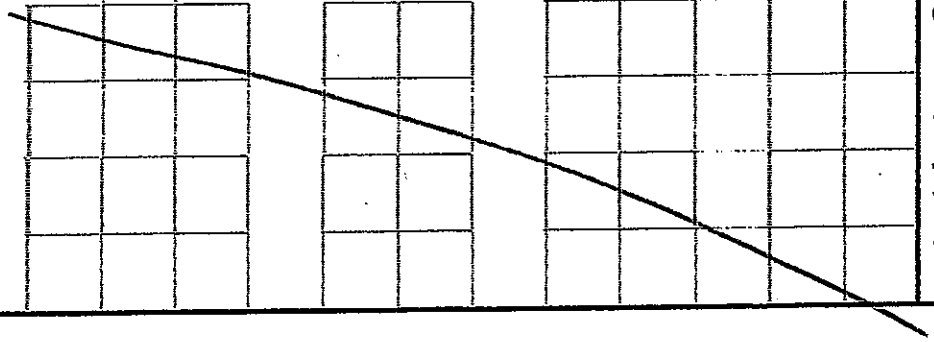
COMMENTS:

Additional Notes Appended? O No O Yes number of pages _____

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
14A1	US detailed	20 m	1 cm / 3m



PROFILE: Horz. Scale Vert. Scale



PROJECT #: 651056
MAPPER: L Knight
NAME OF WATERBODY: 16 Mile
CROSSING #: 14
STATION #: 14A
DATE: DD-MMM-YY: 02-Nov-11

LEGEND

10d depth (cm)
6w width (m)

➡ Riffle
⇨ Run/Glide
⬭ Pool
▓ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** * *** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
////// Eroded Bank

XXX Riprap / Other Stabilization

⊂⬭ Instream Log/Tree
^^^ Dam/Weir/Obstruction

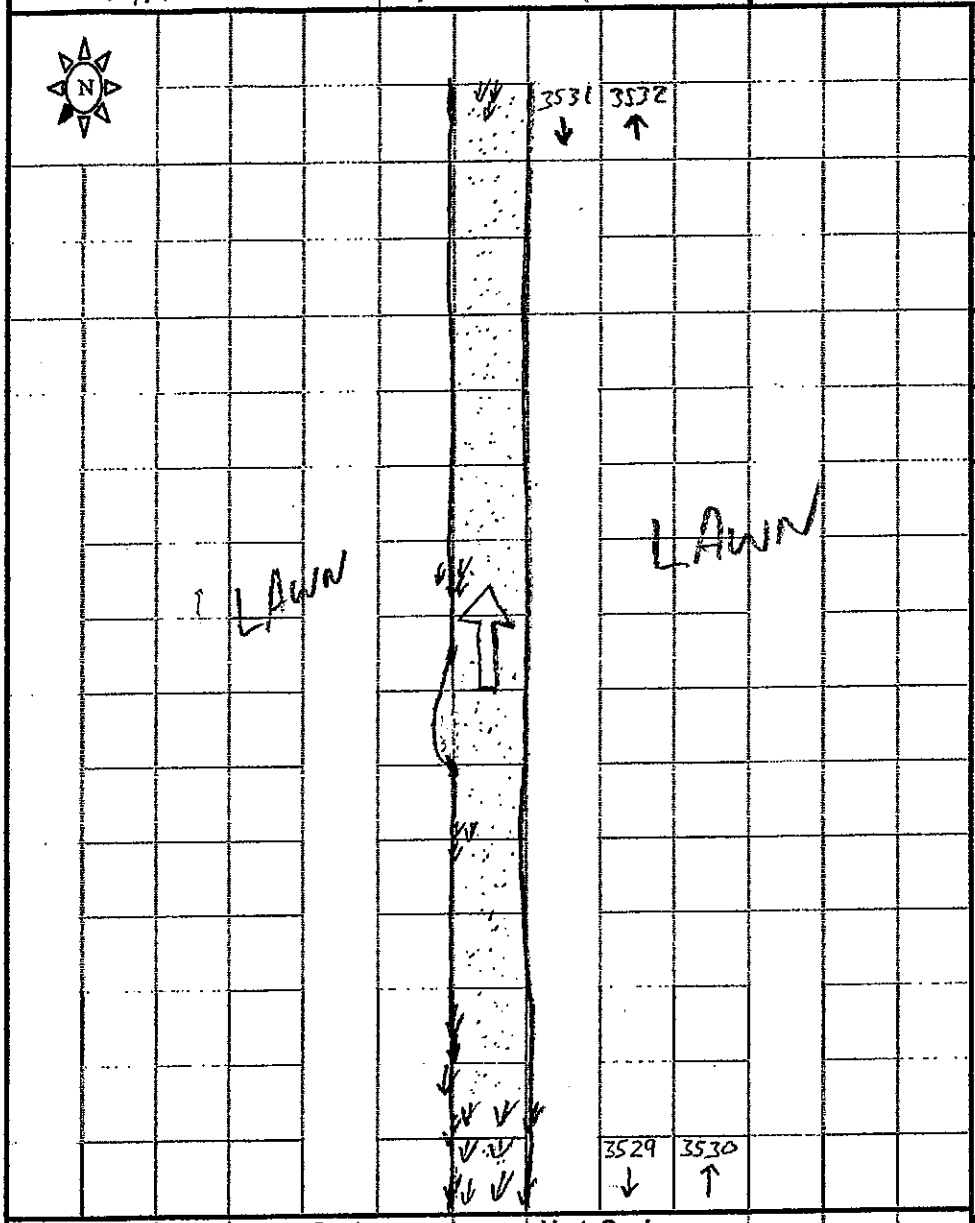
® Riparian Tree

⊢▶ Seep/Spring
------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
⊔ Culvert

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
14A2	u/s General	30 m	1/2



PROFILE: Horz. Scale Vert. Scale

PROJECT #:	050516
MAPPER:	C. LORENZ
NAME OF WATERBODY:	16 MILE
CROSSING #:	14
STATION #:	14A
DATE: DD-MMM-YY	02-NOV-11

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▓ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** * *** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
/////// Eroded Bank

XXX Riprap / Other Stabilization

⊂⊃ Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree

├► Seep/Spring
-------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
└┘ Culvert

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
05056	Britannia EA	02	Nov	2011

Is STREAM REALIGNMENT required for this section:

O Yes O No ✓ Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
C. LORENZ, L. KNIGHT	SUNNY	9:22	9:30

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
5°C	4°C	—

PHOTO NUMBERS AND DESCRIPTIONS: See habitat map

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
16 Mile	L. Ontario	14	14B

LOCATION OF CROSSING: Britannia Rd, west of 6th Line

GPS COORDINATES:	MTO CHAINAGE:
597582E 4819796N ±4m	—

TOWNSHIP:	MNR DISTRICT:
Milton	Aurora

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:
Res, Transportation Ag	Houses, Agriculture, Road

EXISTING STRUCTURE TYPE

Bridge O	Box Culvert O	Open Foot Culvert ✓	CSP O	N/A O

Other O Describe:

Size (w x h) m² 1.9 x 0.9m

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (include on habitat map)
14B1	In culvert

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	✓	O	O	✓	O	—

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):
9.9	~0.5 m/s

SUB-SECTION(S)	Run	Pool	Riffle	Flats	Inside culvert	Other
	✓	O	O	O	✓	
Percentage of area	100					
Mean depth wetted (m)	0.12					
Mean width wetted (m)	1.9					
Mean bankfull width (m)	1.9					
Mean bankfull depth(m)	0.72					
Substrate	Cl					

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	0	0	0	0
Right Upstream Bank	0	0	0	0

HABITAT

IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris	Organic debris	Vascular Macrophytes	None
	0	0	0	Instream 0 Overhanging 0	0	Instream 0 Overhanging 0	100

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	0	0	0	0	0

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
	0	0	0	100
Predominant Species	—	—	—	

MIGRATORY OBSTRUCTIONS:	None	Seasonal	Permanent
	—	Intermittent	—

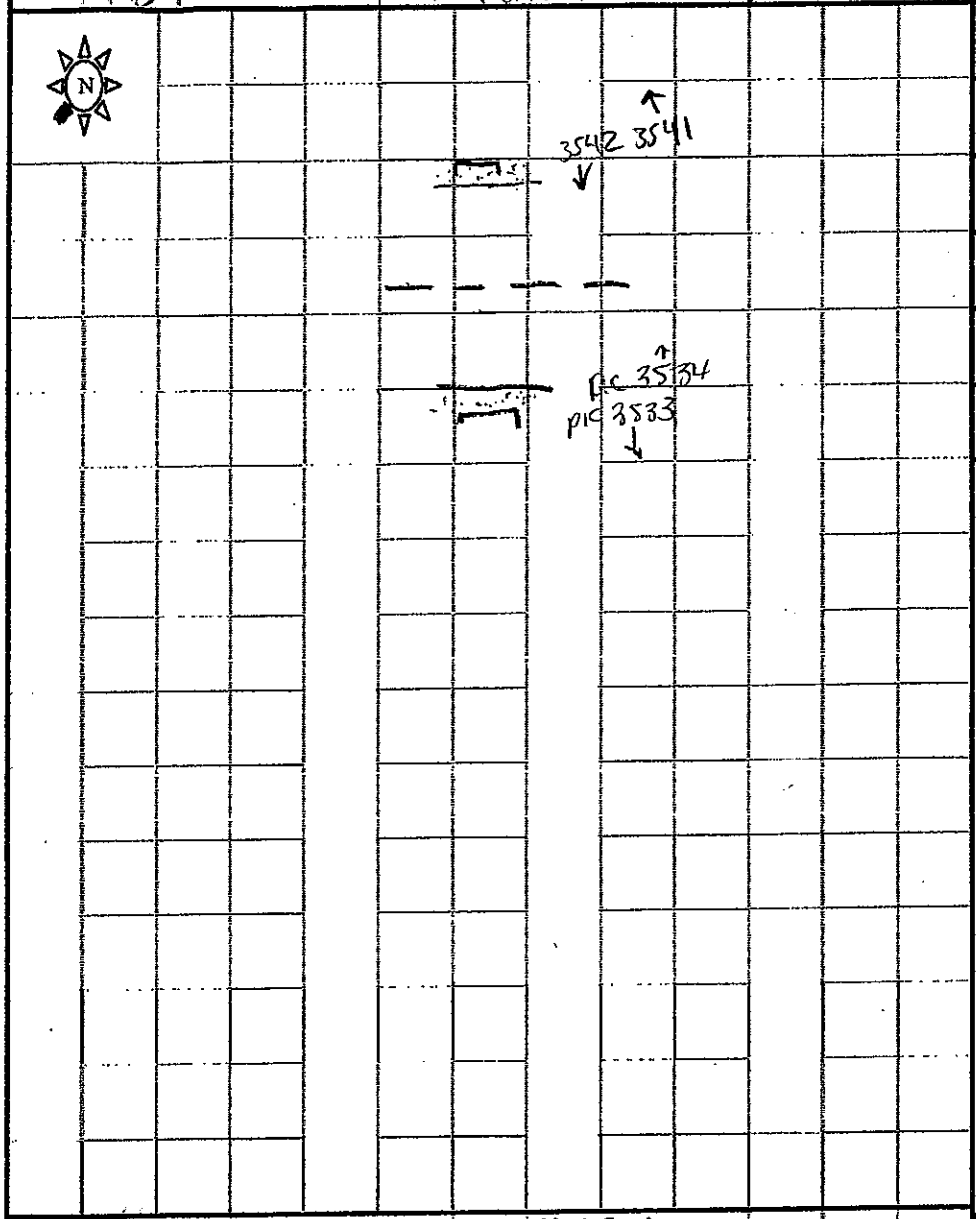
POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other
	—	—	—

POTENTIAL ENHANCEMENT OPPORTUNITIES:

COMMENTS:

Additional Notes Appended? O No O Yes number of pages _____

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
1431	In culvert	9.9	1cm/3m



PROFILE: Horz. Scale Vert. Scale

PROJECT #: 650056

MAPPER: L. Knight

NAME OF WATERBODY: 16 mile

CROSSING #: 14

STATION #: 1413

DATE: DD-MMM-YY 02-Nov-11

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▓ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
* * * Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
/////// Eroded Bank

XXX Riprap / Other Stabilization

⊂⊃ Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree

├▶ Seep/Spring
------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
└┘ Culvert

9.9
8.9
1.5

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
60502	BRITANNIA EA	02	NOV	2011

Is STREAM REALIGNMENT required for this section:

O Yes O No ✓ Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
C. LORENZ, L. KNIGHT	SUNNY	10:20	10:50

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
		—

PHOTO NUMBERS AND DESCRIPTIONS: See habitat mapping

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
No Name	Ontario	14	14C

LOCATION OF CROSSING: Britannia Rd, west of 6th Line

GPS COORDINATES:	MTO CHAINAGE:
595525E 4819796N ±4M	—

TOWNSHIP:	MNR DISTRICT:
Milton	Aurora

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:
Agriculture, Transportation	Roads, agriculture

EXISTING STRUCTURE TYPE

Bridge O	Box CulvertO	Open Foot Culvert ✓	CSP O	N/A O

Other O Describe: Size (w x h) m^2 1.9 X 0.9m

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (include on habitat map)
14C1	DS detailed

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	✓	O	O	✓	O	—

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):
50m	~0.2 m/s

SUB-SECTION(S)	Run	Pool	Riffle	Flats	Inside culvert	Other
	✓	O	O	O	O	
Percentage of area	100					
Mean depth wetted (m)	0.1					
Mean width wetted (m)	0.60					
Mean bankfull width (m)	2.3					
Mean bankfull depth(m)	0.60					
Substrate	C1					

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	0	✓	0	0
Right Upstream Bank	0	✓	0	0

HABITAT

IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris	Organic debris	Vascular Macrophytes	None
	5	0	0	Instream 0 Overhanging 0	10	Instream 40 Overhanging 30	15

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	✓	0	0	0	0

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
	—	—	70	30
Predominant Species	—	—	cattails, grasses	

MIGRATORY OBSTRUCTIONS:	None	Seasonal	Permanent
	~	Intermittent	—

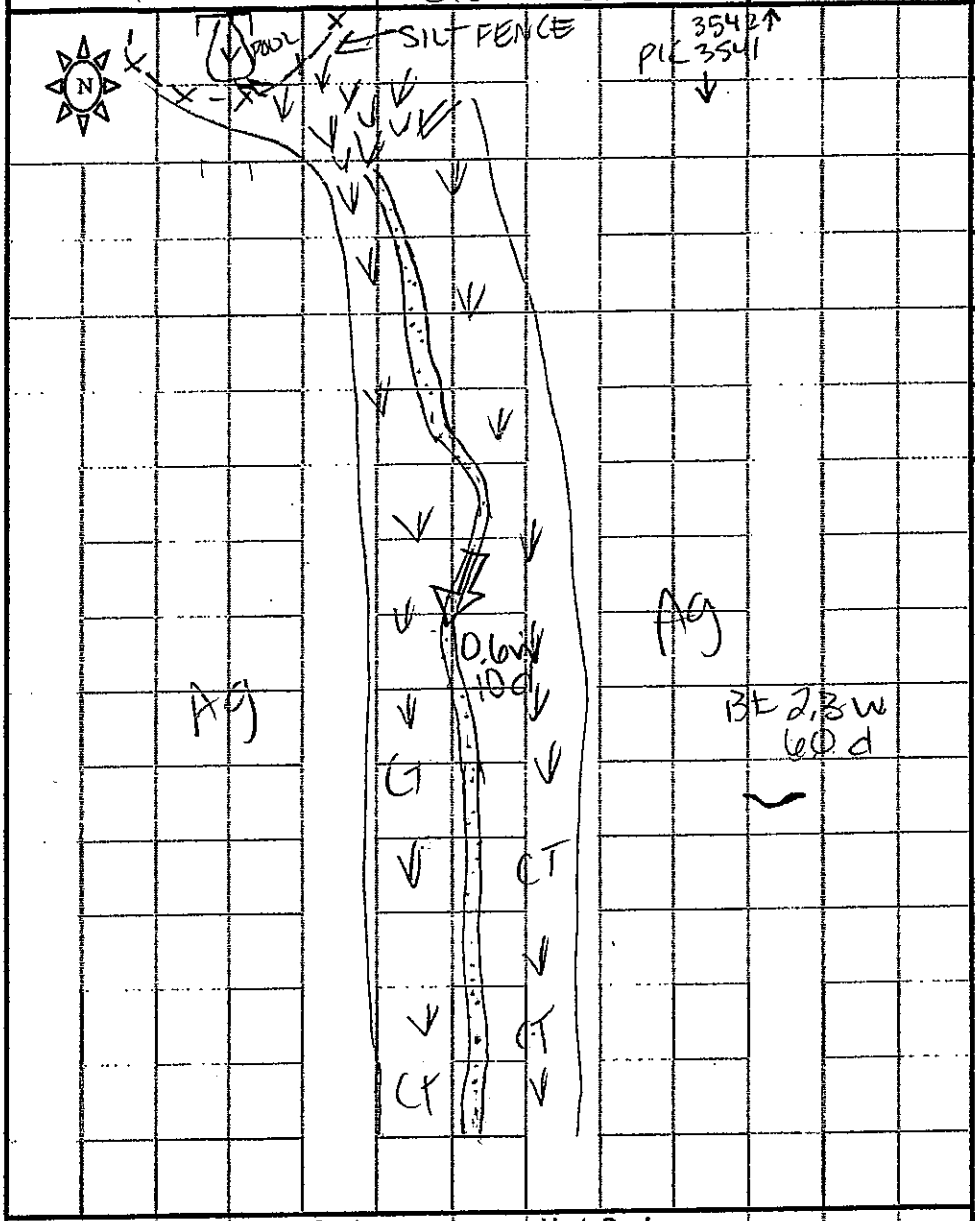
POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other
	~	—	—

POTENTIAL ENHANCEMENT OPPORTUNITIES:

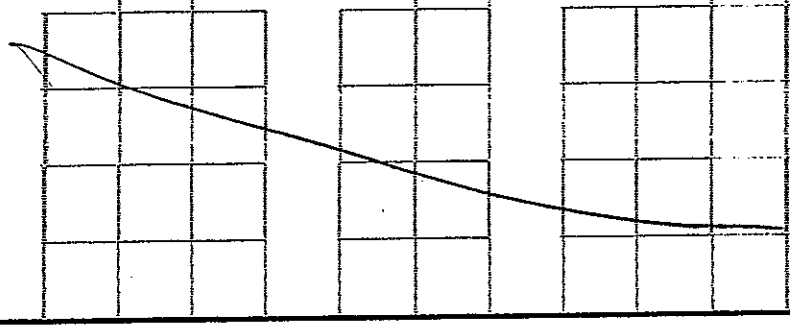
COMMENTS:

Additional Notes Appended? O No O Yes number of pages _____

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
14 c1	ds detailed	50m	1cm/3m



PROFILE: Horz. Scale Vert. Scale



PROJECT #: 05056

MAPPER: L. Knight

NAME OF WATERBODY: 16 Mile

CROSSING #: 14

STATION #: 14C

DATE: DD-MMM-YY 02-Nov-11

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▓ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** * *** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
/////// Eroded Bank

XXX Riprap / Other Stabilization

⊂⊃ Instream Log/Tree
^^^ Dam/Weir/Obstruction

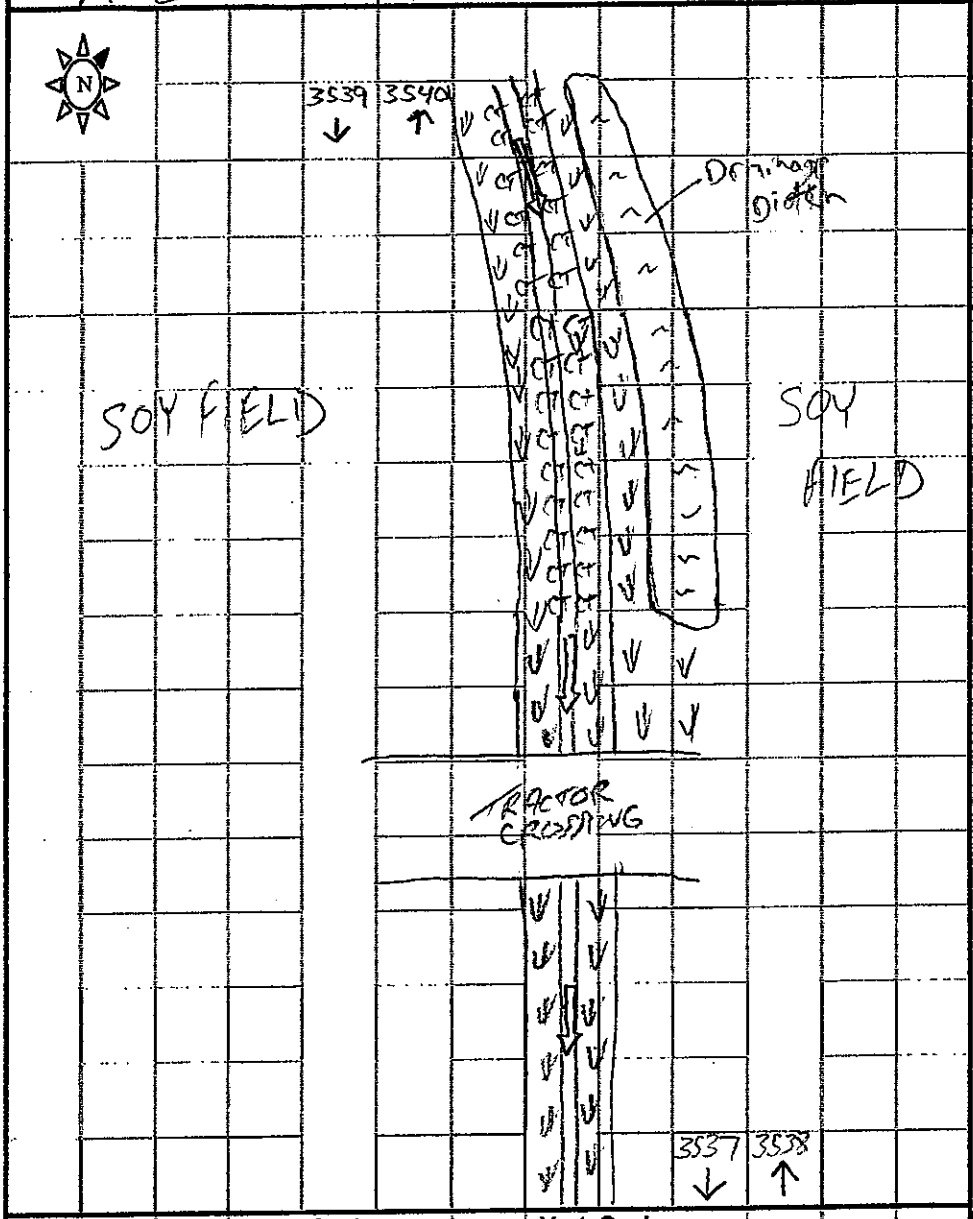
® Riparian Tree

├► Seep/Spring
------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
└┘ Culvert

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
14C2	d/s General (Culs hill)	75	1|5



PROFILE: Horz. Scale Vert. Scale

PROJECT #:

MAPPER: C. LOREWZ

NAME OF WATERBODY: 16 MILE

CROSSING #: 14

STATION #: 14C

DATE: DD-MMM-YY 02-NOV-11

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▇ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** * *** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
/////// Eroded Bank

XXX Riprap / Other Stabilization

⊂⊃ Instream Log/Tree
^^^ Dam/Weir/Obstruction

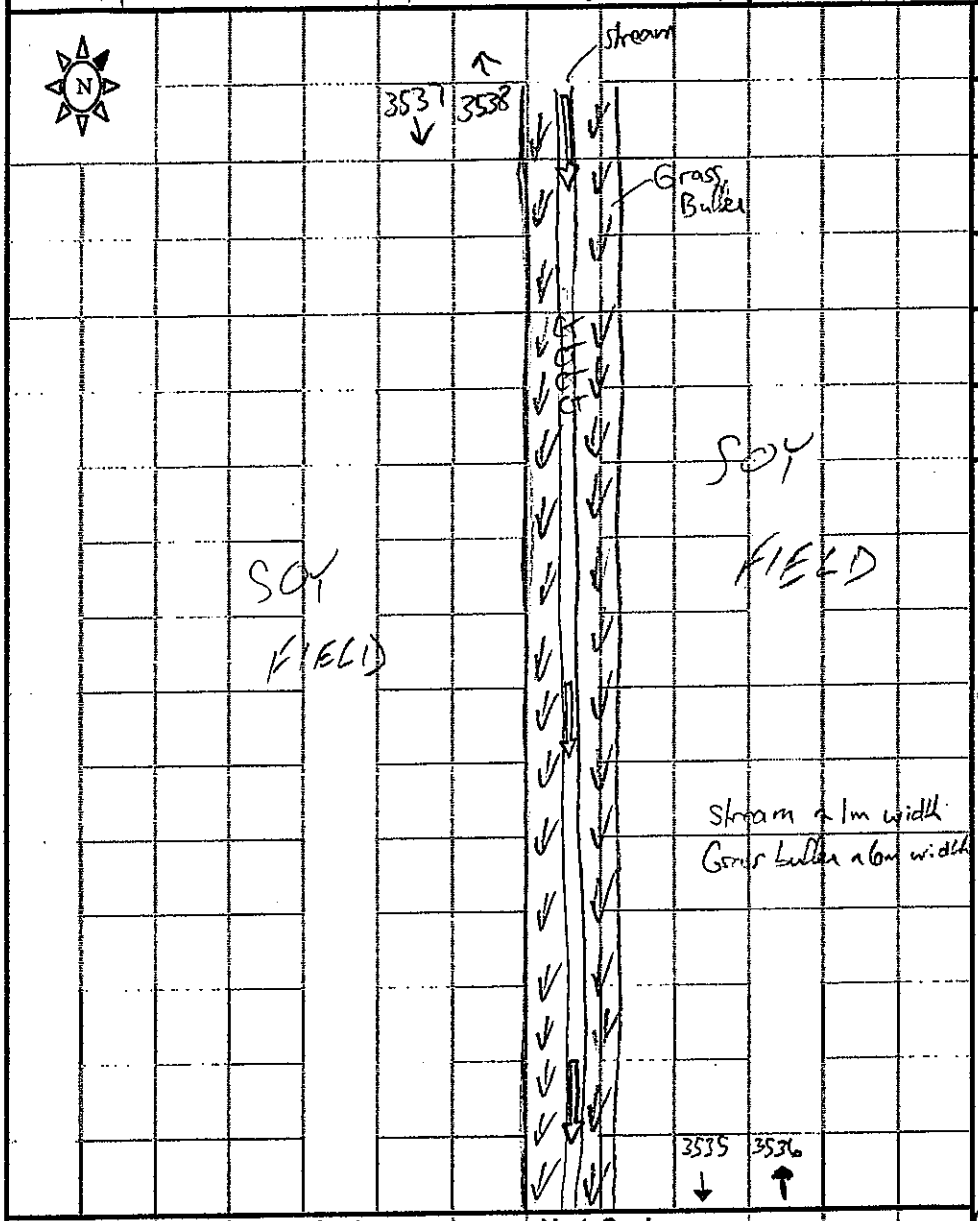
® Riparian Tree

├▶ Seep/Spring
------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
⊔ Culvert

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
14C3	d/s General (d/s half)	75	1/5



PROFILE: Horz. Scale Vert. Scale

PROJECT #:

MAPPER: C. LOREN2

NAME OF WATERBODY: 16 MILE

CROSSING #: 14

STATION #: 14C

DATE: DD-MMM-YY 02-NOV-11

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▓ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** * *** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
//////// Eroded Bank

XXX Riprap / Other Stabilization

Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree

Seep/Spring
-------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
Culvert

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
65056	BRITANNIA RD EA	24	AUGUST	2011

Is STREAM REALIGNMENT required for this section:

O Yes O No ✓ Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
L. KNIGHT, C. LORENZ	OVERCAST, RAINY	11:00	11:31

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
23°C	20°C	—

PHOTO NUMBERS AND DESCRIPTIONS: See habitat mapping

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
16 MILE CREEK, EAST BRANCH	L. ONTARIO	15	15A

LOCATION OF CROSSING: BRITANNIA RD, JUST WEST OF TRAFALGAR RD

GPS COORDINATES:	MTO CHAINAGE:
43°32'03.67"N 79°46'56.65"W	—
TOWNSHIP: MILTON	MNR DISTRICT: AURORA

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:
TRANSPORTATION, AGRICULTURE, RESIDENTIAL	MAJOR ROADS, AGRICULTURE, GOLF COURSE U/S

EXISTING STRUCTURE TYPE

Bridge ✓	Box Culvert O	Open Foot Culvert O	CSP O	N/A O

Other O Describe: —

Size ~~(w x h) m²~~ 24.4 m wide

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (include on habitat map)
15A1	U/S OF BRIDGE TO WEIR (DETAILED ASSESSMENT)

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	✓	O	✓	O	O	—

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):
28.1	~0.25 m/s

SUB-SECTION(S)	Run	Pool	Riffle	Flats	Inside culvert	Other
	✓	✓	O	O	O	
Percentage of area	70	30	—	—	—	—
Mean depth wetted (m)	0.32	0.50	—	—	—	—
Mean width wetted (m)	15.0	12.6	—	—	—	—
Mean bankfull width (m)	18.7	13.7	—	—	—	—
Mean bankfull depth(m)	0.60	0.74	—	—	—	—
Substrate	Gr/Co	Bo/Si	—	—	—	—

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

Fallen from weir material

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	✓	0	0	0
Right Upstream Bank	0	✓	0	0

HABITAT

IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris	Organic debris	Vascular Macrophytes	None
	5	10	15	Instream 10 Overhanging 0	30	Instream 5 Overhanging 5	20

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	0	0	0	✓	0

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
	2	0	3	95
Predominant Species	MACROPHYTES		ARROWHEAD + OTHER MACROPHYTES	

MIGRATORY OBSTRUCTIONS:	None WEIR @ U/S END BUT SIDE CHANNEL PROVIDES PASSAGE	Seasonal —	Permanent —
POTENTIAL CRITICAL HABITAT LIMITING:	Spawning —	Evidence of Groundwater —	Other —

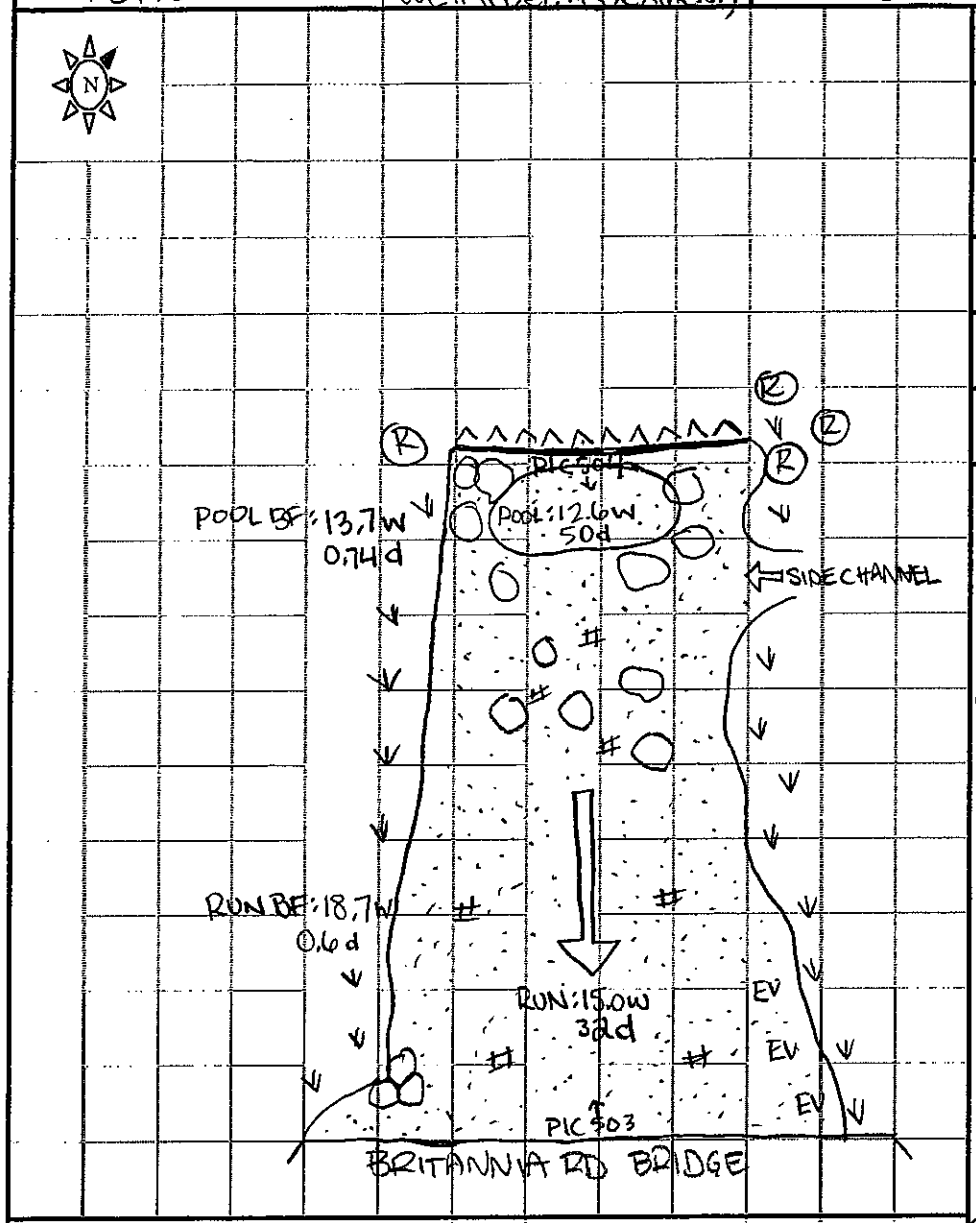
POTENTIAL ENHANCEMENT OPPORTUNITIES:

Remove weir, confirm it has no present function. New bridge should be wider (lack of floodplain under bridge is causing some minor erosion around bridge footings. Weir should only be removed if damage to d/s habitat can be minimized (possible SAR), side channel provides adequate fish passage.

COMMENTS:

Additional Notes Appended? ✓ No O Yes number of pages —

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
15A1	U/S END OF BRIDGE TO WEIR (DET. ASSESSMENT)	28.1	1 cm = 3m



PROFILE: Horz. Scale Vert. Scale

PROJECT #: 650516

MAPPER: L. KNIGHT

NAME OF WATERBODY: 16 MILE CREEK, EAST BRANCH

CROSSING #: 15

STATION #: 15A

DATE: DD-MMM-YY 24-AUG-11

LEGEND

- Riparian Veg
- **10d** depth (cm)
- **6w** width (m)
- ➡ Riffle
- ⇨ Run/Glide
- Pool
- Island/Bar
- Fine Substrate
- **###** Gravel Substrate
- **oOooO** Cobble /Boulder
- *** * *** Debris
- **CT** Cattail
- **SV/FV** Submerg/Float Veg
- **EV** Emergent Vegetation
- **W** Watercress
- **Fe** Iron Staining
- **//////** Eroded Bank
- **XXX** Riprap / Other Stabilization
- Instream Log/Tree
- **^^^** Dam/Weir/Obstruction
- **®** Riparian Tree
- Seep/Spring
- **--------** Undercut Bank
- **—** Barrier to Fish Movement
- **-S-** Seasonal Barrier
- **-x--x-** Fence line
- Culvert

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
650560	BRITANNIA RD EA	24	AUG	2011

Is STREAM REALIGNMENT required for this section:

O Yes O No ✓ Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
L. KNIGHT, C. LORENZ	OVERCAST, RAINY	11:45	12:02

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
23°C	20°C	—

PHOTO NUMBERS AND DESCRIPTIONS: See habitat mapping.

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
16 MILE CREEK, EAST BRANCH	LAKE ONTARIO	15	15A

LOCATION OF CROSSING: BRITANNIA RD, JUST WEST OF TRAFALGAR RD

GPS COORDINATES:	MTO CHAINAGE:
43°32'03.6"N 79°46'56.65"W	—

TOWNSHIP:	MNR DISTRICT:
MILTON	AURORA

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:
TRANSPORTATION, AGRICULTURE, RESIDENTIAL	MAJOR ROADS, AGRICULTURE, GOLF COURSES

EXISTING STRUCTURE TYPE

Bridge ✓	Box Culvert O	Open Foot Culvert O	CSP O	N/A O

Other O Describe: —

Size ~~(w x h) m²~~ 24.4m wide

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (include on habitat map)
15A2	SIDE CHANNEL AROUND WEIR, U/S OF BRIDGE. / DETAILED ASSESSMENT

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	✓	O	✓	O	O	—

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):
45.3	~0.5 m/s

SUB-SECTION(S)	Run	Pool	Riffle	Flats	Inside culvert	Other
	✓	✓	(U/S) ✓	O	O	D/S RIFFLE
Percentage of area	55	20	10	—	—	15
Mean depth wetted (m)	0.28	0.51	0.24	—	—	0.20
Mean width wetted (m)	5.0	5.5	2.6	—	—	4.1
Mean bankfull width (m)	6.1	6.2	N/A	—	—	6.0
Mean bankfull depth(m)	0.53	0.74	0.59	—	—	0.56
Substrate	Gr/Si	Sa/Si	Gr/Sa	—	—	Bo/Sa

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	✓	O	O	O
Right Upstream Bank	O	✓	O	O

HABITAT

IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris	Organic debris	Vascular Macrophytes	None
	10	10	15	Instream 5 Overhanging 5	15	Instream 0 Overhanging 10	30

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	✓	O	O	✓	O

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
Predominant Species				100

MIGRATORY OBSTRUCTIONS:	None	Seasonal	Permanent
	~	—	—

POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other
	—	~	—

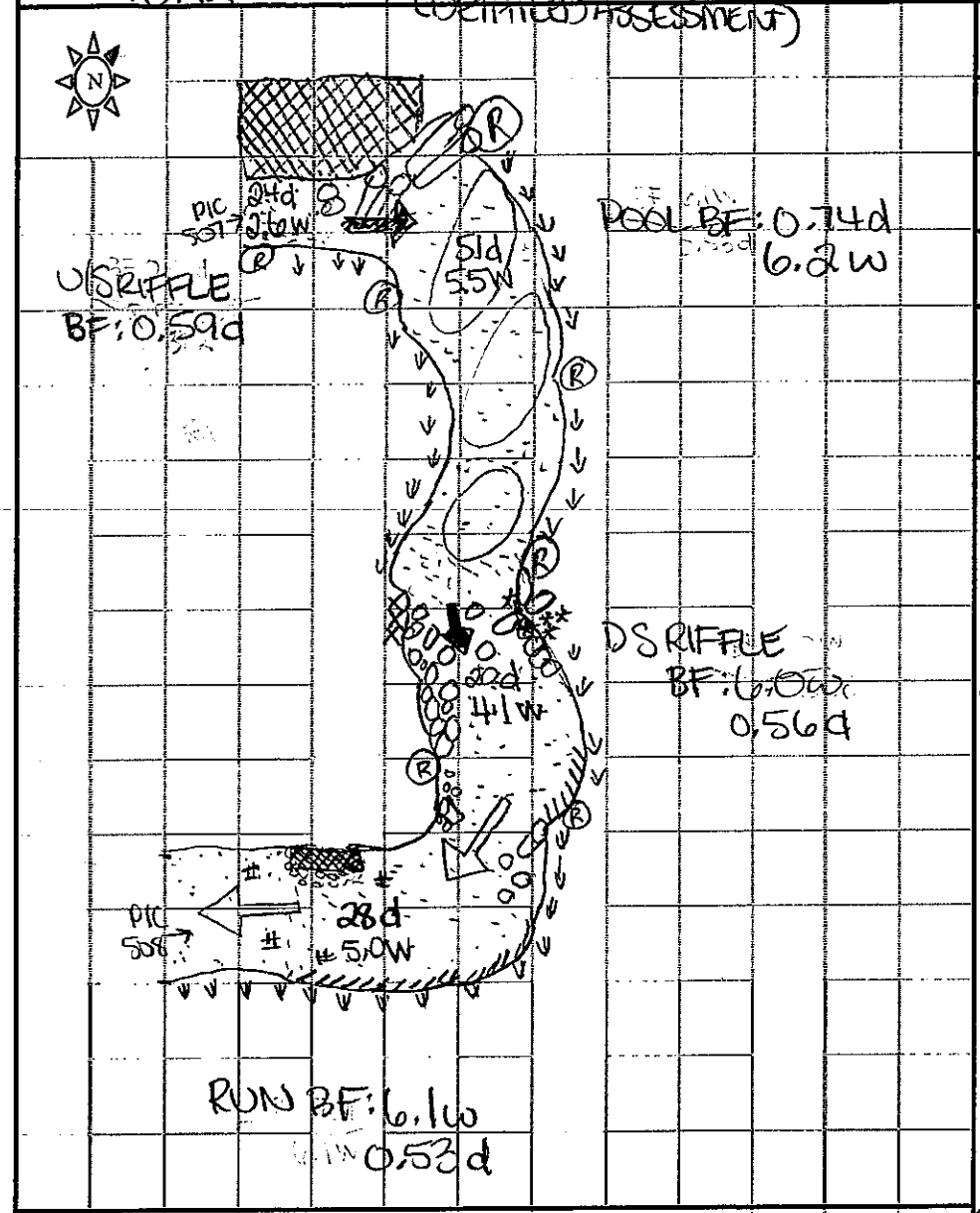
POTENTIAL ENHANCEMENT OPPORTUNITIES:

SEE 15A1.

COMMENTS:

Additional Notes Appended? ✓ No O Yes number of pages —

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
15A2	Side Channel u/s Bridge (DETAILED ASSESSMENT)	45.3	1cm = 3m



PROJECT #:	MAPPER:	NAME OF WATERBODY:	CROSSING #:	STATION #:	DATE: DD-MMM-YY
65056	C. LORENZ	16 MILE CREEK - EAST BRANCH	15	15A	24-AUG-11

PROFILE: Horz. Scale: Vert. Scale:

LEGEND

10d depth (cm)
6w width (m)

➡ Riffle
⇨ Run/Glide
⬭ Pool
▓ Island/Bar

▒ Fine Substrate
Gravel Substrate
oOooO Cobble /Boulder
* * * Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
//////// Eroded Bank

XXX Riprap / Other Stabilization

⬭ Instream Log/Tree
^^^ Dam/Weir/Obstruction

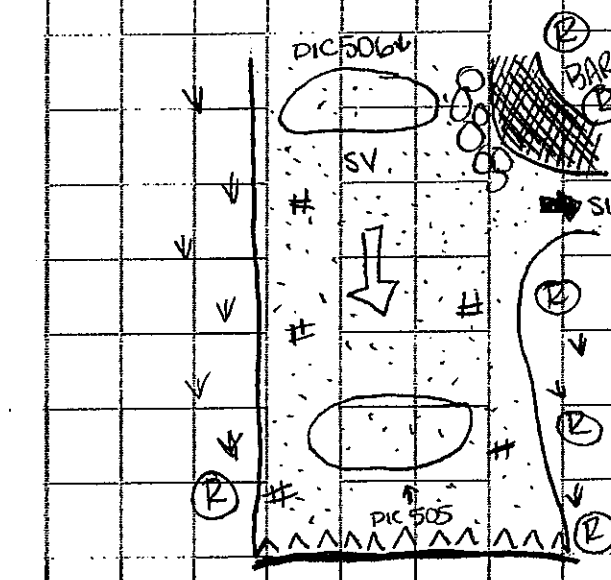
® Riparian Tree

├► Seep/Spring
-------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
└┘ Culvert

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
15A3	U/S OF WEIR (GENERAL ASSESSMENT)	20m	1cm = 3m



PROFILE: Horz. Scale Vert. Scale

PROJECT #: 65056

MAPPER: L. KNIGHT

NAME OF WATERBODY: 16 MILE CREEK, EAST BRANCH

CROSSING #: 15

STATION #: 15A

DATE: DD-MMM-YY 24-AUG-11

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▇ Island/Bar

▒ Fine Substrate
Gravel Substrate
oOooO Cobble /Boulder
*** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
//////// Eroded Bank

XXX Riprap / Other Stabilization

⊂⊃ Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree

⊢► Seep/Spring
------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
└┘ Culvert

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
650560	BRITANNIA RDEA	24	AUGUST	2011

Is STREAM REALIGNMENT required for this section:
O Yes O No ✓ Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
L KNIGHT, C. LORENZ	OVERCAST	9:30	9:45

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
22°C	20°C	—

PHOTO NUMBERS AND DESCRIPTIONS: See habitat map

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
16 MILE CREEK, EAST BRANCH	L. ONTARIO	15	15 B

LOCATION OF CROSSING: BRITANNIA RD, JUST WEST OF TRAFALGAR

GPS COORDINATES:	MTO CHAINAGE:
43° 32' 03.67" N 79° 46' 36.65" W	—
TOWNSHIP: MILTON	MNR DISTRICT: AURORA

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:
TRANSPORTATION, AGRICULTURE, RESIDENTIAL	MAJOR ROADS, AGRICULTURE, GOLF COURSE U/S.

EXISTING STRUCTURE TYPE

Bridge ✓	Box Culvert O	Open Foot Culvert O	CSP O	N/A O

Other O Describe: Size ~~(w x h) m²~~ 24.4 m WIDE

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (include on habitat map)
15 B1	

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	✓	O	✓	O	O	—

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):
11.45	0.25 m/s

SUB-SECTION(S)	Run	Pool	Riffle	Flats	Inside culvert	Other
	O	✓	O	O	O	
Percentage of area	—	100	—	—	—	—
Mean depth wetted (m)	—	0.41	—	—	—	—
Mean width wetted (m)	—	24.4	—	—	—	—
Mean bankfull width (m)	—	24.4	—	—	—	—
Mean bankfull depth(m)	—	0.84	—	—	—	—
Substrate	—	Sa/Gr	—	—	—	—

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	✓	O	O	O
Right Upstream Bank	✓	O	O	O

HABITAT

IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris	Organic debris	Vascular Macrophytes	None
	0	0	0	Instream 5 Overhanging 0	0	Instream 0 Overhanging 0	95

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	✓	O	O	O	O

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
Predominant Species				100

MIGRATORY OBSTRUCTIONS:	None WEIR U/S; BUT SIDE CHANNEL PROVIDES PASSAGE	Seasonal	Permanent

POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other

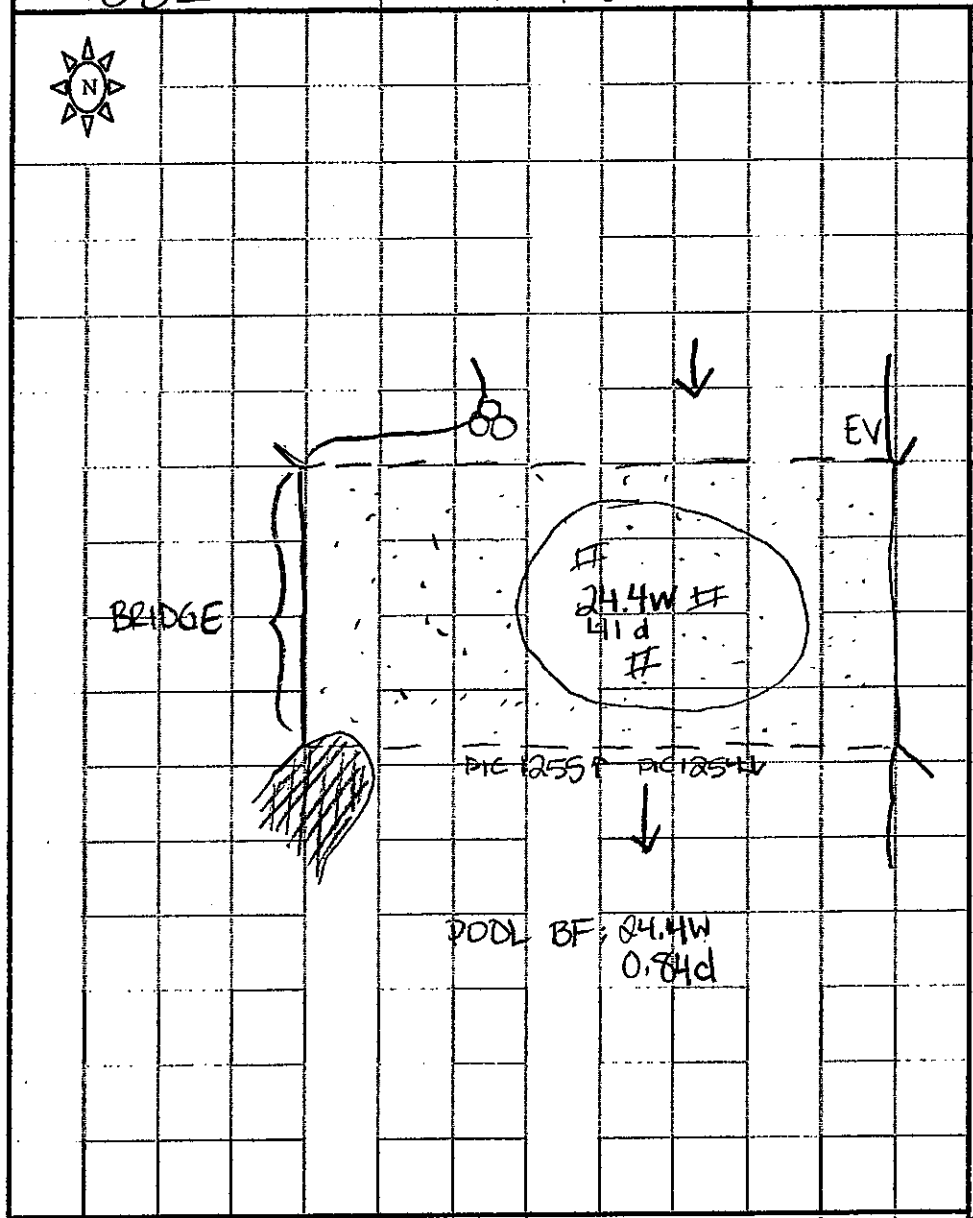
POTENTIAL ENHANCEMENT OPPORTUNITIES:

SEE 15A1.

COMMENTS:

Additional Notes Appended? ✓ No O Yes number of pages —

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
15B1	UNDER BRIDGE	11.45	1cm = 3m



PROFILE: Horz. Scale Vert. Scale

PROJECT #: 65056

MAPPER: L. KNIGHT

NAME OF WATERBODY: 16 MILE CREEK, EAST BRANCH

CROSSING #: 15

STATION #: 15B

DATE: DD-MMM-YY 24-AUG-11

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▮ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
//////// Eroded Bank

XXX Riprap / Other Stabilization

⊂⊃ Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree

⊢▶ Seep/Spring
------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
└┘ Culvert

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
65056	BRITANNIA RDEA	24	AUG	2011

Is STREAM REALIGNMENT required for this section:

O Yes O No ✓ Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
L. KNIGHT, C. LORENZ	OVERCAST	9:45	10:10

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
22°C	20°C	—

PHOTO NUMBERS AND DESCRIPTIONS: See habitat mapping.

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
16 MILE CREEK, EAST BRANCH	L. ONTARIO	15	15C

LOCATION OF CROSSING: BRITANNIA RD, JUST WEST OF TRAFALGAR RD.

GPS COORDINATES:	MTO CHAINAGE:
43°32'03.67"N 79°46'56.65"W	—

TOWNSHIP:	MNR DISTRICT:
MILTON	AURORA

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:
TRANSPORTATION, AGRICULTURE, RESIDENTIAL	MAJOR ROADS, AGRICULTURE, GOLF COURSES US/DS

EXISTING STRUCTURE TYPE

Bridge ✓	Box Culvert O	Open Foot Culvert O	CSP O	N/A O

Other O Describe: — Size (w x h) m^2 24.4

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (include on habitat map)
15C1	DS detailed assessment (DS OF BRIDGE)

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	✓	O	✓	O	O	—

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):
50	0.6

SUB-SECTION(S)	Run ✓	Pool O	Riffle ✓	Flats ✓	Inside culvert O	Other
Percentage of area	50	—	20	30	—	—
Mean depth wetted (m)	0.25	—	0.19	0.17	—	—
Mean width wetted (m)	15	—	5.75	7.2	—	—
Mean bankfull width (m)	16.5	—	6.6	8.65	—	—
Mean bankfull depth(m)	0.58	—	0.65	0.79	—	—
Substrate	Gr/Sa	—	Co/Gr	Gr/Sa	—	—

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	O	✓	O	O
Right Upstream Bank	O	✓	O	O

HABITAT

IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris	Organic debris	Vascular Macrophytes	None
	5	O	20	Instream 10 Overhanging O	10	Instream 10 Overhanging 20	25

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	O	O	O	✓	O

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
	O	O	10	90
Predominant Species	—	—	Arrowhead, Rush sp.	

MIGRATORY OBSTRUCTIONS:	None weir u/s, side channel provides passage	Seasonal	Permanent
		—	—

POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other
	—	—	—

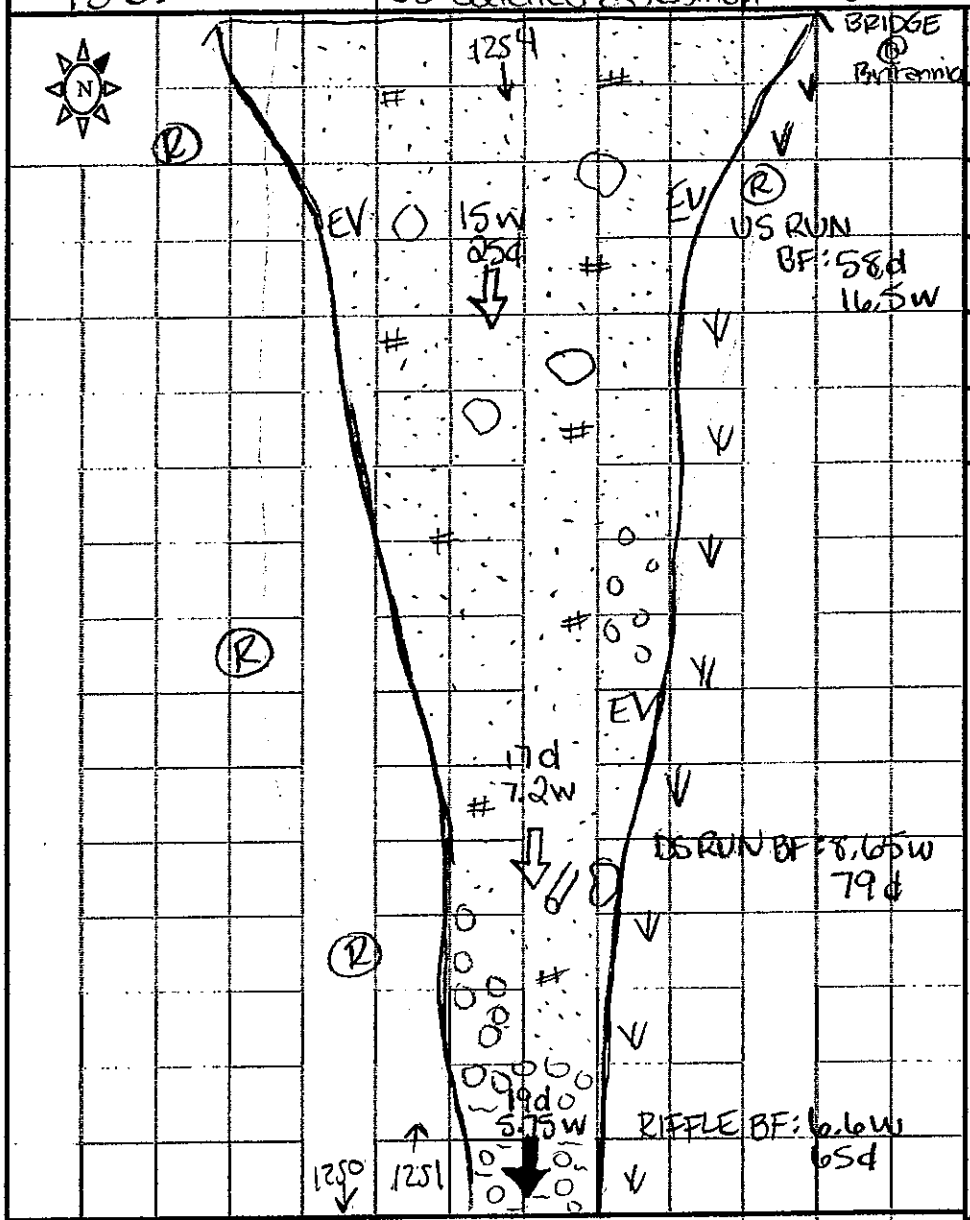
POTENTIAL ENHANCEMENT OPPORTUNITIES:

See 15A1

COMMENTS:

Additional Notes Appended? ✓ No O Yes number of pages —

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
15C1	DS detailed assessment	50	1cm = 3m

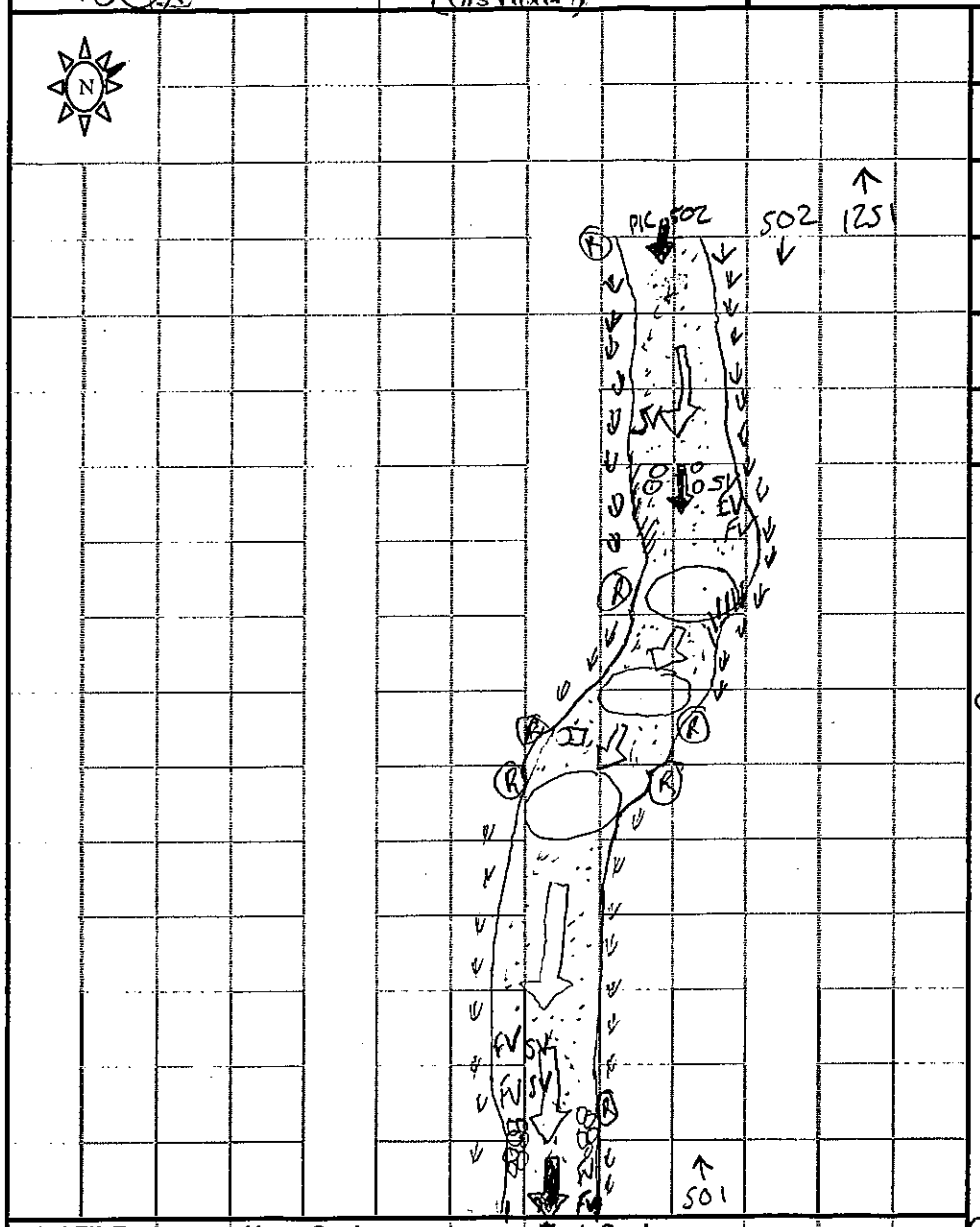


PROJECT #: 650056
MAPPER: L. KNIGHT
NAME OF WATERBODY: 16 MILE CREEK, EAST BRANCH
CROSSING #: 15
STATION #: 15C
DATE: DD-MMM-YY 24-AUG-11

LEGEND

- Riparian veg
- 10d depth (cm)
- 6w width (m)
- ➡ Riffle
- ⇨ Run/Glide
- Pool
- Island/Bar
- Fine Substrate
- ### Gravel Substrate
- oOooO Cobble /Boulder
- * * * Debris
- CT Cattail
- SV/FV Submerg/Float Veg
- EV Emergent Vegetation
- W Watercress
- Fe Iron Staining
- /////// Eroded Bank
- XXX Riprap / Other Stabilization
- Instream Log/Tree
- ^^^ Dam/Weir/Obstruction
- ® Riparian Tree
- Seep/Spring
- ------- Undercut Bank
- — Barrier to Fish Movement
- -S- Seasonal Barrier
- -x--x- Fence line
- Culvert

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
15C2	DS GENERAL ASSESSMENT (U/S half)	90m	km = 7m



PROFILE: Horz. Scale Vert. Scale

PROJECT #: 650Jo

MAPPER: C. LORENZ

NAME OF WATERBODY: 16 MILE CREEK - EAST BRANCH

CROSSING #: 15

STATION #: 15C

DATE: DD-MMM-YY: 24-AUG-11

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▓ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** * *** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
////// Eroded Bank

XXX Riprap / Other Stabilization

⊂⊃ Instream Log/Tree
^^^ Dam/Weir/Obstruction

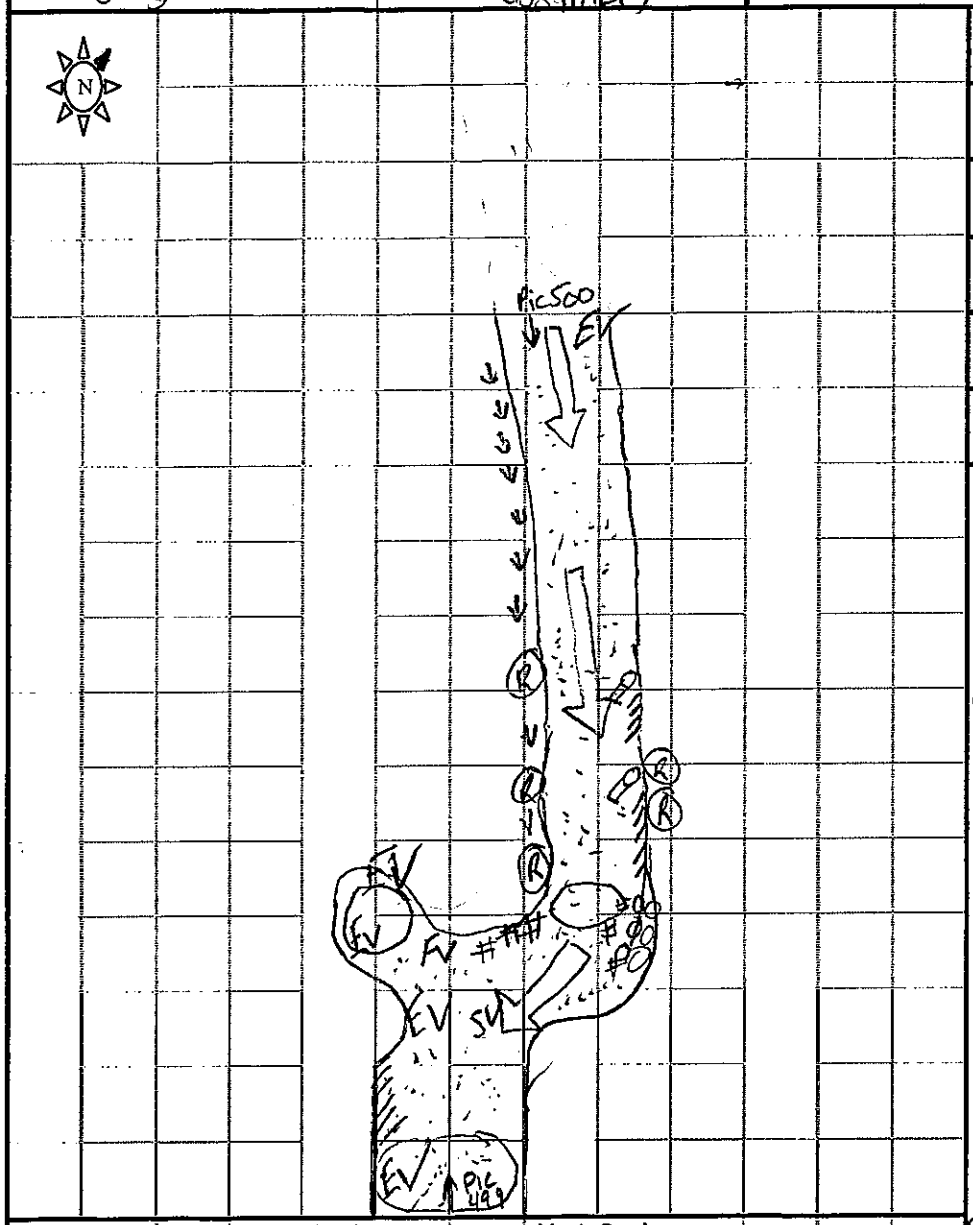
Ⓡ Riparian Tree

├▶ Seep/Spring
-------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
└┘ Culvert

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
15C	DS GENERAL ASSESSMENT (DS #ALE)	60	1cm = 5m



PROFILE: Horz. Scale Vert. Scale

PROJECT #: 650560

MAPPER: C. LORENZ

NAME OF WATERBODY: 16 MILE CREEK

CROSSING #: 15

STATION #: 15C

DATE: DD-MMM-YY 24-AUG-11

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▓ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
//////// Eroded Bank

XXX Riprap / Other Stabilization

⊂⊃ Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree

├► Seep/Spring
-------- Undercut Bank

▬ Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
└┘ Culvert

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
050526	Britannia Rd EA	25	Oct	2011

Is STREAM REALIGNMENT required for this section:

O Yes O No ✓ Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
L Knight, C. Lorenz	rainy	9:20	9:40

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
9°C	9°C	

PHOTO NUMBERS AND DESCRIPTIONS: see habitat map.

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
16 Mile	L. Ontario	16	16 B

LOCATION OF CROSSING: Britannia Rd, east of Trafalgar

GPS COORDINATES:	MTO CHAINAGE:
43°32'15.94"N 79°46'43.12"W	—

TOWNSHIP:	MNR DISTRICT:
Milton	Aurora

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:
Agriculture, Transportation, Residential	Farms, Roads, Golf course, Lawns

EXISTING STRUCTURE TYPE

Bridge O	Box Culvert O	Open Foot Culvert O	CSP ✓	N/A O

Other ✓ Describe: plastic culvert — Size (w x h) m²: 60 cm CSP

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (include on habitat map)
16 B1	In culvert

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	O	O	O	✓	O	

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):
14.5	

SUB-SECTION(S)	Run ✓	Pool O	Riffle O	Flats O	Inside culvert ✓	Other
Percentage of area					100	—
Mean depth wetted (m)					0.3	—
Mean width wetted (m)					0.6	—
Mean bankfull width (m)					flooded around culvert ~1m each side	
Mean bankfull depth(m)					0.51	—
Substrate					Sa	—

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	✓	O	O	O
Right Upstream Bank	✓	O	O	O

HABITAT

IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris	Organic debris	Vascular Macrophytes	None
	O	O	O	Instream O Overhanging O	O	Instream O Overhanging O	100

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	✓	O	O	O	O

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
Predominant Species				100

MIGRATORY OBSTRUCTIONS:	None	Seasonal	Permanent

POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other

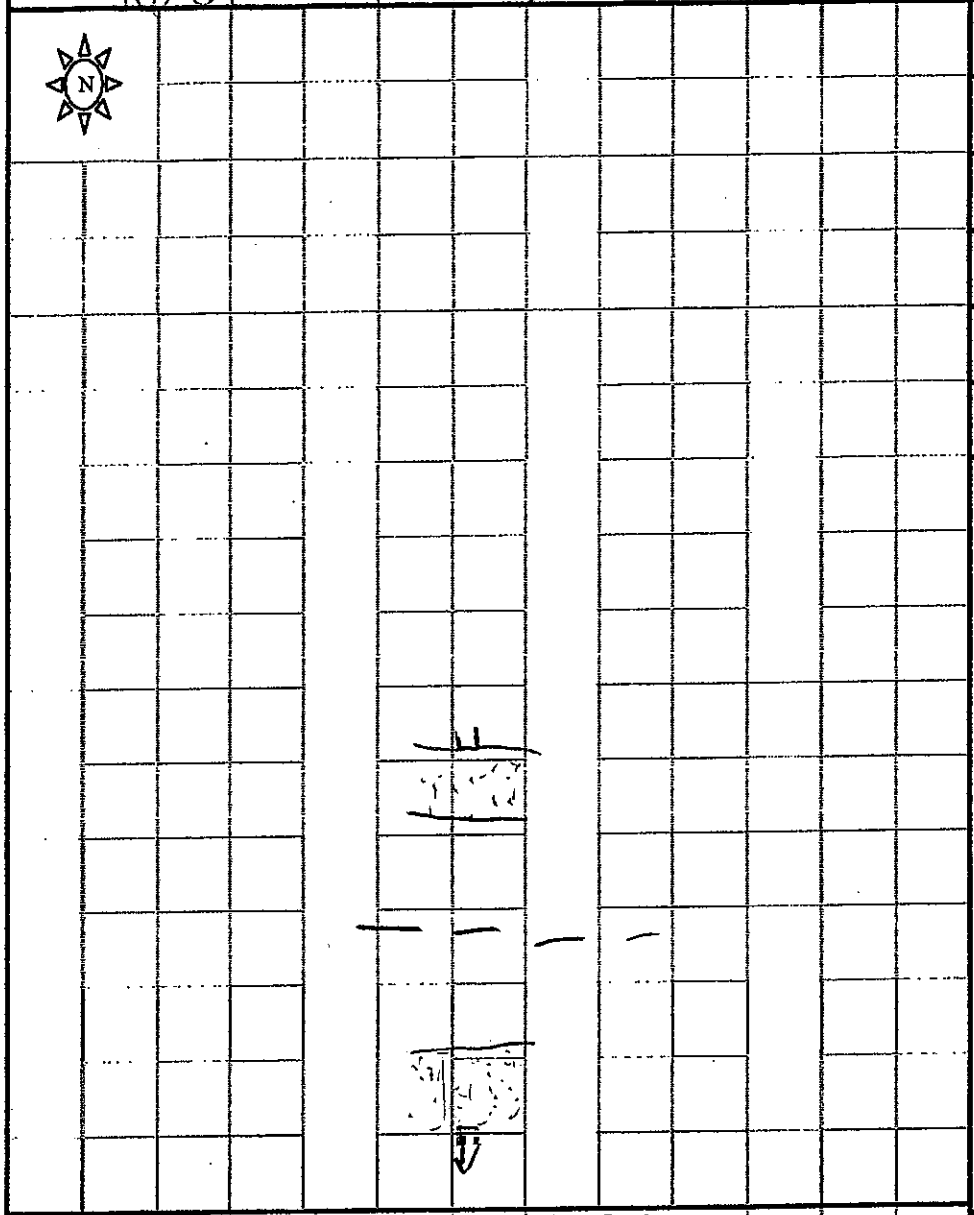
POTENTIAL ENHANCEMENT OPPORTUNITIES:

COMMENTS:

Culvert too small

Additional Notes Appended? O No O Yes number of pages _____

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
16 B1	In culvert	14.5	1cm / 3m



PROJECT #: 05056

MAPPER: C Knight

NAME OF WATERBODY: 16 Mile

CROSSING #: 16

STATION #: 16B

DATE: DD-MMM-YY 25-Oct-2011

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▓ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** * *** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
/////// Eroded Bank

XXX Riprap / Other Stabilization

⊂⬭ Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree

├▶ Seep/Spring
-------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
└┘ Culvert

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
650536	Britannia Rd Area	25	Oct	2011

Is STREAM REALIGNMENT required for this section:

O Yes O No ✓ Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
L Knight, C. Lorenz	raining	950	1015

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
9°C	9°C	—

PHOTO NUMBERS AND DESCRIPTIONS: see habitat map

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
16 Mile	L. Ontario	16	16C

LOCATION OF CROSSING: Britannia Rd, east of Trafalgar

GPS COORDINATES:	MTO CHAINAGE:
43° 32' 15.94" N 79° 46' 43.12" W	—

TOWNSHIP:	MNR DISTRICT:
Milton	Aurora

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:
Agriculture, Transportation, Residential	Golf course d/s, farms, roads, lawns

EXISTING STRUCTURE TYPE

Bridge O	Box CulvertO	Open Foot Culvert O	CSP ✓	N/A O

Other O Describe: Size (w x h) m^2 60 cm CSP

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (include on habitat map)
16C1	DS Detailed

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	O	O	O	✓	O	—

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):
78	0.01

SUB-SECTION(S)	Run ✓	Pool O	Riffle O	Flats O	Inside culvert O	Other
Percentage of area	100					
Mean depth wetted (m)	0.09					
Mean width wetted (m)	0.40					
Mean bankfull width (m)	0.90					
Mean bankfull depth(m)	0.50					
Substrate	Si					

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	✓	O	O	O
Right Upstream Bank	✓	O	O	O

HABITAT

IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris	Organic debris	Vascular Macrophytes	None
	0	0	0	Instream 0 Overhanging 0	0	Instream 50 Overhanging 20	30

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	O	O	O	O	O

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
	50		50	
Predominant Species	Lawn		Lawn	

MIGRATORY OBSTRUCTIONS:	None	Seasonal	Permanent
	—	Intermittent	—

POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other
	—	—	—

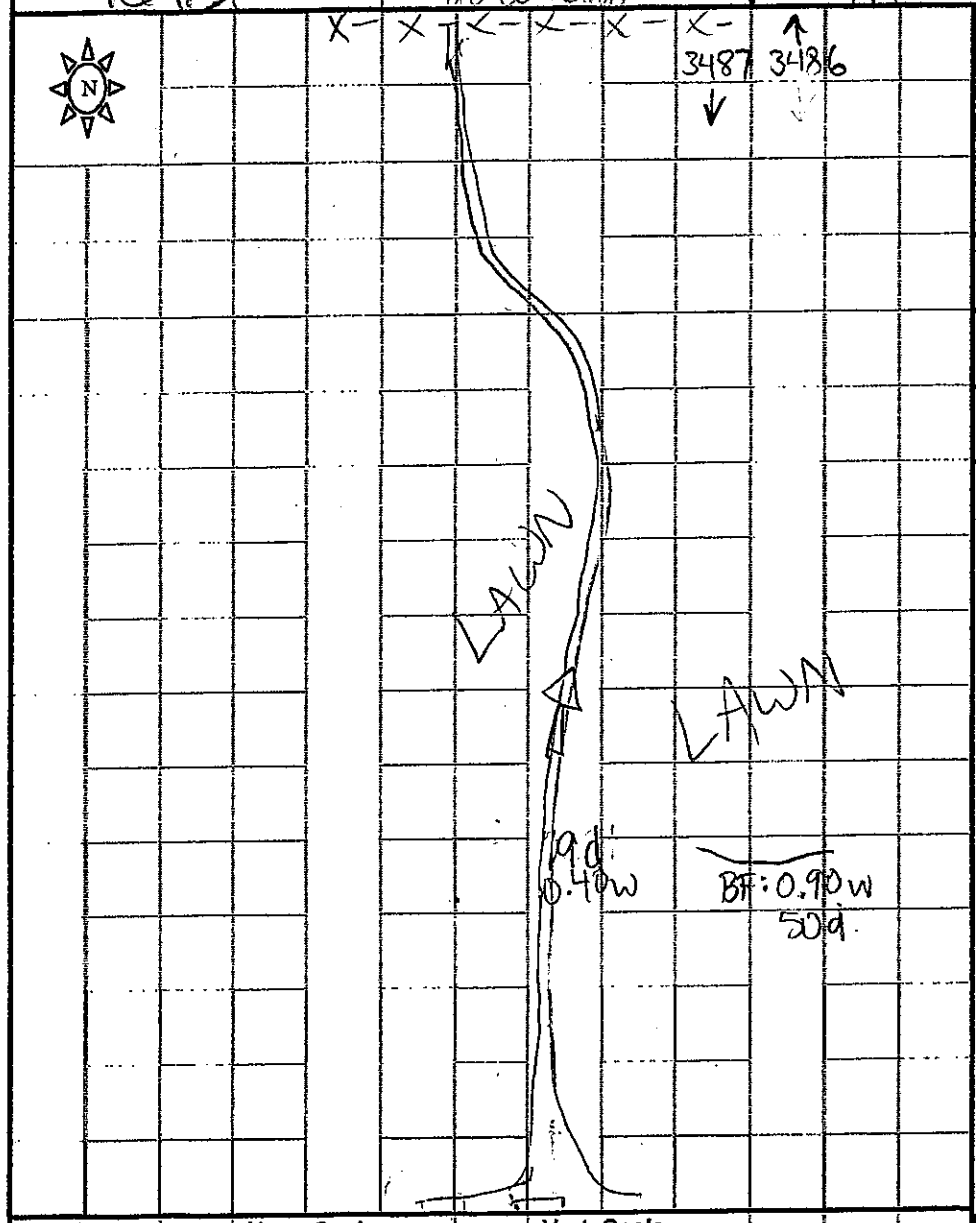
POTENTIAL ENHANCEMENT OPPORTUNITIES:

Dont mow thru watercourse.

COMMENTS:

Additional Notes Appended? O No O Yes number of pages _____

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
16C1	ds dltailed	78	1cm 5m



PROFILE: Horz. Scale Vert. Scale

PROJECT #: 650580

MAPPER: L. Knight

NAME OF WATERBODY: 16 Mile

CROSSING #: 16

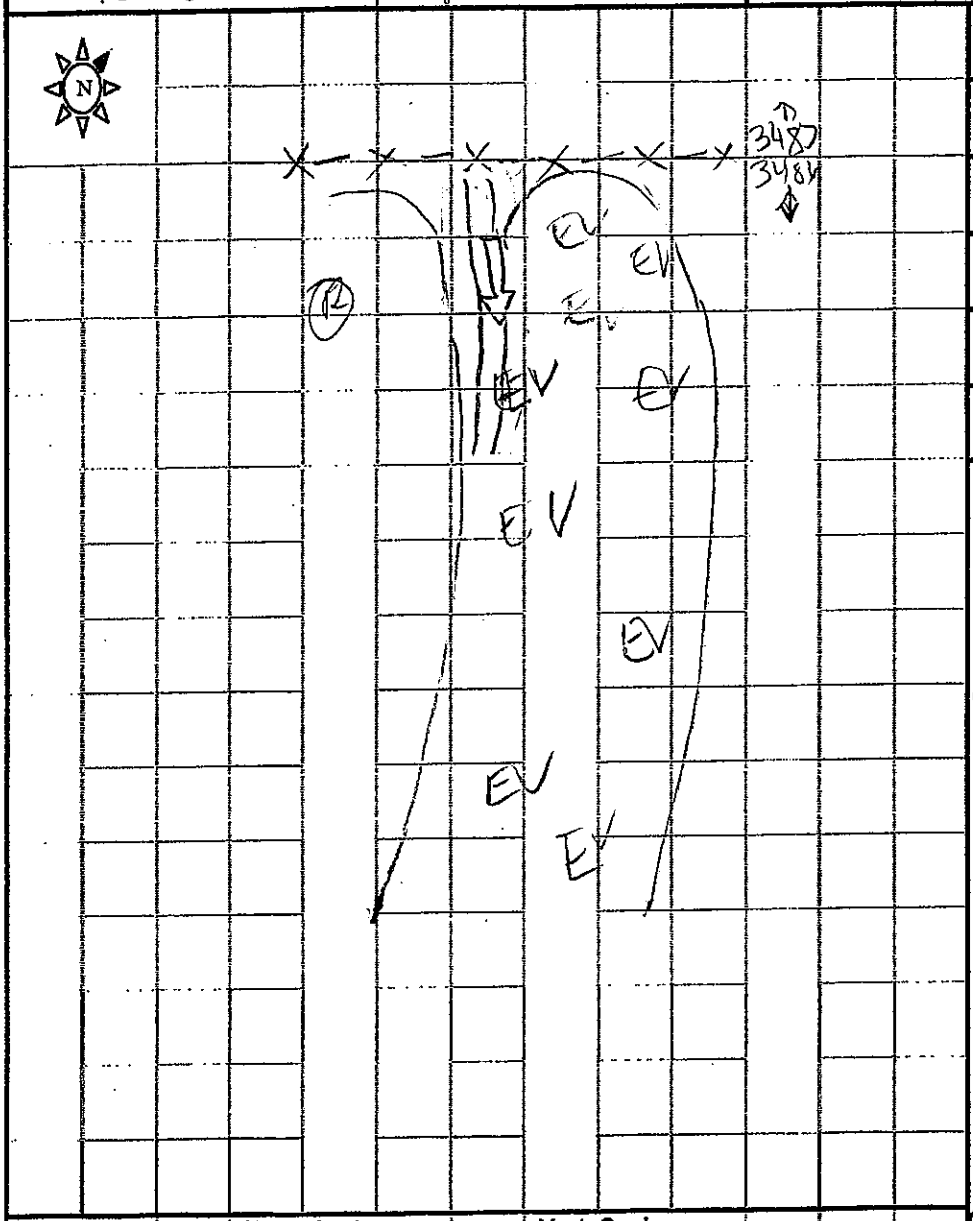
STATION #: 16C

DATE: DD-MMM-YY 25-Oct-11

LEGEND

10d depth (cm)
6w width (m)
➡ Riffle
⇨ Run/Glide
⬭ Pool
▇ Island/Bar
▒ Fine Substrate
Gravel Substrate
oOooO Cobble /Boulder
*** Debris
CT Cattail
SV/FV Submerg/Float Veg
EV Emergent Vegetation
W Watercress
Fe Iron Staining
/////// Eroded Bank
XXX Riprap / Other Stabilization
⬭ Instream Log/Tree
^^^ Dam/Weir/Obstruction
® Riparian Tree
⊢▶ Seep/Spring
------- Undercut Bank
— Barrier to Fish Movement
-S- Seasonal Barrier
-x--x- Fence line
⌴ Culvert

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
16C2	DS gravel Culvert	50m	1cm/5m



PROFILE: Horz. Scale Vert. Scale

PROJECT #: 45056

MAPPER: L. Knight

NAME OF WATERBODY: 16 Mile

CROSSING #: 16

STATION #: 16C

DATE: DD-MMM-YY 25-Oct-11

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▓ Island/Bar

▒ Fine Substrate
Gravel Substrate
oOooO Cobble /Boulder
*** * *** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
////// Eroded Bank

XXX Riprap / Other Stabilization

⊂⊃ Instream Log/Tree
^^^ Dam/Weir/Obstruction

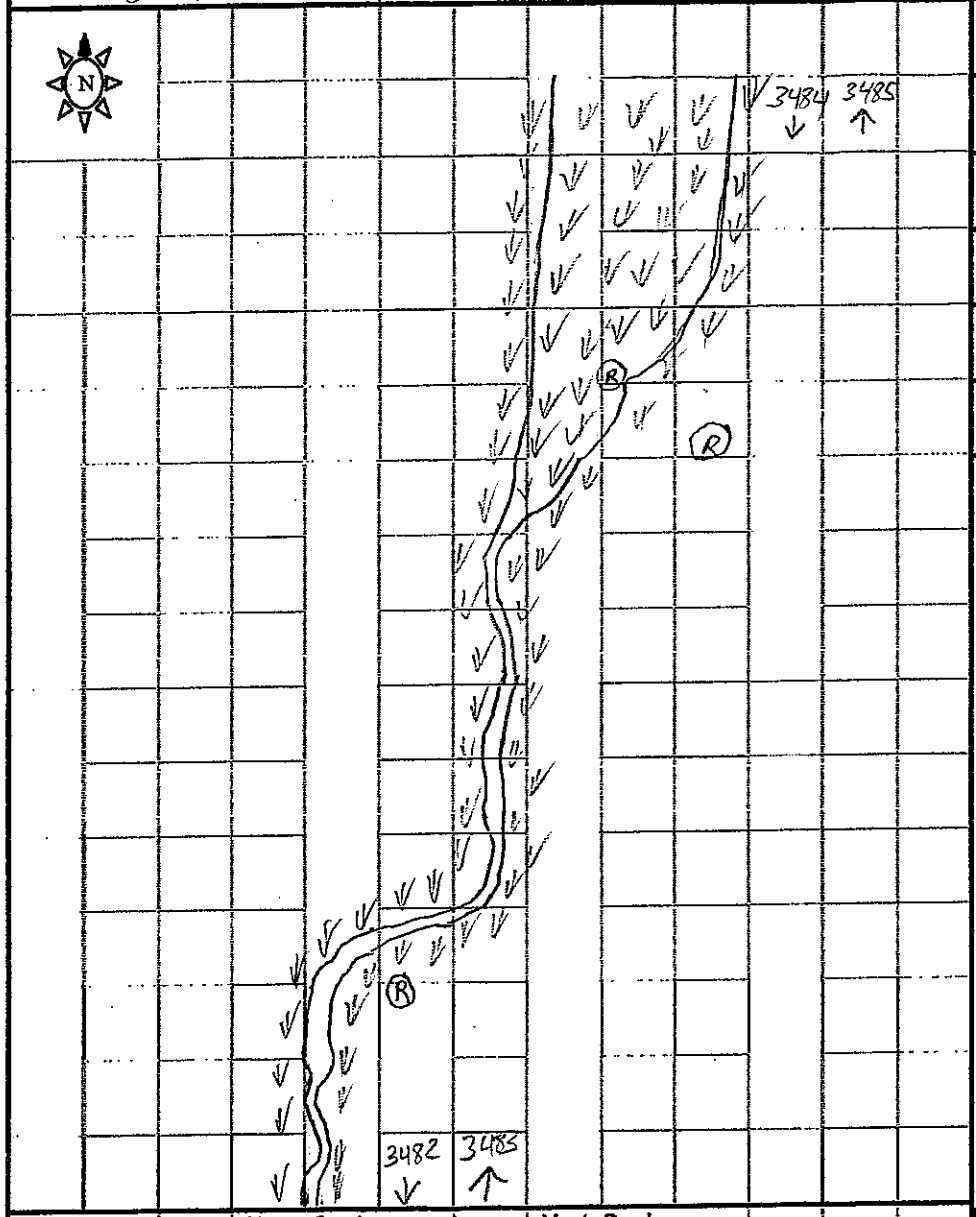
® Riparian Tree

├► Seep/Spring
-------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
└┘ Culvert

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
16C3	Downstream General (ds hwy)	75m	1/5



PROFILE: Horz. Scale Vert. Scale

PROJECT #:	150560
MAPPER:	C. Lorenz
NAME OF WATERBODY:	16 mile
CROSSING #:	16
STATION #:	16C
DATE: DD-MMM-YY	25-Oct-11

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▇ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** * *** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
////// Eroded Bank

XXX Riprap / Other Stabilization

⊂⊃ Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree

├▶ Seep/Spring
------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
└┘ Culvert

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
650556	Britannia 2A	25	Oct	2011

Is STREAM REALIGNMENT required for this section:

O Yes O No ✓ Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
L. KNIGHT, C. LORENZ	sunny, cloudy	1230	1250

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
12°C	7°C	

PHOTO NUMBERS AND DESCRIPTIONS: see habitat map

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
16 Mile	L. Ontario	17	17A

LOCATION OF CROSSING: Britannia Rd, midway btw Trafalgar and 8th Line

GPS COORDINATES:	MTO CHAINAGE:
599 UTM E 4821686 N ± 14 m	—

TOWNSHIP:	MNR DISTRICT:
Milton	Aurora

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:
Transportation, Agricultural, Residential	Transportation, Agriculture.

EXISTING STRUCTURE TYPE

Bridge O	Box CulvertO	Open Foot Culvert O	CSP ✓	N/A O

Other O Describe:

Size (w x h) m^2 0.89 CSP

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (Include on habitat map)
17A1	U/S detailed

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	✓	O	O	✓	O	Unknown

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):
20m	0

SUB-SECTION(S)	Run	Pool	Riffle	Flats	Inside culvert	Other
	✓	O	O	O	O	
Percentage of area	100					
Mean depth wetted (m)	0.07					
Mean width wetted (m)	6.2					
Mean bankfull width (m)	8.4					
Mean bankfull depth(m)	0.36					
Substrate	Cl/Si					

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	✓	O	O	O
Right Upstream Bank	✓	O	O	O

HABITAT

IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris	Organic debris	Vascular Macrophytes	None
	0	0	0	Instream 0 Overhanging 0	0	Instream 80 Overhanging 20	0

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	O	✓	O	O	O

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
	0	0	100	0
Predominant Species			grasses, cattails	

MIGRATORY OBSTRUCTIONS:	None	Seasonal	Permanent
	—	Intermittent	—

POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other
	—	—	—

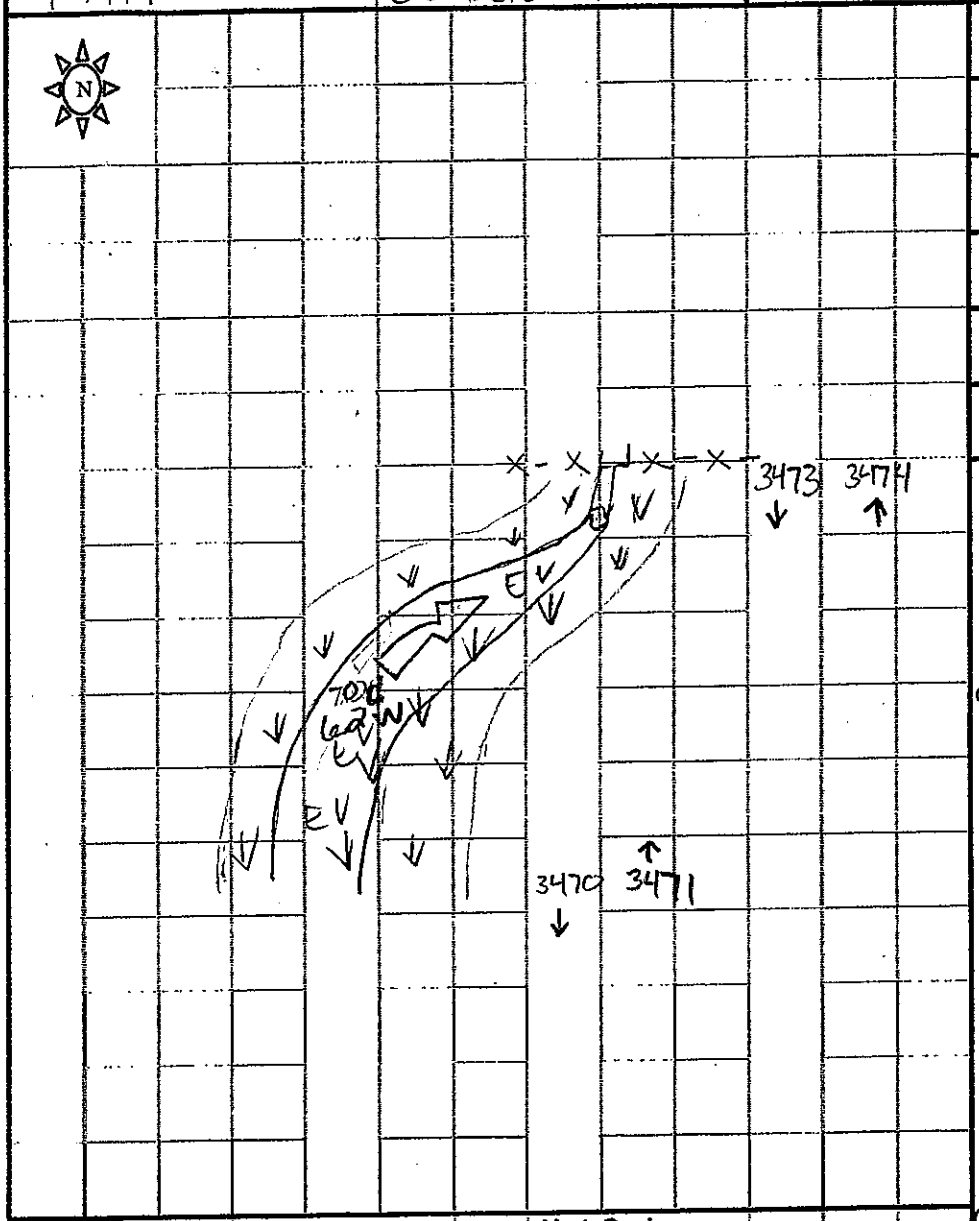
POTENTIAL ENHANCEMENT OPPORTUNITIES:

COMMENTS:

Completely vegetation dominated.

Additional Notes Appended? O No O Yes number of pages _____

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
17A1	US Derailed	20 m	1cm/3m



PROFILE:

Horz. Scale

Vert. Scale

PROJECT #:	650564
MAPPER:	L. Knight
NAME OF WATERBODY:	16 Mile Creek
CROSSING #:	17
STATION #:	17A
DATE: DD-MMM-YY	25-Oct-11

LEGEND

10d depth (cm)
6w width (m)

➡ Riffle
⇨ Run/Glide
⬭ Pool
▇ Island/Bar

▒ Fine Substrate
Gravel Substrate
oOooO Cobble /Boulder
* * * Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
//////// Eroded Bank

XXX Riprap / Other Stabilization

⊂⊃ Instream Log/Tree
^^^ Dam/Weir/Obstruction

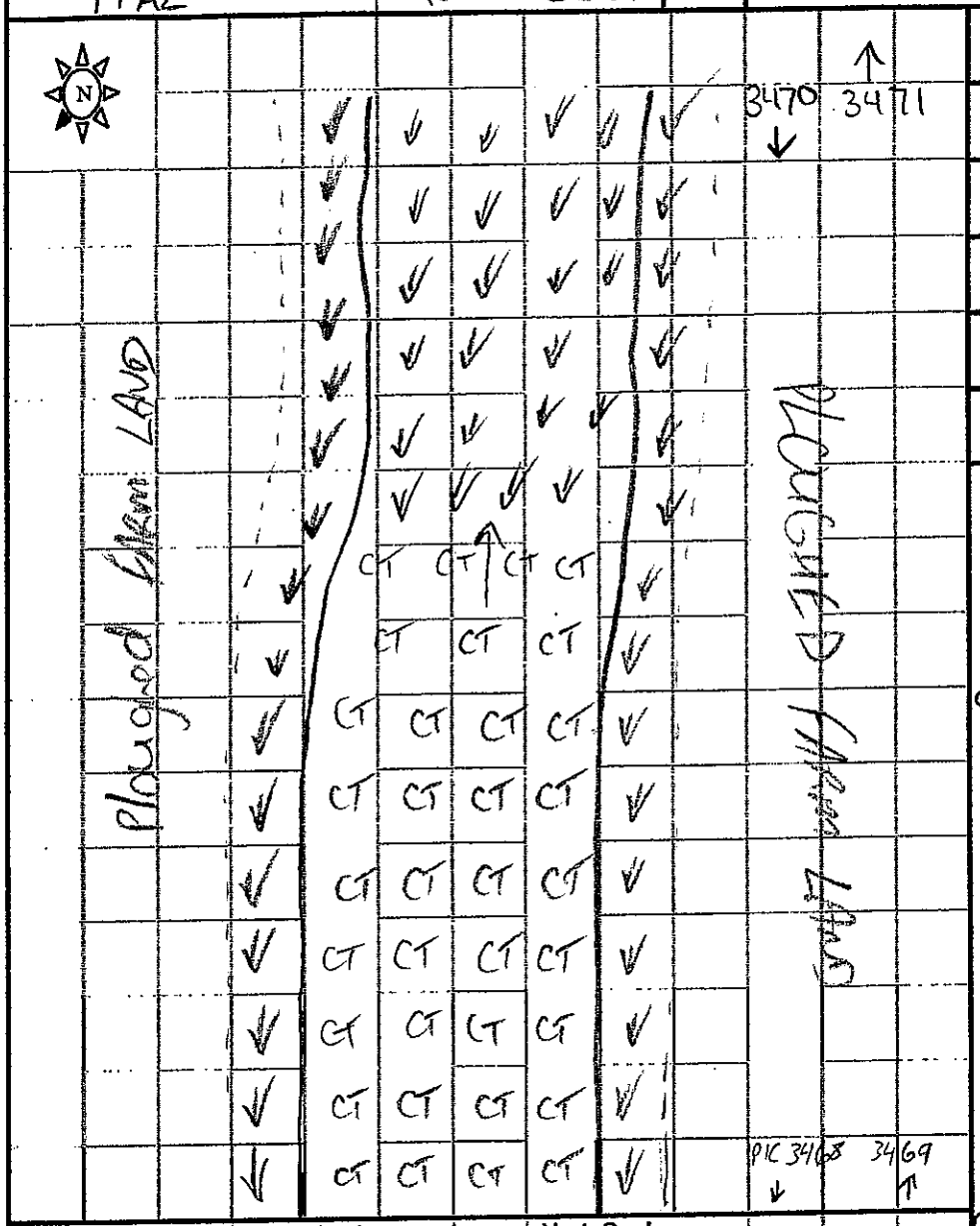
® Riparian Tree

├► Seep/Spring
-------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
└┘ Culvert

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
17 A2	Upstream General	30m	1/2



PROJECT #:	150560
MAPPER:	C. LORENZ
NAME OF WATERBODY:	16 MILE
CROSSING #:	17
STATION #:	17A
DATE: DD-MMM-YY	25-OCT-11

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▇ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** * *** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
/////// Eroded Bank

XXX Riprap / Other Stabilization

Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree

Seep/Spring
Undercut Bank

Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
Culvert

PROFILE: **Horz. Scale** **Vert. Scale**

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
65056	Britannia Rd EA	25	Oct	2011

Is STREAM REALIGNMENT required for this section:

O Yes O No ✓ Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
L Knight, C. Lorenz	sunny, cloudy	1:00	1:15

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
12°C	7°C	—

PHOTO NUMBERS AND DESCRIPTIONS: see habitat map

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
16 Mile Creek	L. Ontario	17	17B

LOCATION OF CROSSING: Britannia Rd, midway btw Trafalgar and 8th Line

GPS COORDINATES:	MTO CHAINAGE:
599 006 E 4821686 N ± 14m	—

TOWNSHIP:	MNR DISTRICT:
Milton	Aurora

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:
Transportation, Recreational, Agricultural	Transportation, Agriculture

EXISTING STRUCTURE TYPE

Bridge O	Box CulvertO	Open Foot Culvert O	CSP ✓	N/A O

Other O Describe: Size (w x h) m^2 0.89 CSP

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (include on habitat map)
17B1	In culvert

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	O	O	O	✓	O	—

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):
12m	0.01

SUB-SECTION(S)	Run ✓	Pool O	Riffle O	Flats O	Inside culvert O	Other
Percentage of area	100	—	—	—	—	—
Mean depth wetted (m)	0.17	—	—	—	—	—
Mean width wetted (m)	0.75	—	—	—	—	—
Mean bankfull width (m)	0.78	—	—	—	—	—
Mean bankfull depth(m)	0.33	—	—	—	—	—
Substrate	—	—	—	—	—	—

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

1.8
9
12

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	✓	O	O	O
Right Upstream Bank	✓	O	O	O

HABITAT

IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris	Organic debris	Vascular Macrophytes	None
	0	0	0	Instream 0 Overhanging 0	0	Instream 0 Overhanging 0	100

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	✓	O	O	O	O

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
				100
Predominant Species				

MIGRATORY OBSTRUCTIONS:	None	Seasonal	Permanent
	—	Intermittent	—

POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other
	—	—	—

POTENTIAL ENHANCEMENT OPPORTUNITIES:

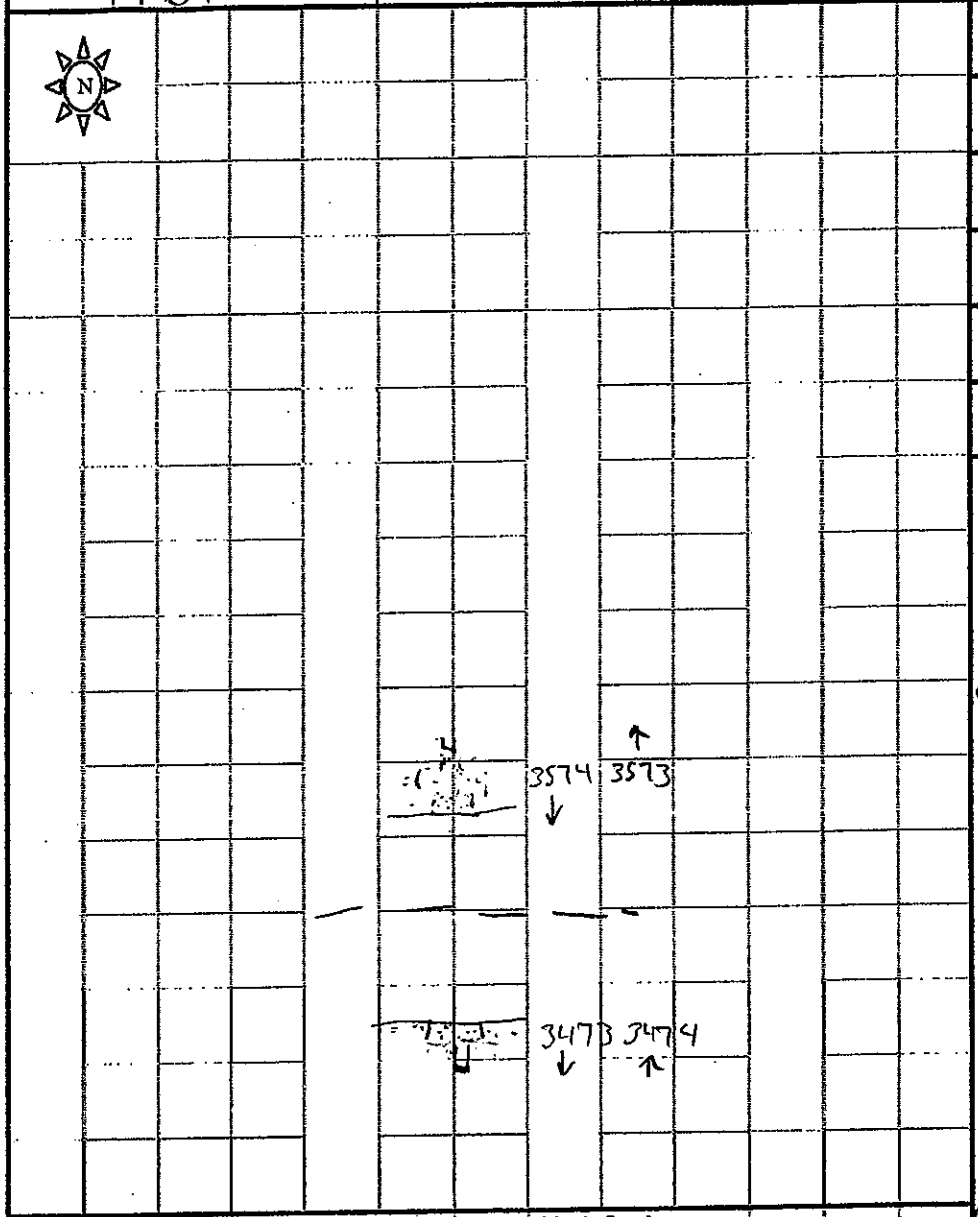
Open bottom culvert!

COMMENTS:

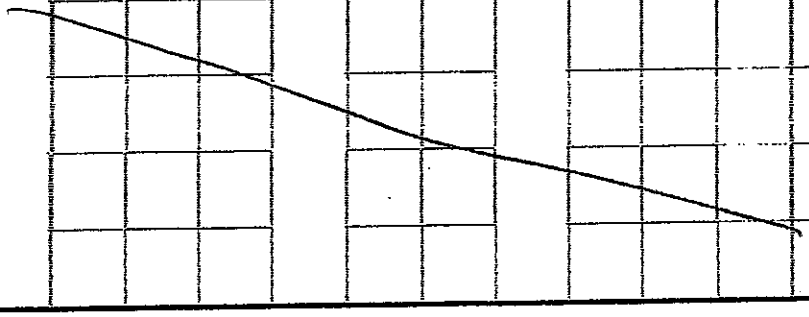
Additional Notes Appended? O No O Yes number of pages _____

89

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
17B1	In culvert	12m	1cm / 3m



PROFILE: Horz. Scale Vert. Scale



PROJECT #: 1650056

MAPPER: L. Knight

NAME OF WATERBODY: 16 Mile Creek

CROSSING #: 17

STATION #: 17B

DATE: DD-MMM-YY 25-Oct-11

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▒ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
* * * Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
//////// Eroded Bank

XXX Riprap / Other Stabilization

⊂⊃ Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree

├► Seep/Spring
------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
⊔ Culvert

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
605056	BRITANNIA EA	4	NOV	11

Is STREAM REALIGNMENT required for this section:

O Yes O No ✓ Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
C. LORENZ, J. KNIGHT	SUNNY	9:00	9:20

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
2°C	4°C	—

PHOTO NUMBERS AND DESCRIPTIONS: See habitat map

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
16 Mile Creek	L. Ontario	17	17C

LOCATION OF CROSSING: Britannia Rd, mid way btw Trafalger + ~~Eighth~~ Line

GPS COORDINATES:	MTO CHAINAGE:
599006E 4821686N ± 14m	—
TOWNSHIP: Milton	MNR DISTRICT: Aurora

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:
Residential, Nursery, Road	Road, Lawn, Nursery

EXISTING STRUCTURE TYPE

Bridge O	Box Culvert O	Open Foot Culvert O	CSP ✓	N/A O

Other O Describe: Size (w x h) m^2

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (include on habitat map)
17 C1	DS detailed

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	✓	O	O	✓	O	—

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):
50m	0.01 m/s

SUB-SECTION(S)	Run ✓	Pool O	Riffle O	Flats O	Inside culvert O	Other
Percentage of area	100					
Mean depth wetted (m)	0.17					
Mean width wetted (m)	1.90					
Mean bankfull width (m)	5.4					
Mean bankfull depth(m)	0.47					
Substrate	Cl/Si					

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	0	0	0	0
Right Upstream Bank	0	0	0	0

HABITAT

IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris	Organic debris	Vascular Macrophytes	None
	0	0	0	Instream 0 Overhanging 0	5	Instream 50 Overhanging 20	25

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	0	0	0	0	0

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
	—	—	70	30
Predominant Species	—	—	grasses	

MIGRATORY OBSTRUCTIONS:	None	Seasonal	Permanent
	—	Intermittent	—

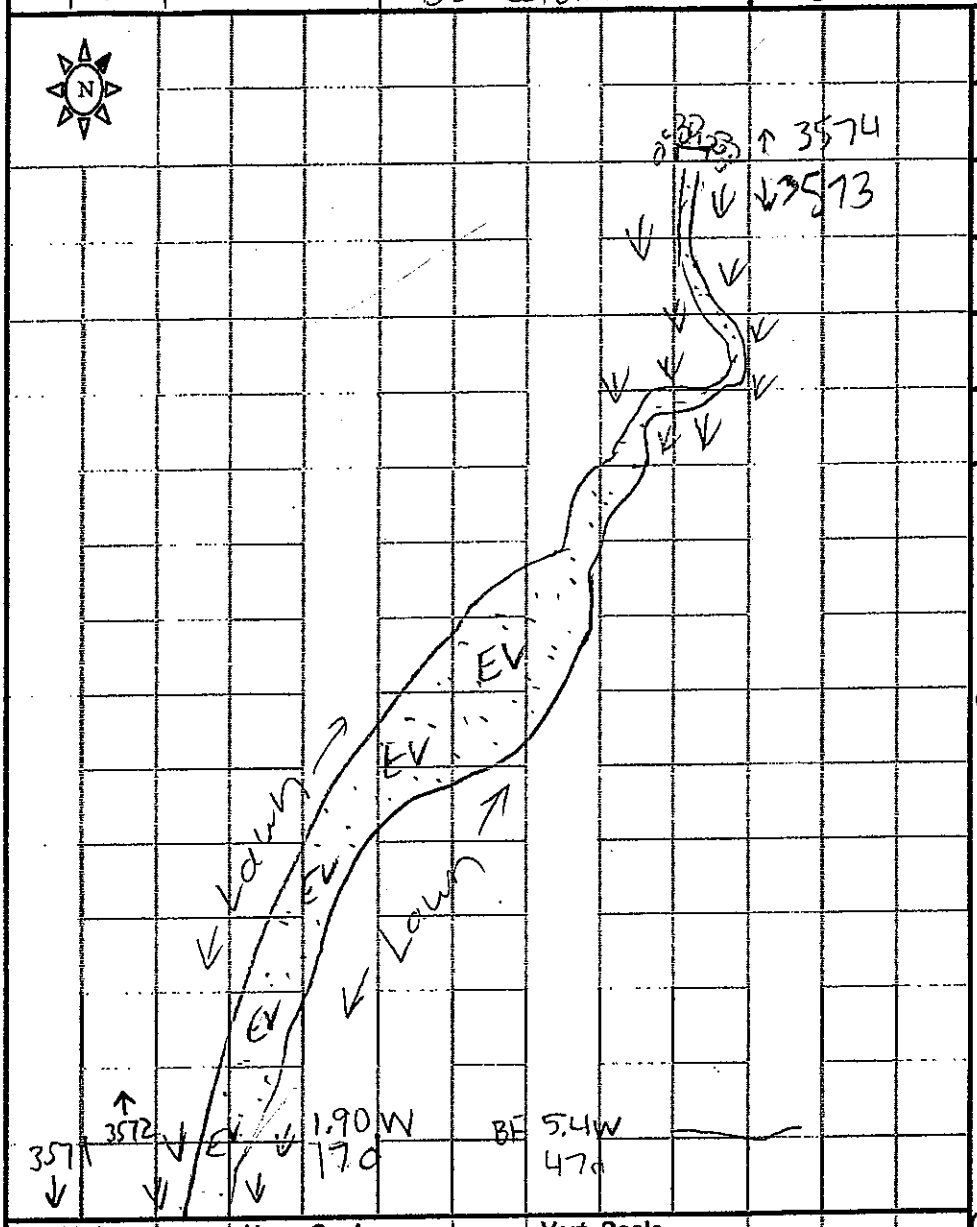
POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other
	—	—	—

POTENTIAL ENHANCEMENT OPPORTUNITIES:

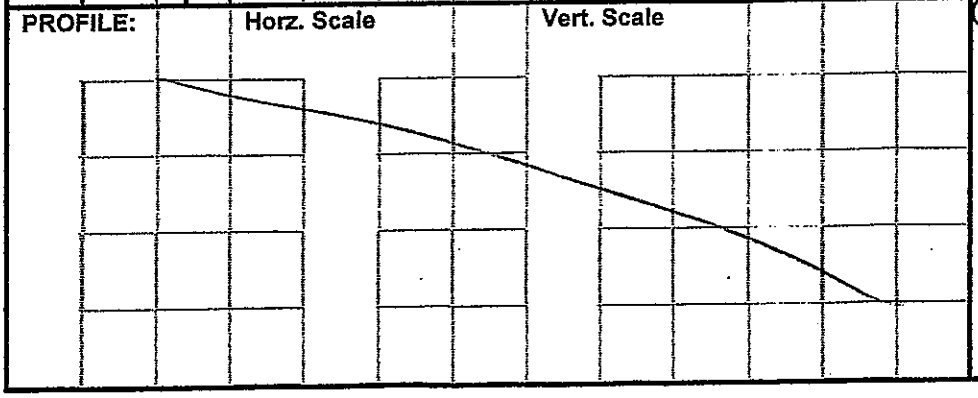
COMMENTS:

Additional Notes Appended? O No O Yes number of pages _____

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
17C1	DS detailed	50 m	1 cm / 3m



PROFILE: Horz. Scale Vert. Scale



PROJECT #: 050056

MAPPER: L Knight

NAME OF WATERBODY: 16 Mile

CROSSING #: 17

STATION #: 17C

DATE: DD-MMM-YY 04-Nov-11

LEGEND

10d depth (cm)
6w width (m)

➡ Riffle
⇨ Run/Glide
⬭ Pool
▮ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** * *** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
////// Eroded Bank

XXX Riprap / Other Stabilization

Instream Log/Tree
^^^ Dam/Weir/Obstruction

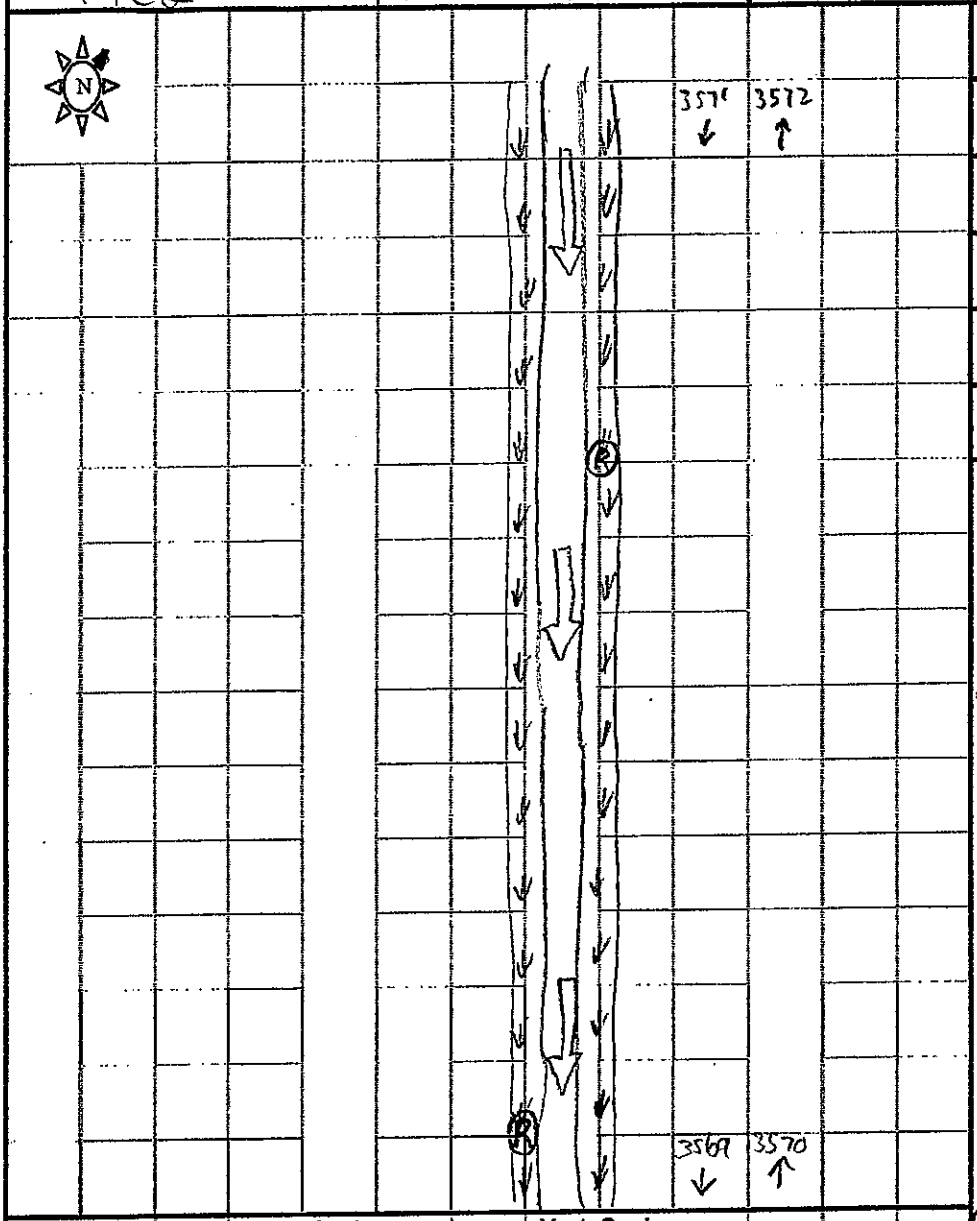
® Riparian Tree

Seep/Spring
Undercut Bank

Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
Culvert

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
17C2	d/s General (u/s half)	75	1/5



PROFILE: Horz. Scale Vert. Scale

PROJECT #: 650510

MAPPER: C. LORENZ

NAME OF WATERBODY: 16 MILE

CROSSING #: 17

STATION #: 17C

DATE: DD-MMM-YY 04-NOV-11

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▓ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** * *** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
/////// Eroded Bank

XXX Riprap / Other Stabilization

⬭ Instream Log/Tree
^^^ Dam/Weir/Obstruction

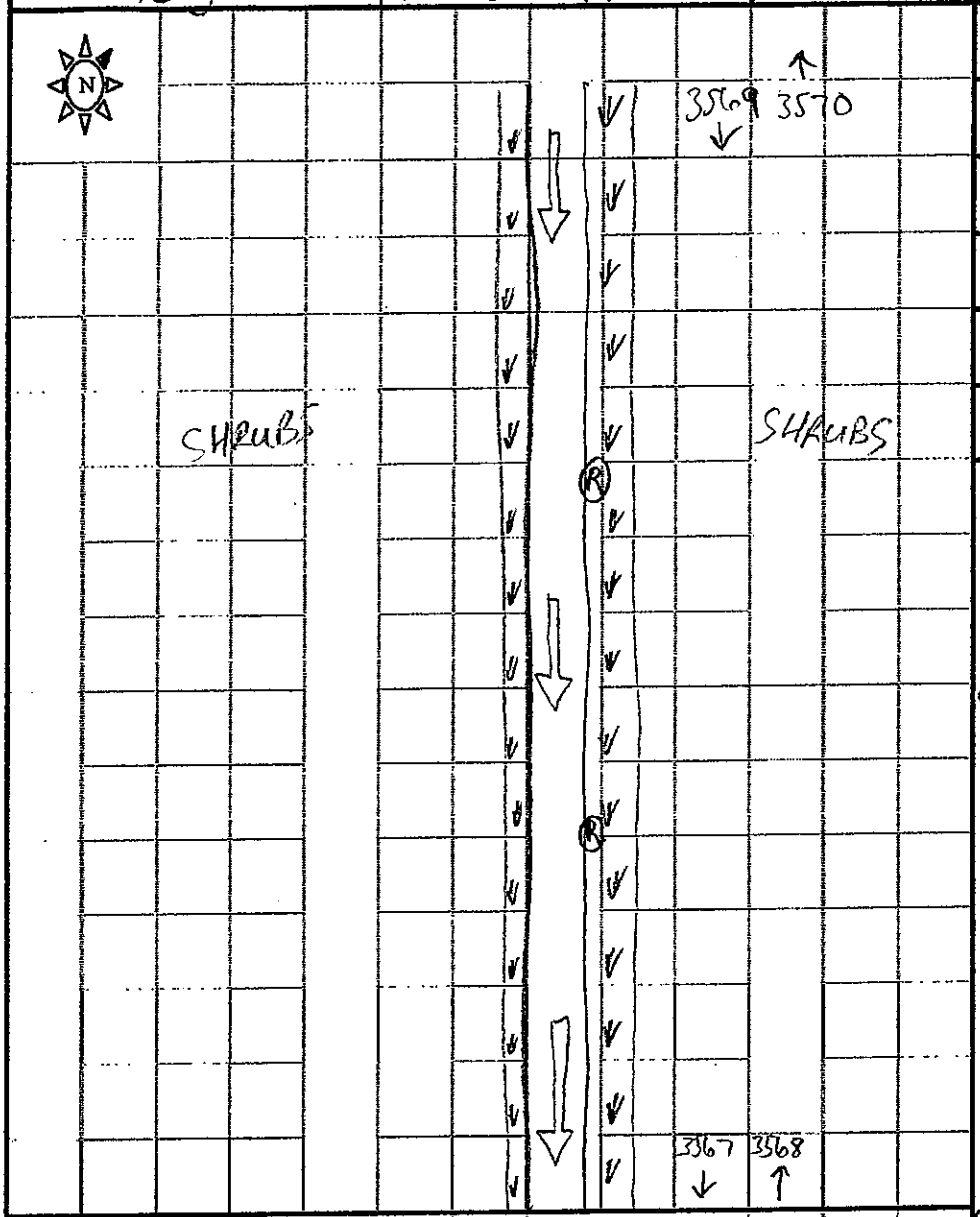
® Riparian Tree

├▶ Seep/Spring
------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
└┘ Culvert

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
17C3	d/s General (d/s half)	75	1/5



PROFILE: Horz. Scale Vert. Scale

PROJECT #: 650520

MAPPER: C. LORENZ

NAME OF WATERBODY: 16 MILE

CROSSING #: 17

STATION #: 17C

DATE: DD-MMM-YY 04-NOV-11

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▓ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** * *** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
/////// Eroded Bank

XXX Riprap / Other Stabilization

Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree

Seep/Spring
-------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
Culvert

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
050510	BRITANNIA RD EA	30	AUG	2011

Is STREAM REALIGNMENT required for this section:

O Yes O No ◉ Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
L. KNIGHT, C. LORENZ	SUNNY, FEW CLOUDS	13:35	

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
—	—	—

PHOTO NUMBERS AND DESCRIPTIONS: See habitat map

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
16 MILE CREEK	LAKE ONTARIO	18	18B

LOCATION OF CROSSING: IMMEDIATELY WEST OF 407/BRITANNIA RD

GPS COORDINATES:	MTO CHAINAGE:
599840E 4822702N ± 8m	—
TOWNSHIP: MILTON	**MNR DISTRICT:** AURORA

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:
TRANSPORTATION, RESIDENTIAL, AGRICULTURAL	ROADS, AGRICULTURE

EXISTING STRUCTURE TYPE

Bridge O	Box Culvert ◉	Open Foot Culvert O	CSP O	N/A O

Other O Describe: | Size (w x h) m^2 47 m wide.

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (include on habitat map)
18B1	INSIDE CULVERT

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	◉	O	O	◉	O	—

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):
47	0.05

SUB-SECTION(S)	Run	Pool	Riffle	Flats	Inside culvert	Other
	◉	O	O	O	◉	
Percentage of area	—	—	—	—	100	—
Mean depth wetted (m)	—	—	—	—	0.51	—
Mean width wetted (m)	—	—	—	—	7.8	—
Mean bankfull width (m)	—	—	—	—	7.8	—
Mean bankfull depth(m)	—	—	—	—	0.78	—
Substrate	—	—	—	—	Mu	—

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	✓	O	O	O
Right Upstream Bank	✓	O	O	O

HABITAT

IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris Instream Overhanging	Organic debris	Vascular Macrophytes Instream Overhanging	None
							100

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	✓	O	O	O	O

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
Predominant Species				100

MIGRATORY OBSTRUCTIONS:	None	Seasonal	Permanent
	✓	—	—

POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other
	—	—	—

POTENTIAL ENHANCEMENT OPPORTUNITIES:

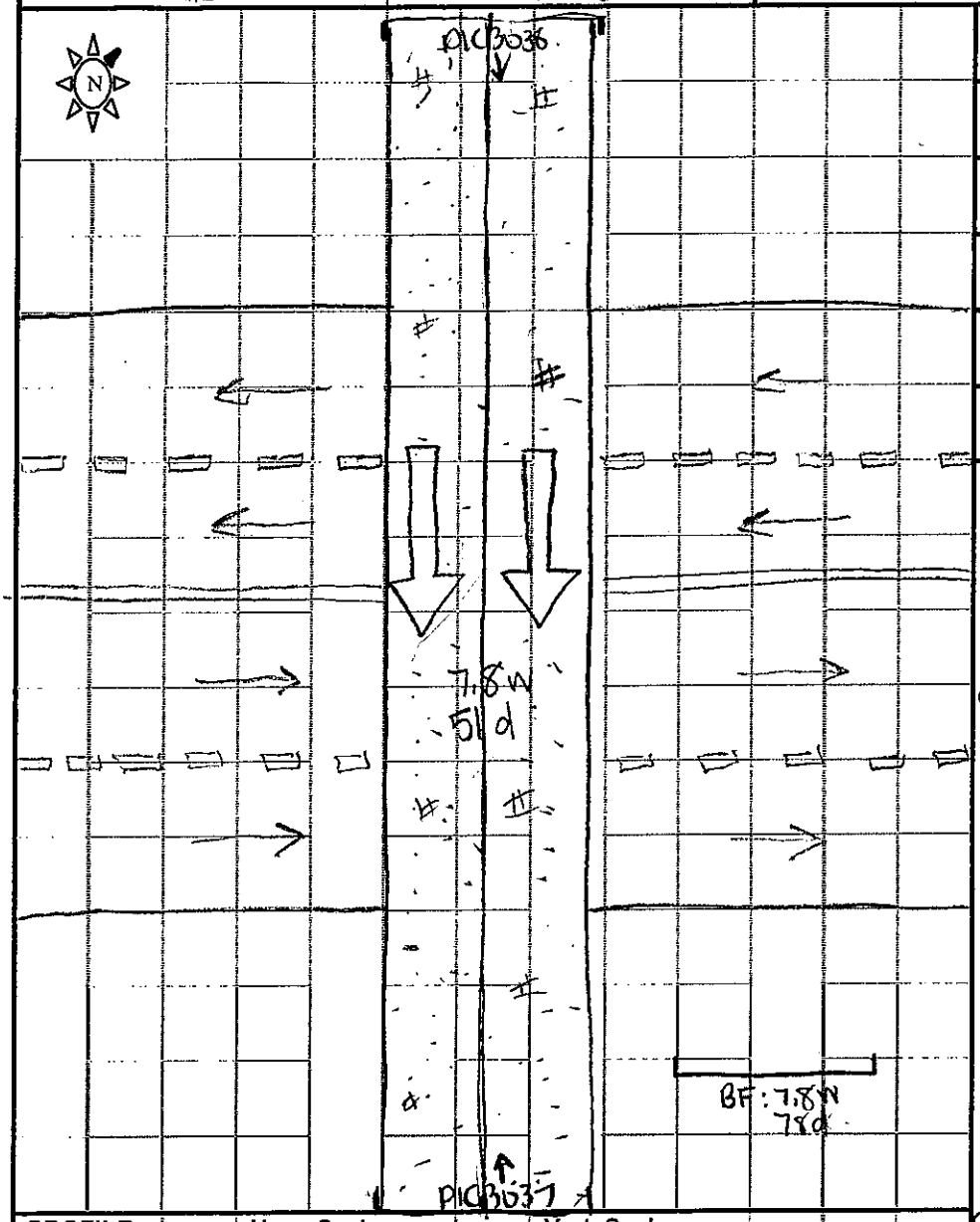
REMOVE CLOSED BOTTOM CULVERT

COMMENTS:

—

Additional Notes Appended? ✓ No O Yes number of pages —

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
18B1	In Culvert	47m	1cm = 3m



PROFILE: Horz. Scale Vert. Scale

PROJECT #:	05056
MAPPER:	C. Lorenz
NAME OF WATERBODY:	16 mile creek
CROSSING #:	18
STATION #:	18B
DATE: DD-MMM-YY	30-AUG-11

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▓ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** * *** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
/////// Eroded Bank

XXX Riprap / Other Stabilization

⊂⬭ Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree

├▶ Seep/Spring
-------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
└┘ Culvert

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
05056	BRITANNIA RD EA	30	AUG	2011

Is STREAM REALIGNMENT required for this section:

O Yes O No ✓ Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
E.KNIGHT, C.LORENZ	SUNNY, FEW CLOUDS	14:05	

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
—	—	—

PHOTO NUMBERS AND DESCRIPTIONS: see habitat map

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
16 MILE CREEK	LAKE ONTARIO	18	18A

LOCATION OF CROSSING: BRITANNIA RD CROSSING, IMMEDIATELY WEST OF HWY 407

GPS COORDINATES:	MTO CHAINAGE:
17T 599840E 4822722N ± 4	—
TOWNSHIP: MILTON	**MNR DISTRICT:** AURORA

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:
TRANSPORTATION, RESIDENTIAL, AGRICULTURAL	ROADS, AGRICULTURE

EXISTING STRUCTURE TYPE

Bridge O	DOUBLE Box Culvert ✓	Open Foot Culvert O	CSP O	N/A O

Other O Describe: Size (w x h) m² 47 m wide.

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (include on habitat map)
18A1	U/S DETAILED ASSESSMENT

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	✓	O	O	✓	O	—

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):
20 m	0.05 m/s

SUB-SECTION(S)	Run	Pool	Riffle	Flats	Inside culvert	Other
	O	✓	O	O	O	
Percentage of area	70	30	—	—	—	—
Mean depth wetted (m)	0.04	0.08	—	—	—	—
Mean width wetted (m)	1.5	5.45	—	—	—	—
Mean bankfull width (m)	5.6	11.25	—	—	—	—
Mean bankfull depth(m)	0.62	0.91	—	—	—	—
Substrate	Cl/Si	Cb/Si	—	—	—	—

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

3.5
4.5
6.0
3.0
2.0
18.0

5.5
5.6
38

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	✓	0	0	0
Right Upstream Bank	✓	0	0	0

HABITAT

IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris	Organic debris	Vascular Macrophytes	None
	0	0	10	Instream 0 Overhanging 0	0	Instream 10 Overhanging 10	70

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	0	0	0	✓	0

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
			40	
Predominant Species			Common Cattail	60

MIGRATORY OBSTRUCTIONS:	None	Seasonal	Permanent
	✓	—	—

POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other
	—	—	—

POTENTIAL ENHANCEMENT OPPORTUNITIES:

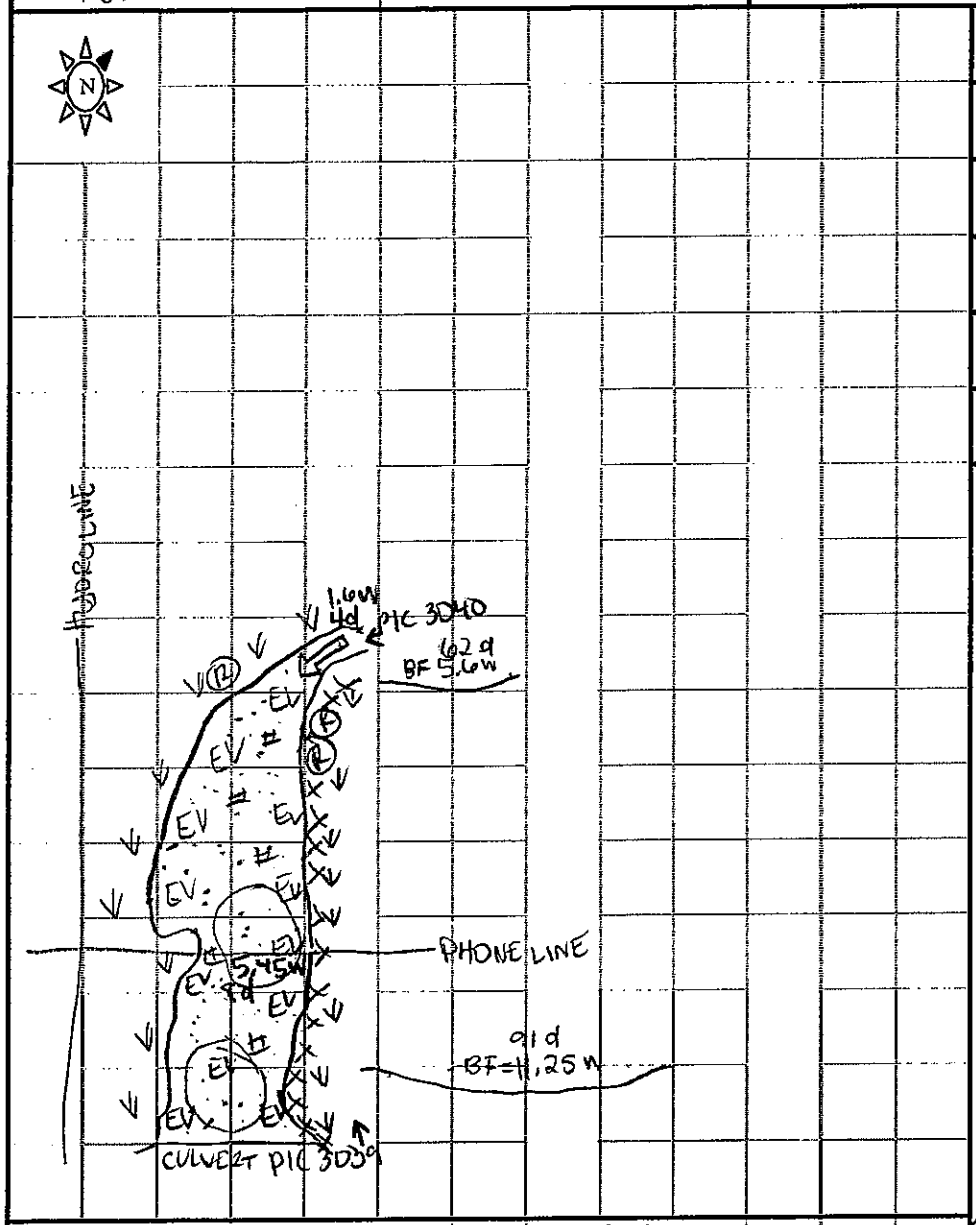
—

COMMENTS:

Fish observed

Additional Notes Appended? ✓ No O Yes number of pages ~

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
18A1	U/S DETAILED ASSESSMENT	20	1cm / 3m



PROFILE: Horz. Scale Vert. Scale

PROJECT #: 05056

MAPPER: L. KNIGHT

NAME OF WATERBODY: 16 MILE CREEK

CROSSING #: 18

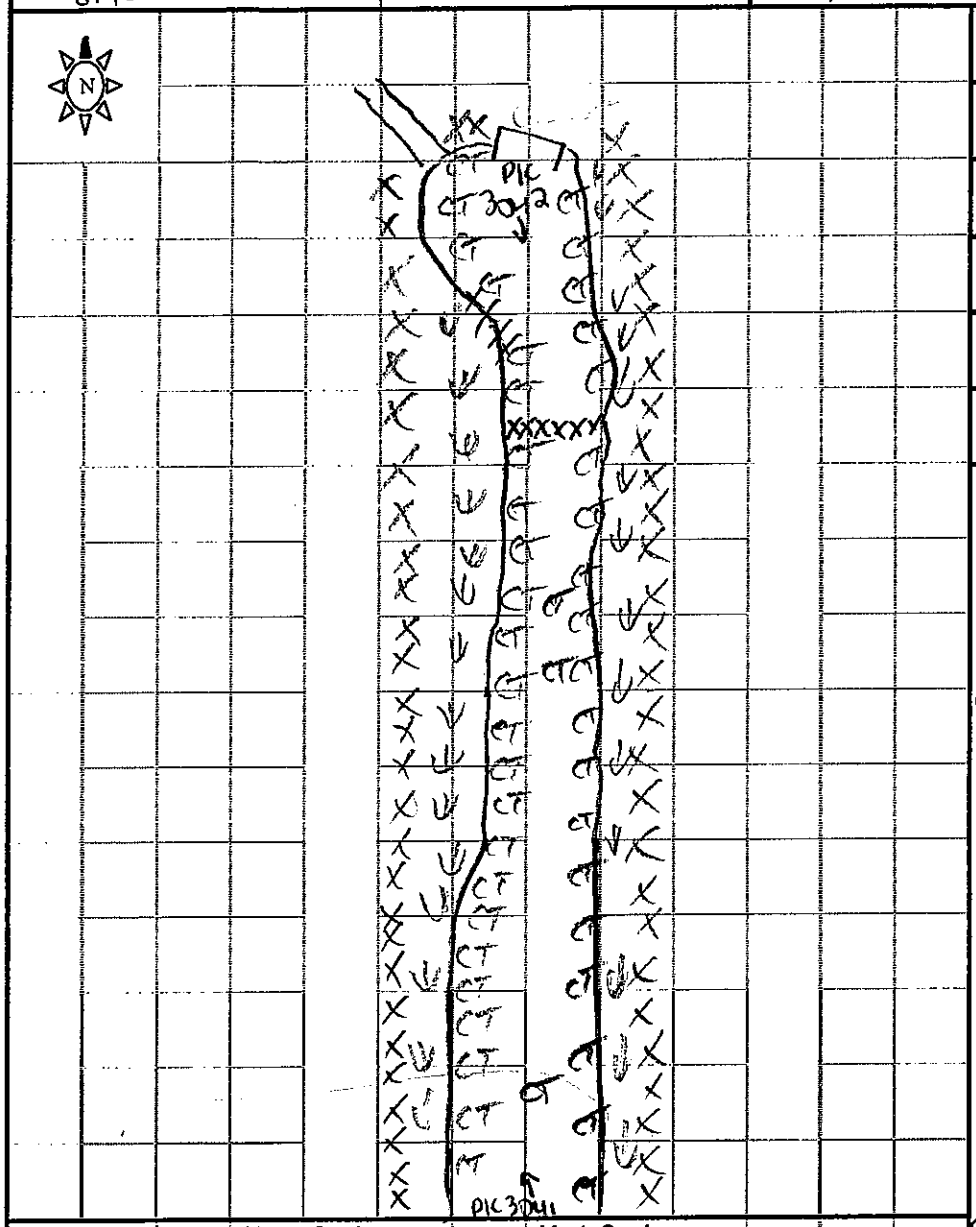
STATION #: 18A

DATE: DD-MMM-YY 30-Aug-11

LEGEND

- Riparian Veg.
- **10d** depth (cm)
- **6w** width (m)
- ➡ Riffle
- ⇨ Run/Glide
- ⬭ Pool
- ▓ Island/Bar
- ⁘ Fine Substrate
- ### Gravel Substrate
- **oOooO** Cobble /Boulder
- * * * Debris
- **CT** Cattail
- **SV/FV** Submerg/Float Veg
- **EV** Emergent Vegetation
- **W** Watercress
- **Fe** Iron Staining
- ////// Eroded Bank
- **XXX** Riprap / Other Stabilization
- ⊂⊃ Instream Log/Tree
- ^^^ Dam/Weir/Obstruction
- ® Riparian Tree
- ⊢► Seep/Spring
- -------- Undercut Bank
- — Barrier to Fish Movement
- -S- Seasonal Barrier
- -x--x- Fence line
- ⊔ Culvert

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
18A2	U/S GENERAL ASSESSMENT	14	1cm = 1m



PROFILE: Horz. Scale Vert. Scale

PROJECT #: 050956

MAPPER: C. LORENZ

NAME OF WATERBODY: 16 MILE CREEK

CROSSING #: 18

STATION #: 18A

DATE: DD-MMM-YY 30-AUG-11

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▓ Island/Bar

▒ Fine Substrate
Gravel Substrate

oOooO Cobble /Boulder
*** * *** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
////// Eroded Bank

XXX Riprap / Other Stabilization

⊂⬭ Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree

├► Seep/Spring
-------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
└┘ Culvert

GENERAL INFORMATION

PROJECT #:	PROJECT DESCRIPTION:	DAY:	MONTH:	YEAR:
05056	BRITANNIA RD EA	30	AUG	2011

Is STREAM REALIGNMENT required for this section:

O Yes O No O Unknown

COLLECTORS:	WEATHER CONDITIONS:	TIME STARTED:	TIME FINISHED:
L KNIGHT, C. LORENZ	SUNNY, CLEAR	12:34	13:15

AIR TEMP:	WATER TEMP:	CONDUCTIVITY (µS/cm):
—	—	—

PHOTO NUMBERS AND DESCRIPTIONS: see habitat map

LOCATION

NAME OF WATERBODY:	DRAINAGE SYSTEM:	CROSSING #:	STATION #:
16 MILE CREEK	LAKE ONTARIO	18	18C

LOCATION OF CROSSING: BRITANNIA ROAD, IMMEDIATELY WEST OF HIGHWAY 407.

GPS COORDINATES: ±5m	MTO CHAINAGE:
599840E 4822822N	—
TOWNSHIP: MILTON	**MNR DISTRICT:** AURORA

LAND USE AND POLLUTION

SURROUNDING LAND USE:	SOURCES OF POLLUTION:
TRANSPORTATION, RESIDENTIAL, AGRICULTURAL	ROADS, AGRICULTURE

EXISTING STRUCTURE TYPE

Bridge O	DOUBLE Box Culvert ✓	Open Foot Culvert O	CSP O	N/A O

Other O Describe: Size (w x h) m² 47m wide

SECTION TYPE AND MORPHOLOGY

SECTION IDENTIFIER:	SECTION LOCATION: (include on habitat map)
18C1	DIS DETAILED ASSESSMENT

TYPE:	Stream / river	Channelized	Permanent	Intermittent	Ephemeral	ASSOCIATED WETLAND:
	✓	O	O	✓	O	Yes

TOTAL SECTION LENGTH (m):	CURRENT VELOCITY (m/s):
50m	0

SUB-SECTION(S)	Run ✓	Pool ✓	~~Riffle~~ POOL 2 O	Flats O	Inside culvert O	Other
Percentage of area	55	35	10	—	—	—
Mean depth wetted (m)	0.07	0.28	0.09	—	—	—
Mean width wetted (m)	4.0	6.9	5.0	—	—	—
Mean bankfull width (m)	8.2	9.6	7.8	—	—	—
Mean bankfull depth(m)	0.88	0.83	0.54	—	—	—
Substrate	Gr/Si	Mu/Co	Gr/Si	—	—	—

Bedrock Br	Boulder Bo	Cobble Co	Gravel Gr	Sand Sa	Silt Si	Clay Cl	Muck Mu	Detritus D

BANK STABILITY

	Stable	Slightly Unstable	Moderately Unstable	Unstable
Left Upstream Bank	✓	O	O	O
Right Upstream Bank	✓	O	O	O

HABITAT

IN-STREAM COVER (% surface area):	Undercut banks	Boulders	Cobble	Woody Debris	Organic debris	Vascular Macrophytes	None
	0	5	10	Instream 3 Overhanging 5	2	Instream 50 Overhanging 10	15

SHORE COVER (% stream shaded):	100 – 90 %	90 – 60%	60- 30%	30 – 1%	None
	O	✓	O	O	O

VEGETATION TYPE (%):	Submergent	Floating	Emergent	None
		15	60	25
Predominant Species		Duckweed	Common Cattail	

MIGRATORY OBSTRUCTIONS:	None	Seasonal	Permanent
	✓	—	—

POTENTIAL CRITICAL HABITAT LIMITING:	Spawning	Evidence of Groundwater	Other
	—	—	—

POTENTIAL ENHANCEMENT OPPORTUNITIES:

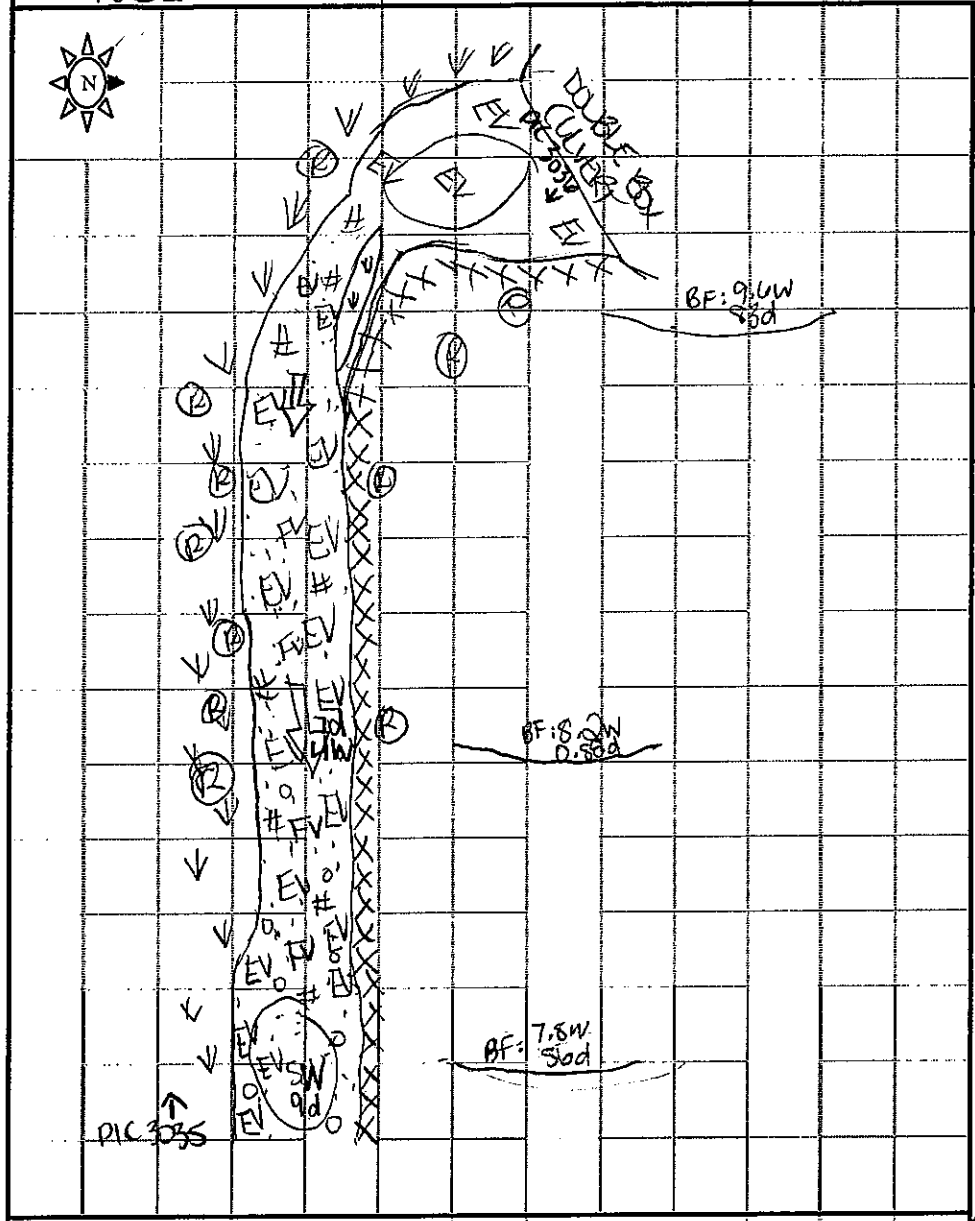
—

COMMENTS:

Juv. Micropterus salmoides observed

Additional Notes Appended? ✓ No O Yes number of pages —

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
18C1	D/S DETAILED ZONE	50m	1 cm / 3m



PROFILE: Horz. Scale Vert. Scale

PROJECT #: 650560

MAPPER: L. KNIGHT

NAME OF WATERBODY: 16 MILE CREEK

CROSSING #: 18

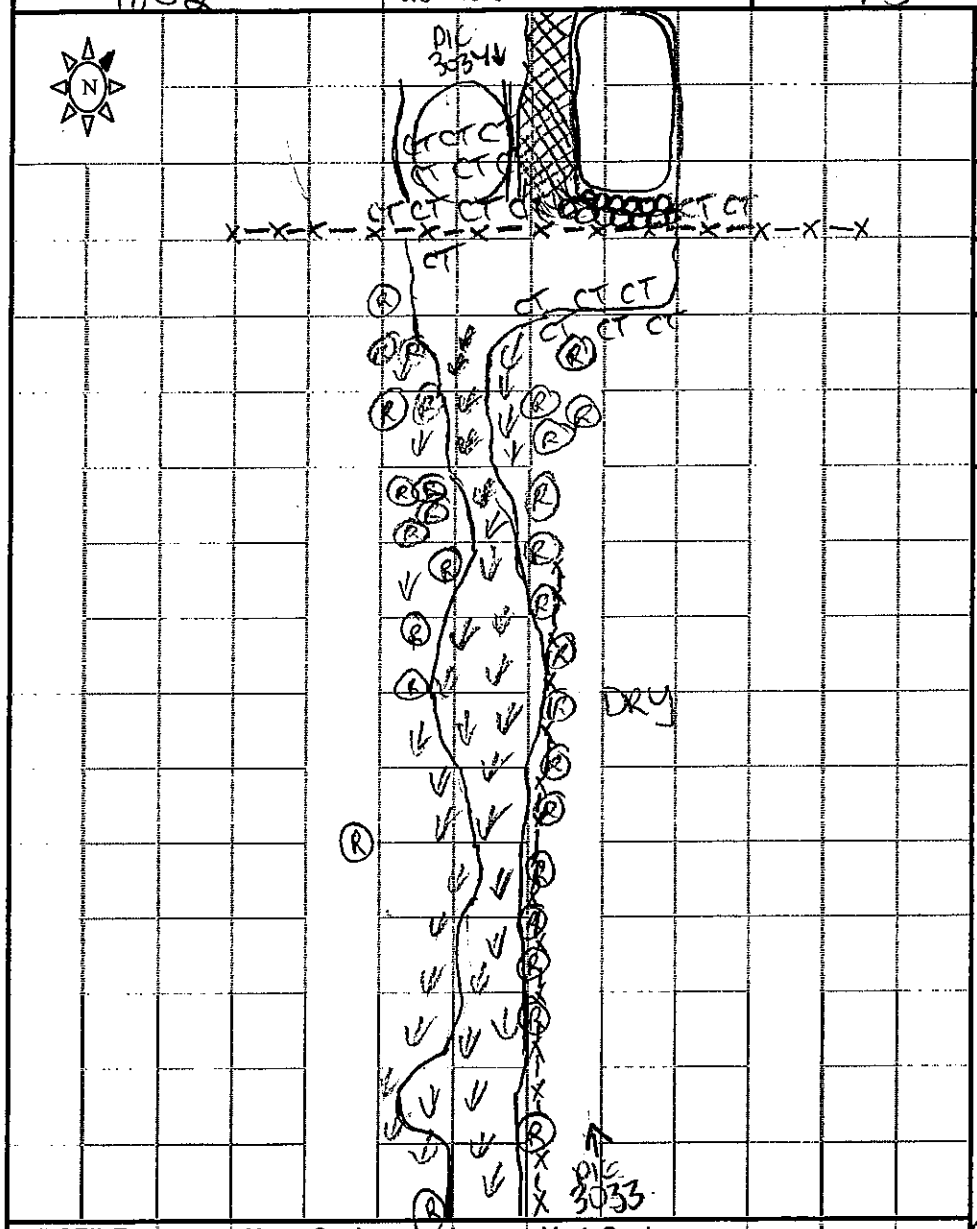
STATION #: 18C

DATE: DD-MMM-YY 30-AUG-11

LEGEND

- Riparian Veg
- **10d** depth (cm)
- **6w** width (m)
- ➡ Riffle
- ⇨ Run/Glide
- ⬭ Pool
- ▒ Island/Bar
- ⁘ Fine Substrate
- **###** Gravel Substrate
- **oOooO** Cobble /Boulder
- *** * *** Debris
- **CT** Cattail
- **SV/FV** Submerg/Float Veg
- **EV** Emergent Vegetation
- **W** Watercress
- **Fe** Iron Staining
- **//////** Eroded Bank
- **XXX** Riprap / Other Stabilization
- ⊂⊃ Instream Log/Tree
- **^^^** Dam/Weir/Obstruction
- ® Riparian Tree
- ⊢▶ Seep/Spring
- **--------** Undercut Bank
- **—** Barrier to Fish Movement
- **-S-** Seasonal Barrier
- **-x--x-** Fence line
- ⌴ Culvert

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
18C2	U/S END OF DISCHARGE ASS.	75	1 cm/5m



PROFILE: Horz. Scale Vert. Scale

PROJECT #:	6505/2
MAPPER:	C. LORENZ
NAME OF WATERBODY:	16 MILE CREEK
CROSSING #:	18
STATION #:	18C
DATE: DD-MMM-YY	30-AUG-11

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▇ Island/Bar

▒ Fine Substrate
Gravel Substrate
oOooO Cobble /Boulder
*** Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
//////// Eroded Bank

XXX Riprap / Other Stabilization

⬭ Instream Log/Tree
^^^ Dam/Weir/Obstruction

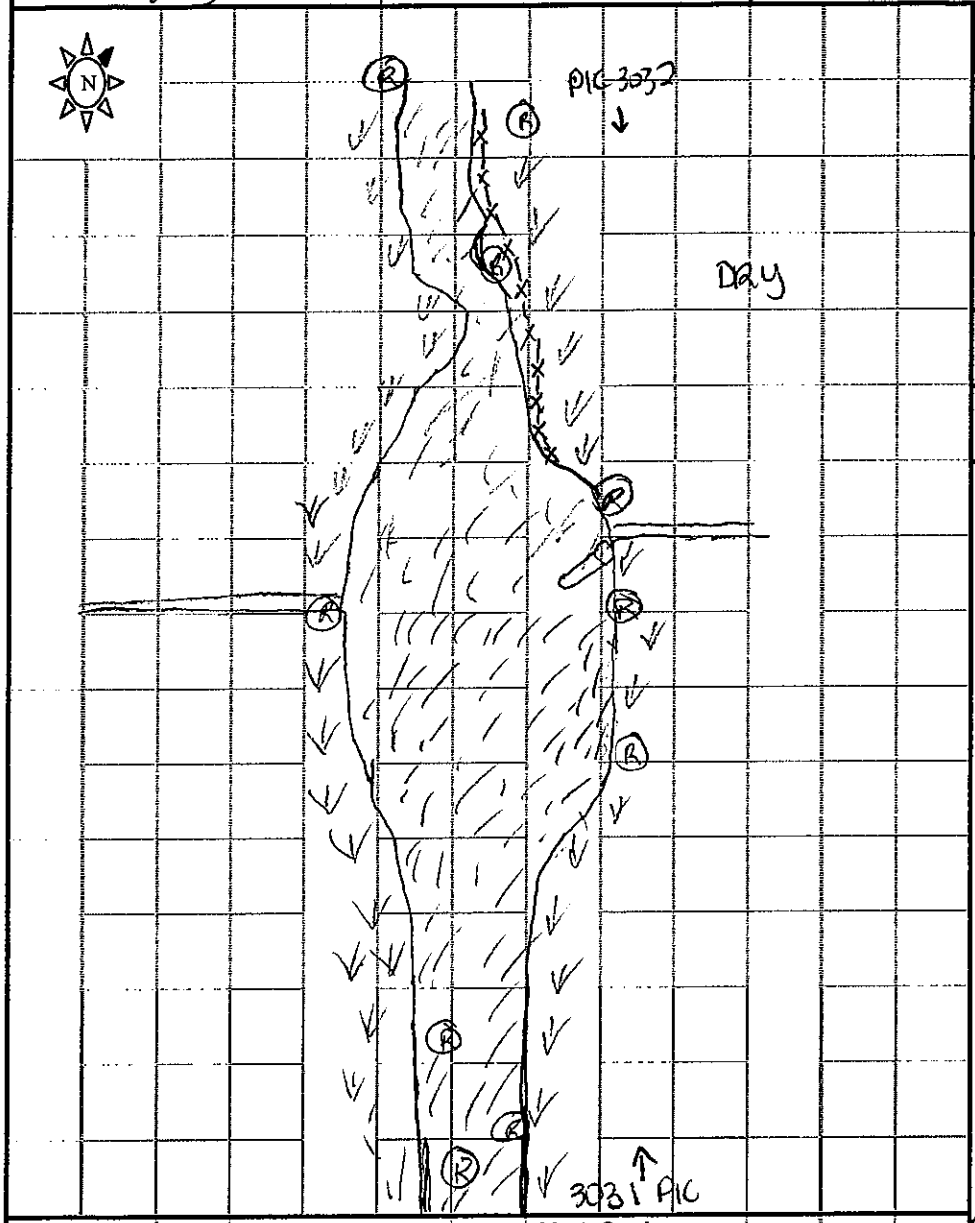
® Riparian Tree

├► Seep/Spring
-------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
└┘ Culvert

SECTION IDENTIFIER:	SECTION LOCATION:	SECTION LENGTH (m):	SCALE (cm / m):
18C3	D/S END OF D/S GEN. ASS.	75m	1cm = 5m



PROFILE: Horz. Scale Vert. Scale

PROJECT #:	05054
MAPPER:	C. LORENZ
NAME OF WATERBODY:	16 MILE CREEK
CROSSING #:	18
STATION #:	18C
DATE: DD-MMM-YY	30-AUG-11

LEGEND

10d depth (cm)
6w width

➡ Riffle
⇨ Run/Glide
⬭ Pool
▓ Island/Bar

▒ Fine Substrate
Gravel Substrate
oOooO Cobble /Boulder
* * * Debris

CT Cattail
SV/FV Submerg/Float Veg

EV Emergent Vegetation
W Watercress

Fe Iron Staining
//////// Eroded Bank

XXX Riprap / Other Stabilization

⊂⊃ Instream Log/Tree
^^^ Dam/Weir/Obstruction

® Riparian Tree

├► Seep/Spring
------- Undercut Bank

— Barrier to Fish Movement
-S- Seasonal Barrier

-x--x- Fence line
⊔ Culvert

APPENDIX 13: WATERCOURSE CROSSING PHOTO DOCUMENTATION

APPENDIX 14: LETTER FROM MNR SPECIES AT RISK BIOLOGIST

Southern Region
Aurora District Office
50 Bloomington Road West
Aurora, ON L4G 0L8

Ontario

Ministry of Natural Resources | **Ministere des Richesses Naturelles**

August 19, 2011

Chris Lorenz, Aquatic Biologist
Aquafor Beech Limited
55 Regal Road, Unit 3
Guelph, Ontario N1K 1B6
Phone: (519) 224-3740 x 1301
Fax: (519) 224-3750
Email: lorenz.c@aquaforbeech.com

Re: Britannia Rd. Species at Risk

Dear Mr. Lorenz,

In your email dated August 8, 2011 you requested information on natural heritage features and element occurrences occurring on or adjacent to the above mentioned location.

There are a number of Species at Risk recorded from your study area. The MNR has records of Milksnake, as well as historical records of Snapping Turtle and Jefferson Salamander from your specified study area. In addition, we have records of Red-headed Woodpecker, Chimney Swift, Bobolink and Cerulean Warbler in the vicinity of your area. Some of these species may receive protection under the *Endangered Species Act 2007* and thus, a permit may be required if the work you are proposing could cause harm to these species or their habitat. Please provide additional information on your proposal to our office, and we will assess it to determine whether a permit under the ESA 2007 is required for the works to proceed.

Natural heritage features recorded for your area include the Provincial Candidate Sixteen Mile Creek ANSI, Provincial Candidate Britannia Wetlands ANSI, an Environmentally Significant Area and identified wetlands.

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

If you have any questions or comments, please do not hesitate to contact me at 905-713-7425.

Sincerely,

Melinda Thompson-Black

Melinda Thompson-Black

Species at Risk Biologist
Ontario Ministry of Natural Resources, Aurora District

APPENDIX 15: RESPONSE TO CONSERVATION HALTON COMMENTS

CH Comment (October 25, 2012)	ABL Response (January, 2013)	CH Response
Terrestrial and Aquatic Resources		
1. For all intermittent watercourses within the study area, it is preferred that watercourses be realigned if necessary to facilitate the entry of the watercourse at a perpendicular angle to Britannia Road. This is suggested to reduce the length of the culverts underneath Britannia Road as much as possible. Staff recognize that this will require significant coordination between the Region, Town, Conservation Halton and the landowners north and south of Britannia Road. The landowners in the Boyne Secondary Plan Area are proposing on-line Regional Storm controls. This could have a significant impact on the crossing designs and will need to be discussed in detail.	This comment will be addressed in the Fluvial Geomorphology Report.	
2. Staff recommend that the report should include discussion as to how construction equipment will access the main Sixteen Mile Creek Valley, particularly as it relates to impacts on terrestrial features. Mapping of the 12 regionally significant plant species would be of assistance in this regard.	As this project is still in the conceptual stage, to minimize the disturbance of terrestrial features, Aquafor Beech has recommended that development of a construction access and staging plan be part of detailed design, when final design drawings/construction plans are complete. At this point, Aquafor Beech Limited believes it is premature to comment on construction access and staging when the design of the crossing structures and equipment required has not yet been finalized.	
3. A comprehensive commitments section should be added to the report to provide clarity on which recommendations will be carried forward to detailed design.	A Comprehensive Commitments Section has been added to Section 6.0 of the Terrestrial and Aquatic Resources Report.	
4. *Table 1* - The breeding bird surveys were conducted on consecutive days which increases the likelihood of some species being missed and makes it more difficult to confirm the breeding status of birds observed. As such, a conservative approach to determining breeding status would be appropriate. We also note the fall dates of the vegetation inventory would not have captured the full species diversity present in the study area. Additional spring/summer inventory work should be conducted at detailed design within the limits of disturbance to ensure that no species of conservation concern will be impacted by the works.	Breeding evidence was assigned based on protocols outlined in the OBBA (2001). Breeding evidence as defined in the OBBA that is dependent upon surveys taking place a week or more apart is as follows: • "permanent territory presumed through registration of territorial song on at least 2 days, a week or more apart, at the same place = Probable Breeding" For the purpose of this EA, the breeding evidence of 'probable' was assigned based on the following: - pair observed in their breeding season in suitable nesting habitat; or - courtship or display between a male and a female or 2 males, including courtship feeding or copulation; or - agitated behaviour or anxiety calls of an adult Due to the single breeding bird survey, permanent territory presumed through registration of territorial song on at least 2 days, a week or more apart, at the same place, was NOT assessed as breeding evidence. Had there been a second breeding survey a week or more apart at the same locations, some evidence of 'possible' breeding may have been assessed as probable. Therefore, a conservative approach to determining breeding status has already been applied. The text in Section 2.2.1.4 has been updated accordingly. Section 2.2.1 has been updated to include the recommendation of additional spring/summer vegetation inventory work conducted at detailed design within the limits of disturbance.	
5. *Section 3.3.4, Historic Records of Provincially Significant Fauna* - It should be noted that, in addition to being provincially rare (S2), the habitat of Jefferson dominated polyploids (i.e. LJJ) is protected under the *Endangered Species Act*. Direction on additional survey requirements for Jefferson Salamander should be obtained from MNR. By copy of this letter, staff are providing our comments to Aurora McAllister, MNR Aurora District.	Aquafor Beech Limited will be completing Jefferson Salamander Surveys during the first spring rains of 2013. The ESR will be updated accordingly with respect to existing conditions and future requirements once the surveys are complete.	

CH Comment (October 25, 2012)	ABL Response (January, 2013)	CH Response
6. *Section 3.3.6, Significant Wildlife Habitat, page 33 and Section 4.1.1.4, Significant Species and Habitat, page 37*- It is staff's understanding that the habitat for Threatened species (e.g. Bobolink) would not also be considered under the significant wildlife habitat policies of the PPS.	The habitat of Threatened species is not considered under the significant wildlife habitat policies of the PPS. As this is a Class Environmental Assessment, it is not subject to the provisions within the Provincial Policy Statement. The significant wildlife habitat within the study area was assessed to allow Aquafor Beech Limited to make informed recommendations as to the preferred alternative. Section 3.3.6 has been revised to eliminate any confusion.	
7. *Section 4.1.1.1, Flora and Vegetation Communities* - This section lacks a discussion about the relative impacts of expanding to the north or to the south at the main branch of Sixteen Mile Creek. It should include a summary of the vegetation community and any significant features present, and make a recommendation as to which option would be preferred from a terrestrial habitat perspective.	A discussion about the relative impacts of expanding to the north or to the south at the Main and East Branches of Sixteen Mile Creek has been added to Section 4.1.1.1. This discussion includes a summary of the vegetation community and any significant features present and makes a recommendation as to which option would be preferred.	
8. *Section 4.1.1.2, Tree Survey* - Please clarify the statement, "There are six trees along the proposed alignment of Britannia Road that appear to be outside of the new proposed property line." How many of the 221 trees surveyed within the new property line will be removed?	Please see Section 4.1.1.2 for clarification to this statement and ABL recommendations regarding trees to be removed and trees to be retained.	
9. *Section 4.1.1.3, Wetlands* - It is stated in the text that no wetland will be removed adjacent to the significant woodland because of the shift of the road alignment to the south, however the drawing appears to indicate that the sidewalk/trail will swing north across the meadow marsh, resulting in a loss of about 7-11 m of wetland along its length. Please clarify. It should also be noted that meadow marsh habitat in the vicinity of Crossings 2 and 3 will be lost.	Section 4.1.1.3 has been revised per CH comment 9 (Left). Section 4.1.1.3 has been revised to note the lost wetland in the vicinity of crossings 2 and 3.	
10. *Section 4.1.1.4, Significant Species and Habitat, Significant Woodlands, page 36* – this section states, "Intrusion into these significant woodlands to avoid encroaching on private property would need to be discussed with Conservation Halton at Detail Design." We note that this was discussed briefly at the October 1, 2012 meeting. At that time CH terrestrial ecology staff were not present and, as such, staff deferred comment in this regard until such time as those staff had reviewed the terrestrial assessment. As noted on October 1, 2012, staff appreciate that an Environmental Assessment is intended to balance the impacts to various environmental impacts including the natural environment and social environment however; based on the information contained within the report, there is insufficient data available to allow staff to determine what the anticipated impacts to the woodlands would be. Staff recommend that this be discussed in greater detail at the next agency meeting.	Aquafor Beech Limited provided ELC data sheets to Conservation Halton on October 17, 2012 at their request for comment on this matter. Conservation Halton to review data sheets and terrestrial assessment and provide guidance as to the possibility of intruding into these woodlots to avoid encroaching on private property.	
11. *Section 4.3, Endangered Species Act Protection* - Staff note that the two letters sent from MNR (July 5, 2011 to Brent Tegler and August 29, 2011 to Chris Lorenz) related to species at risk and natural areas reference different species. The August letter requests additional information on the proposal to allow MNR to determine whether an ESA permit would be required. Has this information been provided to MNR and if so, what was the outcome? The text in the report indicates that the need for ESA permits will be determined at detailed design. We strongly recommend that these matters be resolved at the earliest possible opportunity given that the approvals process under the ESA can be lengthy.	As this project is still at the conceptual stage, Aurora McAllister, Assistant Species at Risk Biologist at the MNR (Aurora District) has recommended that the Information Gathering Form (IGF) required for a permit application under the ESA be submitted when more documentation (design drawings, etc) become available. Aquafor Beech Limited has revised the text in Section 4.3 to recommend that the IGF and subsequent ESA permit applications be completed as early as possible in the design process.	
12. *Section 4.5.1.1, Terrestrial Impacts* - Please quantify the number of tree removals required.	The number of tree removals required has been quantified in Section 4.5.1.1	
13. *Table 5* - Staff appreciate the thorough and comprehensive form of this table.	Aquafor Beech Limited notes Conservation Halton's satisfaction with Table 5	
14. *Section 5.1, Terrestrial Resources* - All tree removals should be undertaken outside of the breeding bird season, not just those adjacent to hayfields. This commitment should be included in the ESR.	Aquafor Beech Limited has revised Section 5.1 accordingly.	

CH Comment (October 25, 2012)	ABL Response (January, 2013)	CH Response
15. *Section 5.2, Wildlife Crossing Structures* - enhanced wildlife crossings should be implemented at Crossings 1, 2, 5, 6, 7 and 11, as identified in the Boyne FSEMS, and we also support the recommendation of Aquafor Beech for enhanced wildlife crossings at crossings 15, 17 and 18. We note that proposed culvert sizing is available in the Hydraulic Analyses of Stream Crossings and Stormwater Management Alternatives Assessment report. The Terrestrial and Aquatic Resources report should cross-reference these values, in consideration of the wetted width of the respective watercourses, to determine whether adequate freeboard will be available along the sides to allow for use by terrestrial wildlife.	Aquafor Beech Limited has cross-referenced the culvert-sizing for the proposed enhanced wildlife crossings within the Terrestrial and Aquatic Resources Report in Section 5.3, Table 8. Conservation Halton staff have confirmed that if a single span culvert is based on 2x the bankfull channel width (as recommended in the CFCP), it will address CH terrestrial and aquatic criteria. Table 8 (Section 5.3) calculates the minimum amount of freeboard available on either side of the channel during bankfull conditions for use by terrestrial wildlife.	
16. *Table 6* - outlines the fish collection records held by Conservation Halton and the results of fish collections performed by LGL Limited (2007; 2008), C. Portt and Associates (2008) and Aquafor Beech Ltd. (2011). Staff note the following: • Conservation Halton's fish community database indicates that the following additional 14 fish species have been documented in the vicinity of Crossing # 7 and Britannia Road: Brown Trout, Mottled Sculpin, Fantail Darter, Rainbow Trout, Rosyface Shiner, River Chub, Stonecat, Rock Bass, Pumpkinseed, Bluntnose Minnow, Johnny Darter, Rainbow Smelt, Yellow Perch, Fathead Minnow. • Conservation Halton's fish community database indicates that 19 additional fish species are documented to use the Lower Middle Branch of Sixteen Mile Creek that crosses under Britannia Road at Crossing # 15: Rainbow Trout, Chinook Salmon, Stonecat, Black Crappie, Golden Shiner, Longnose Dace, Fantail Darter, Silver Shiner, Northern Pike, Northern Hognose Sucker, Blacknose Dace, Rosyface Shiner, River Chub, Sea Lamprey, Brook Stickleback, Fathead Minnow, Largemouth Bass, Bluegill Sunfish. Please add these fish species to the appropriate column in Table 6.	These fish species have been added to the appropriate column in Table 6.	
17. *Section 5.2 Aquatic Resources* A number of the fish species in the study area are considered to be cold and cool water fish species. Regardless of this situation, timing windows are usually based on the timing of spawning of the fish species present in the study area. Please note the first bullet point in this section, which refers to the timing window applicable for the watercourses in the study area.	Regarding the timing windows applicable for the watercourses in the study area, the first paragraph in Section 5.2 has been updated accordingly following discussions with both CH and the MNR.	
18. Staff request a commitment within the ESR to undertake all work in dry conditions and that no work will be undertaken in wet conditions within the watercourses in the study area for this project.	Paragraph 2 in Section 5.2 has been updated to request that all work within watercourses be undertaken during dry conditions.	
19. *Appendix 6* - Please add a column to this table to indicate which trees will be removed and which will be retained.	A column has been added to Appendix 6 indicating which trees will be removed and which will be retained. Please see section 4.1.1.2 in Terrestrial and Aquatic Resources Report.	
20. *Appendix 8 Watercourse Crossing Photo Documentation* Please ensure that each photograph in this section is labelled with respect to the direction in which the photo is being taken, its location upstream or downstream of Britannia Road and the culvert number that it has been taken at. Please use the same numerals used in Figure 1: Study Area Stream Crossings in the Hydraulic Analyses of Stream Crossings and SWM Alternatives Document.	Each photograph has been labelled per the following: • Photo# - Culvert#; u/s or d/s of road; direction facing Please see accompanying photo key for location of each photo within the watercourse	

CH Comment (October 25, 2012)	ABL Response (January, 2013)	CH Response
21. As noted in previous meetings, there are a number of background documents that have been prepared by AMEC on behalf of the Town of Milton for the Boyne Survey. Although none of the documents have been endorsed by Conservation Halton yet, they contain important direction for works within the Secondary Plan Area, including watercourse crossings. With respect to watercourse crossing width requirements, Section 4.3 of the draft Conceptual Fisheries Compensation Plan for the Boyne Survey, prepared by AMEC, dated March 2011 provides detailed requirements that should be incorporated into any watercourse crossing. A portion of Section 4.3 is outlined below however, we recommend that a complete review of the draft CFCP and FSEMS be undertaken to ensure consistency: *4.3.1 Stream Crossings (Preliminary Design Components – Road/Railway Crossings)* *The estimated size of each hydraulic opening for the respective crossing has been based on the estimated minimum conveyance geometry to sustain natural channel form at each location and approximate 25 year flow rate. The final size determination is to be completed as part of future SIS's and site plan applications, based on a detailed assessment of hydrologic and hydraulic conditions, and required road/railway geometrics including conveyance of the Regulatory flood event, which will likely overtop most local roadways.* In addition, Table 4.8 in the draft CFCP identifies estimated hydraulic structures within the Boyne Survey. Section 4.3.1 of the draft CFCP also notes the following: *Each of the road crossings should be designed and constructed to provide the following:* *(a) Natural substrate through open footing design or through the use of an embedded culvert invert to a depth of 0.5m preferred (minimum 0.3m);* *(b) Low flow channel through crossing (this may involve staggering the depth of culvert inverts i.e. multiple culvert crossings to promote low flow through a single culvert.);* *(c) Minimum span opening recommended to be approximately twice the proposed bankfull width in order to maintain natural channel form.* Finally, Section 4.3.1 of the draft CFCP also provides direction with respect to enhanced wildlife crossings. Please consult this document. Staff would be pleased to discuss any concerns/questions that the Study Team has with these recommendations.	Aquafor Beech Limited has reviewed the CFCP (AMEC 2011) and has incorporated recommendations within the Terrestrial and Aquatic Resources report where appropriate. These recommendations include but are not limited to: a minimum span opening of 2x bankfull width, recommendations concerning Enhanced Wildlife Crossings (Section 4.3.1 of the CFCP) and construction practices for watercourses (Section 4.2.2 of the CFCP).	
22. Appendix 8, Fish Passage, page 67 - fish passage must be assured at all crossings, when the watercourse is considered fish habitat.	Paragraph 3 in Section 5.2 states that fish passage must be assured at each crossing when the watercourse is considered direct fish habitat.	
23. The no in-water work timing window for Crossings # 7 and # 15 is from Sept. 15 to July 1 of any year. The no in water work timing window that applies to the remainder of the watercourses is from April 1 and July 1 of any year.	Paragraph 1 of Section 5.2 has been updated accordingly.	
Figures 24. It is unclear why tree numbers are provided on only one of the long drawings. Please clarify.	Aquafor Beech has provided tree numbers on Figure 3 (Long Drawing representing the eastern portion of Britannia Road).	
25. For future submissions, it would be helpful to number figures and provide more descriptive titles for ease of reference.	Aquafor Beech Limited has provided figure numbers and more descriptive titles for ease of reference.	