

Fish collection records held by Conservation Halton for portions of Sixteen Mile Creek Subwatersheds 2 and 7 (S-*n*) and Indian Creek subwatershed in Bronte Creek (B-*n*), within or downstream of the Milton Phase 3 and Business Park #2 lands. Station locations are provided in Figure 3.5.4.

TABLE 3.5.3 con't

Station	S-178	S-179	S-205	S-205	S-216	S-216	S-216	S-216	S-217	S-218	S-236
Date (d/m/y)	29/7/98	5/8/98	19/7/06	3/7/07	14/8/98	11/8/05	31/7/06	4/7/07	14/8/98	14/8/98	14/8/98
Number of fish species collected	1	0	12	13	10	10	10	11	9	2	2
alewife ( <i>Alosa pseudoharengus</i> )											
black crappie ( <i>Pomoxis nigromaculatus</i> )			1								
blacknose dace ( <i>Rhinichthys atratulus</i> )					✓	7		4			
bluntnose minnow ( <i>Pimephales notatus</i> )				2					✓		
brook stickleback ( <i>Culaea inconstans</i> )	✓		7								
brown bullhead ( <i>Ameiurus nebulosus</i> )											
carps and minnows (Cyprinidae)								56			
common carp ( <i>Cyprinus carpio</i> )											
common shiner ( <i>Luxilus cornutus</i> )				2	✓	1	2		✓		
creek chub ( <i>Semotilus atromaculatus</i> )			2	5	✓	20	7	17			✓
emerald shiner ( <i>Notropis atherinoides</i> )											
fantail darter ( <i>Etheostoma flabellare</i> )			10	22			1				
fathead minnow ( <i>Pimephales promelas</i> )											
golden redhorse ( <i>Moxostoma erythrurum</i> )											
johnny darter ( <i>Etheostoma nigrum</i> )			3	1					✓		
largemouth bass ( <i>Micropterus salmoides</i> )				9	✓	2	1	4			
longnose dace ( <i>Rhinichthys cataractae</i> )			2	5	✓	12	32	17	✓	✓	
river or hornyhead chub ( <i>Nocomis</i> sp.)											
northern hog sucker ( <i>Hypentelium nigricans</i> )					✓	5	1	3	✓		
northern pike ( <i>Esox lucius</i> )											
pumpkinseed ( <i>Lepomis gibbosus</i> )			1								
rainbow darter ( <i>Etheostoma caeruleum</i> )			37	27	✓	3	9	11	✓		
rainbow trout ( <i>Oncorhynchus mykiss</i> )										✓	
river chub ( <i>Nocomis micropogon</i> )			1	3	✓	21	11	19			
rock bass ( <i>Ambloplites rupestris</i> )			42	16			2		✓		
rosyface shiner											
sea lamprey ( <i>Petromyzon marinus</i> )											
smallmouth bass ( <i>Micropterus dolomieu</i> )				1				2			
spottail shiner ( <i>Notropis hudsonius</i> )											
stonecat ( <i>Noturus flavus</i> )			3	4	✓	8	9	8	✓		
white sucker ( <i>Catostomus commersonii</i> )			3	7	✓	8		4	✓		✓
yellow bullhead ( <i>Ameiurus natalis</i> )											

Fish collection records held by Conservation Halton for portions of Sixteen Mile Creek Subwatersheds 2 and 7 (S-n) and Indian Creek subwatershed in Bronte Creek (B-n), within or downstream of the Milton Phase 3 and Business Park #2 lands. Station locations are provided in Figure 3.5.4.

TABLE 3.5.3 con't									
Station	S-237	S-238	S-239	S-240	S-241	S-242	S-254	S-395	S-412
Date (d/m/y)	14/8/98	14/8/98	14/8/98	14/8/98	14/8/98	14/8/98	26/6/01	17/6/03	25/6/04
Number of fish species collected	4	1	5	2	1	3	1	1	6
alewife ( <i>Alosa pseudoharengus</i> )									
black crappie ( <i>Pomoxis nigromaculatus</i> )									
blacknose dace ( <i>Rhinichthys atratulus</i> )									
bluntnose minnow ( <i>Pimephales notatus</i> )									
brook stickleback ( <i>Culaea inconstans</i> )			✓		✓	✓			
brown bullhead ( <i>Ameiurus nebulosus</i> )									6
carps and minnows (Cyprinidae)							✓		
common carp ( <i>Cyprinus carpio</i> )									
common shiner ( <i>Luxilus cornutus</i> )									
creek chub ( <i>Semotilus atromaculatus</i> )	✓		✓			✓			7
emerald shiner ( <i>Notropis atherinoides</i> )									
fantail darter ( <i>Etheostoma flabellare</i> )									5
fathead minnow ( <i>Pimephales promelas</i> )	✓	✓	✓	✓					
golden redhorse ( <i>Moxostoma erythrurum</i> )									
johnny darter ( <i>Etheostoma nigrum</i> )									
largemouth bass ( <i>Micropterus salmoides</i> )									1
longnose dace ( <i>Rhinichthys cataractae</i> )									17
river or hornyhead chub ( <i>Nocomis</i> sp.)									
northern hog sucker ( <i>Hypentelium nigricans</i> )									
northern pike ( <i>Esox lucius</i> )									
pumpkinseed ( <i>Lepomis gibbosus</i> )	✓		✓	✓					
rainbow darter ( <i>Etheostoma caeruleum</i> )									
rainbow trout ( <i>Oncorhynchus mykiss</i> )									1
river chub ( <i>Nocomis micropogon</i> )									
rock bass ( <i>Ambloplites rupestris</i> )									
rosyface shiner									
sea lamprey ( <i>Petromyzon marinus</i> )									
smallmouth bass ( <i>Micropterus dolomieu</i> )									
spottail shiner ( <i>Notropis hudsonius</i> )									
stonecat ( <i>Noturus flavus</i> )									
white sucker ( <i>Catostomus commersonii</i> )	✓		✓			✓		100	
yellow bullhead ( <i>Ameiurus natalis</i> )									

Fish collection records held by Conservation Halton (BRO-*n*), from the Milton Urban Expansion Phase 2 - Sherwood Survey (I-*n*), and collected by C. Portt and Associates staff as part of this study (CP-*n*). Station locations are provided in Figure 3.5.5. YOY = young-of-the-year.

TABLE 3.5.4									
Station	BRO-151	BRO-151	BRO-239	I-16	I-11	CP-1	CP-2	CP-3	CP-4
Date (d/m/y)	15/08/00	5/07/07	15/08/07	20/11/01	20/11/01	7/07/08	7/07/08	7/07/08	7/08/08
Number of fish species collected	11	8	10	7	0	3	0	1	1
blacknose dace ( <i>Rhinichthys atratulus</i> )	1								
bluntnose minnow ( <i>Pimephales notatus</i> )	17	9	✓	✓					
brook stickleback ( <i>Culaea inconstans</i> )	12	16	✓	✓		1			
carps and minnows (Cyprinidae)		128							
common carp ( <i>Cyprinus carpio</i> )	2		✓						
common shiner ( <i>Luxilus cornutus</i> )	3		✓						
creek chub ( <i>Semotilus atromaculatus</i> )	55	48	✓	✓					
fathead minnow ( <i>Pimephales promelas</i> )	7		✓			1			
johnny darter ( <i>Etheostoma nigrum</i> )		2							
largemouth bass ( <i>Micropterus salmoides</i> )	1		✓	✓					
northern redbelly dace ( <i>Phoxinus eos</i> )	5		✓	✓					
pumpkinseed ( <i>Lepomis gibbosus</i> )	23	1	✓	✓					1
rock bass ( <i>Ambloplites rupestris</i> )		3							
white sucker ( <i>Catostomus commersonii</i> )	9	37	✓	✓		2 YOY		3 YOY	

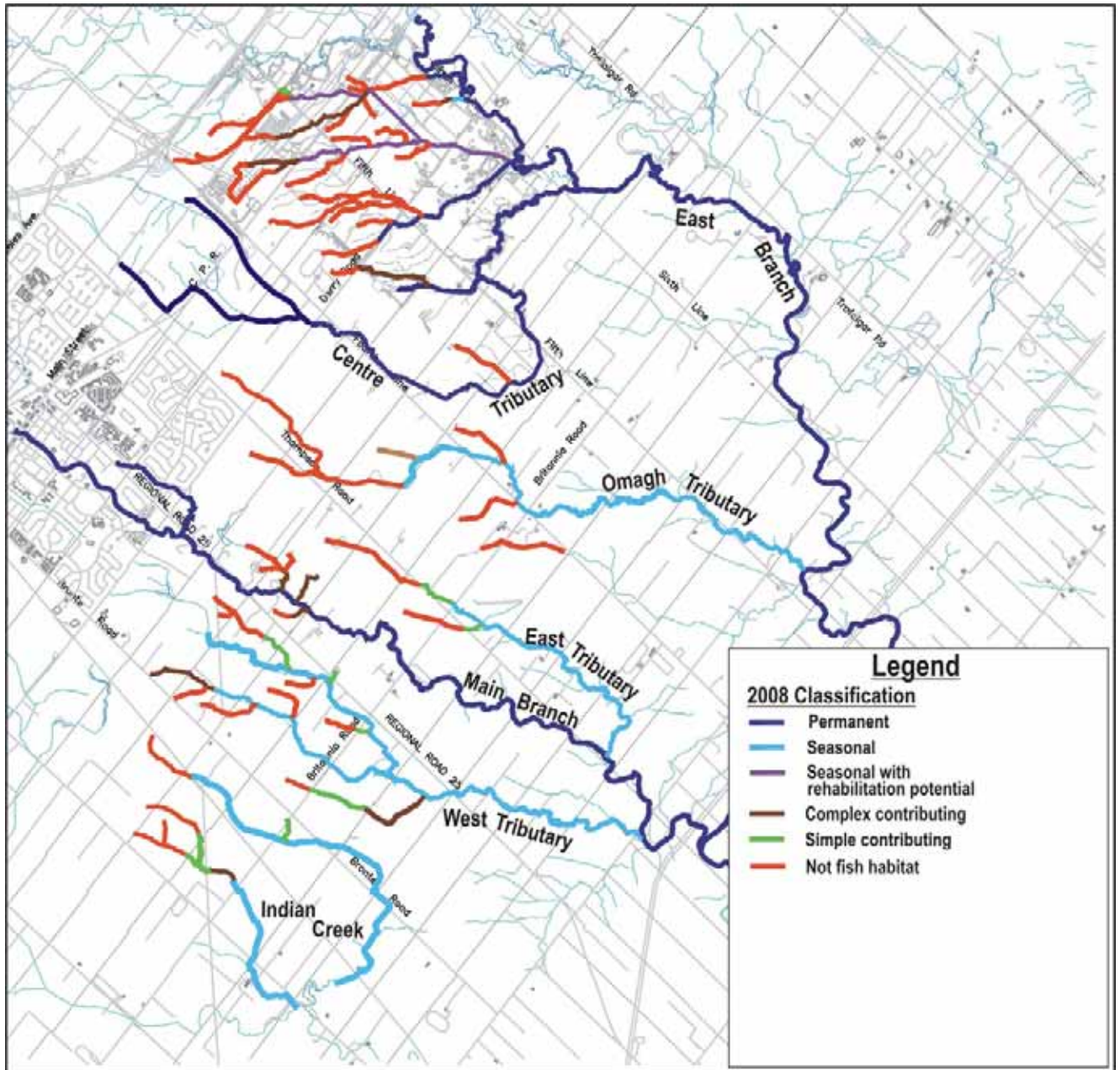


Figure 3.5.2: Drainage features classification, based on the interim guidelines for the evaluation, classification and management of headwater drainage features (ref. CVC and TRCA, March 2009).

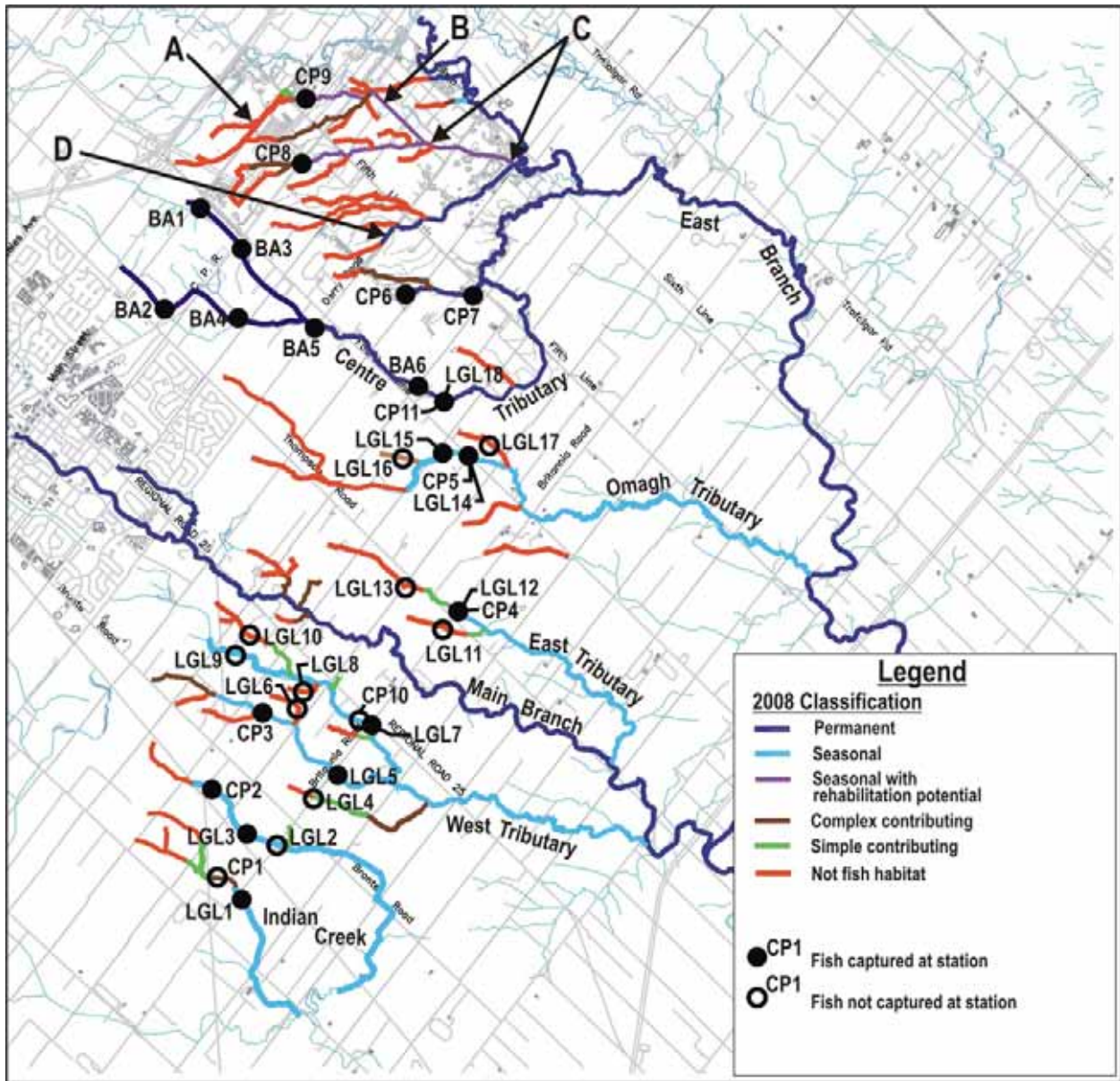
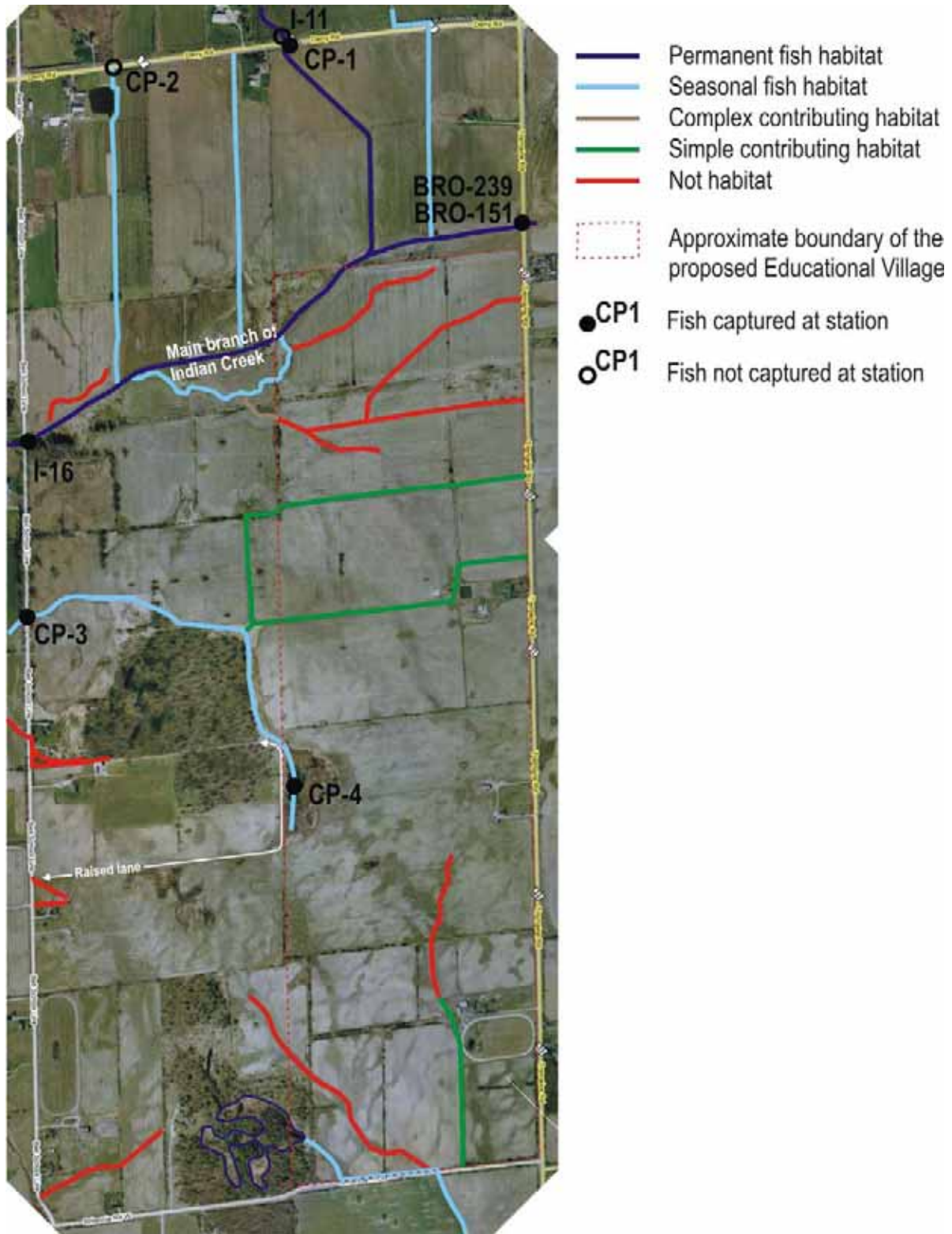


Figure 3.5.3: Locations of recent fish sampling conducted by C. Portt and Associates (2005 and 2008) and LGL Limited (2007, 2008), superimposed on the watercourse classifications. The capture data are presented in Tables 3.5.1 and 3.5.2.





➤ **Main Branch (Subwatershed Area 2)**

**Figure 3.5.5: Drainage features classification for the Educational Village, based on the interim guidelines for the evaluation, classification and management of headwater drainage features (ref. CVC and TRCA, March 2009), and locations of fish sampling data on file with Conservation Halton and recent fish sampling conducted by C. Portt and Associates (2008). The capture data are presented in Table 3.5.4.**

## **Phase 3 and Business Park 2**

### **➤ Main Branch (Subwatershed Area 2)**

The Main Branch of Sixteen Mile Creek begins at the confluence of the Kelso Branch and the North Branch in downtown Milton. Conditions within the Main Branch proper are not thought to have changed materially since the Subwatershed Area 2 and 7 Study was completed, and it was not re-examined during this update study. The Main Branch is contained within a concrete channel from the downstream end of the Milton Pond to approximately 500 m downstream of the Milton Wastewater Treatment Plant (WWTP), which discharges into the concrete channel. Downstream for another 450 m to Laurier Avenue, the channel is lined with interlocking concrete structures and buried gabion baskets and provides somewhat better habitat than the upstream concrete channel. Downstream of Laurier Avenue to its confluence with the East Branch of Sixteen Mile Creek, the Main Branch typically has a pool/riffle/run structure. No evidence of groundwater inputs were observed during the field investigation of this section of creek. A total of 22 fish species were reported from this section of Sixteen Mile Creek in the subwatershed study (Philips, 2000). While the fish community is generally that of a warmwater stream, this is a migratory route for salmonids from Lake Ontario and rainbow trout, brown trout and Pacific salmon have been captured in the upstream part of this section, and the vicinity of Regional Road 25 is considered the farthest downstream where significant rainbow trout spawning occurs (FSAH, 1995).

All tributaries discharging to the Main Branch of the Sixteen Mile Creek between downtown Milton and its confluence with the East Branch, with the exception of one tributary from the east that crosses Derry Road, were dry to standing pools in 1998 during summer field investigations for the subwatershed study (Philips, 2000). Our re-examination of this area in September 2007 (ref. Figure 3.5.1) found the stream habitat conditions essentially unchanged from 1998. The one tributary with permanent base flow originates from a storm sewer under Regional Road 25, a short distance upstream from Derry Road, which evidently intercepts a groundwater source. The other, seasonally dry stream channels within the flat Peel Plain physiographic region were typically heavily impacted by agriculture and past ditching activities, except at locations near the Main Branch channel where their gradient increases and they become more incised as they descend into the valley occupied by the Main Branch. The upstream limit of seasonal fish habitat in these tributaries was determined by examining the habitat at the farthest upstream location where fish were present, and then extending upstream to where that type of habitat changed to something less likely to support fish. Permanent fish habitat was determined to be all contiguous watercourses with permanent flow, in which fish were collected at selected locations.

The West Tributary to the Main Branch of Sixteen Mile Creek was totally dry within the Phase 3 lands during the summer of 1998, except for the Britannia Road culverts at fish stations LGL5 and LGL7 (ref. Figure 3.5.3). In September 2007 the instream conditions were essentially identical to those observed in 1998, except that the culvert at station LGL7 was also dry. The watercourses of this tributary within the Phase 3 lands have mainly soil substrate, and are poorly defined (ref. Appendix 'F': Photographs 1-6). Fish (brook stickleback) have only been observed in this tributary within Phase 3 at one location (ref. Table 3.5.1: CP3), but have been collected at the downstream limit of Phase 3, in the Britannia Road culverts (ref. Table 3.5.2: LGL5 – brook stickleback, and LGL7 – fathead minnow; Table 3.5.3: S240 – fathead minnow and

pumpkinseed, and S241 – brook stickleback). The number of fish species present increases closer to the Main Branch, with white sucker and creek chub also present at most sites (ref. Table 3.5.3: stations S132-S134, S236-S239).

The East Tributary to the Main branch of Sixteen Mile Creek was dry to a few standing pools, usually at road culverts, within the Phase 3 lands during the summer of 1998. In September 2007 the instream conditions were essentially identical to those observed in 1998 (ref. Figure 3.5.1). The watercourses of this tributary within the Phase 3 lands have mainly soil substrate, and are poorly defined (ref. Appendix ‘F’: Photographs 7-8). Fish have only been collected as far upstream as Britannia Road in this tributary, which is the downstream boundary of Phase 3. During this study only fathead minnows were captured there (ref. Table 3.5.1: CP4; Table 3.5.2: LGL12), but a 1973 record indicates that longnose dace were captured there (ref. Table 3.5.3: S141). In streams, longnose dace are a riffle-dwelling species, typically found in permanently flowing watercourses with coarse substrate. At station S-141 the flow is intermittent and the substrate is soil. We suspect that this record is a result of either an incorrect species identification or an incorrect station location.

#### ➤ **East Branch (Subwatershed Area 7)**

During the summer of 1998, the East Branch of Sixteen Mile Creek was the only permanently flowing stream within Subwatershed Area 7. The East Branch is a meandering channel with few riffle sections upstream of Britannia Road. Downstream of Britannia Road it is more typically pool/riffle/run, as the stream becomes entrenched within a deepening valley. The East Branch was not explicitly examined during this study, but fish sampling since the subwatershed studies indicates that it continues to support a diverse warmwater fish community (ref. Table 3.5.3).

#### ➤ **North Tributaries of the East Branch**

All tributaries of the East Branch within the study area were dry to standing pools at the time of the 1998 field investigation, however, the 2007 and 2008 investigations have found that permanent flow now occurs in watercourses that are in, or originate in, the Phase 1 urban expansion lands (ref. Figure 3.5.1).

The watercourses that originate north of Derry Road, within the BP2 lands, were dry except for on-line ponds or within road culverts when examined during the summer of 1998 (Philips, 2000). In September 2007 the flow conditions were essentially identical to those observed in 1998. Observations during the spring of 2008, when the watercourses were flowing, revealed that the roadside ditches along Main Street, excavated to below the invert of the natural watercourses, have resulted in flow being diverted along Main Street to Fifth Line (ref. Figure 3.5.3: location A). Downstream from the C.P.R. the watercourse has been diverted by a low berm, so that it flows south-east along the property line to join another watercourse (ref. Figure 3.5.3: location B). A reach of that watercourse is diverted to an underground pipe that conveys flow under normal conditions (ref. Figure 3.5.3: location C), although high flows still are conveyed overland.

The watercourses in this area of the BP2 lands have mainly soil substrate, and are poorly defined (ref. Appendix ‘F’: Photographs 9-14). One fathead minnow was collected at CP8 (ref.

Table 3.5.1; Figure 3.5.3) where a culvert beneath the railway tracks provides a low-flow refuge. Four koi (carp) and a pumpkinseed were captured at CP9 (ref. Table 3.5.1; Figure 3.5.3), which is just downstream of an on-line pond at a garden centre, the likely source of these fish. Creek chub and brook stickleback were collected at S177 (ref. Table 3.5.3; Figure 3.5.4) where a culvert beneath Derry Road, situated between upstream and downstream sections of piped watercourse, provides a low-flow refuge.

One tributary that originates from the vicinity of Derry Road (ref. Figure 3.5.3: location D) was dry in 1998, but now flows throughout the summer because it is fed by water seeping from the storm sewer system that has since been installed. The upstream limit of seasonal fish habitat in these tributaries was determined by examining the habitat at the farthest upstream location where fish were present, and then extending upstream to where that type of habitat changed to something less likely to support fish. Permanent fish habitat was simply considered to be present where there was permanent flow (ref. Figure 3.5.2).

### ➤ Centre Tributary

The Centre Tributary begins as two watercourses near Hwy. 401, which converge 200 m upstream of Derry Road. This watercourse generally flows in a south direction until exiting the Phase 1 development area, where it turns east, winding approximately 4.5 km before discharging to the East Branch of the Sixteen Mile Creek. At the time of the 1998 field investigations most of the upper reaches of this watercourse existed as swales or ditches with soil substrate through cropland and pasture, while downstream of the Fifth Line it occupied a defined 'valley' feature (ref. Appendix 'F': Photograph 15). In 1998 there was no flow throughout the Centre Tributary, and water only occurred in isolated pools or road culverts.

Since 1998, approximately the upper half of the Centre Tributary watershed has undergone urban residential development, and almost all of the watercourses within this new urban area have been reconstructed using natural channel design principles. When examined at the end of the dry summer, in September 2007, the main branch of the Centre Tributary and all its tributaries that originate within the new urban area, with the exception of some extreme headwater watercourses near Hwy 401, were flowing. Up to four fish species were captured at sampling locations in the centre tributary in 2005 (Sites BA1 – BA6, Table 3.5.1). Four (LGL18, Table 3.5.2) or five (CP11, Table 3.5.1) fish species were captured at Louis St. Laurent Boulevard in 2007 and 2008. Ten fish species were captured in the Centre Tributary near its confluence with the East Branch in 1973 and 2005 (Site S-38, Table 3.5.3), although several of the species differed between the two years.

The rehabilitated stream habitat in conjunction with the permanent flow (ref. Appendix 'F': Photograph 16), provides a significant improvement in the quality and quantity of fish habitat in the upper reaches of the Centre Tributary, which in turn should contribute significantly to fish habitat productivity. Permanent fish habitat was determined to be all contiguous watercourses with permanent flow, in which fish were collected at selected locations. No seasonal fish habitat was observed within the Phase 3 or BP2 lands.

### ➤ **Omagh Tributary**

The Omagh Tributary arises at the south border of the present Milton urban area, then flows generally southeast through the Phase 3 lands and beyond, to the East branch of Sixteen Mile Creek. Throughout most of the upper reaches, this watercourse exists as a swale or ditch with soil substrate through cropland and pasture (ref. Appendix 'F': Photographs 17 and 18). Just upstream of Britannia Road, within the Phase 3 lands, it exists as a roadside ditch (ref. Appendix 'F': Photographs 19 and 20). Only downstream of Britannia Road, outside of the Phase 3 lands, does it occupy a shallow valley feature. At all locations examined within the Phase 3 area, with the exception of the culvert at Britannia Road, this watercourse was completely dry when examined in both 1998 and 2007 (ref. Figure 3.5.1). Brook stickleback and creek chub have been captured in the Omagh Tributary within the Phase 3 lands (ref. Table 3.5.2: stations LGL14, LGL15; Table 3.5.3: station S164), and unidentified minnows were reported from station S254 (ref. Table 3.5.3). The upstream limit of seasonal fish habitat in this tributary was determined by examining the habitat at the farthest upstream location where fish were present, and then extending upstream to where that type of habitat changed to something less likely to support fish.

### ➤ **Indian Creek (Bronte Creek watershed)**

In September 2007, the two tributaries of Indian Creek that drain the Phase 3 lands, were completely dry at Britannia Road and upstream within Phase 3 (ref. Figure 3.5.1). These watercourses have mainly soil substrate, and are poorly defined (ref. Appendix 'F': Photographs 21-24). Fathead minnow, brook stickleback and creek chub have each been collected from one site in these two tributaries (ref. Table 3.5.1: CP2; Table 3.5.2: LGL1 and LGL3; Table 3.5.3: B35-B37 and B97). The upstream limit of seasonal fish habitat was determined by examining the habitat at the farthest upstream location where fish were present, and then extending upstream to where that type of habitat changed to something less likely to support fish.

### **Educational Village**

Based upon the field investigations undertaken in 2008, it is believed that only two locations within the proposed Educational Village lands have *Permanent* aquatic habitat. The main channel of Indian Creek generally borders the northwest edge of the Educational Village lands, and traverses the northwest corner of these lands (ref. Figure 3.5.5). This watercourse has been straightened and ditched in the past, but is naturalizing (Photographs 25 and 26), forming a meandering channel within the broader ditched cross-section, developing undercut banks due to the grass buffer of the streambank areas, and with patches of mainly sand and gravel along the hard clay/soil channel. Despite the past channelization of this portion of Indian Creek, it maintains a diverse warmwater fish community (ref. Table 3.5.4: BRO-151, BRO-239, I-16). The second location of permanent aquatic habitat within the Educational Village lands is in the southwest corner, where a portion of a large swamp wetland is within the Educational Village boundary (ref. Figure 3.5.5; Photograph 27). This swamp drains intermittently across the southwest corner of the Educational Village lands via a swale (ref. Photograph 28) to a roadside ditch that conveys the flow northeastward to a culvert beneath Britannia Road, where it combines with more flow from the agricultural fields that presently comprise the proposed

Educational Village lands (ref. Photograph 29), and then flows southeast from Britannia Road (ref. Photograph 30). The swale and roadside ditch that convey the flow from the swamp to where it exits the subject lands is classed as *Seasonal*, because it provides a linkage between the swamp and downstream habitats.

Two other watercourses within the subject lands are classed *Seasonal*. In the northwest corner of the subject lands, a side-channel of the main Indian Creek channel flows when the water level within the adjoining ditched portion of Indian Creek is high enough to overflow into it (ref. Figure 3.5.5). It has a meandering soil channel that may be a remnant channel from prior to Indian Creek being straightened (ref. Photograph 31). It likely does not provide any critical habitats because of its soil substrate and temporary flow, but it may play a part in any future rehabilitation of the adjoining straightened portion of Indian Creek. The second *Seasonal* watercourse is located about half way along the southwest side of the Educational Village lands (ref. Figure 3.5.5), where it drains a small, shallow marsh area within the subject property (ref. Photograph 32). This marsh likely dries occasionally, based upon the fact that none of the aquatic plants were submergent species, and only one fish was captured after about 20 minutes of continuous electrofishing (ref. Table 3.5.4: CP-4). The connecting watercourse (ref. Photograph 33) to downstream habitats was almost completely dry on July 7, 2008, but a small isolated pool at the downstream end of the Bell School Line culvert contained some white sucker young-of-the-year (ref. Table 3.5.4: CP-3). Apparently fish move upstream into this watercourse to spawn, as indicated by the white sucker young-of-the-year, but a connection farther upstream to the small marsh would be more difficult. The small marsh area may be the result of a raised farm laneway, that blocks drainage to its natural outlet.

The remaining watercourses on the Educational Village lands are either deemed *Contributing* or *Not direct or indirect* fish habitat. The three watercourses classed as *Simple Contributing* are shown in Photographs 34, 35 and 36. Photographs 29, 37 and 38 are examples of watercourses that provide no fish habitat, as they are generally cultivated through.

### 3.5.4 Analysis

#### **Phase 3 and Business Park 2**

Instream habitat conditions observed during the field component of this subwatershed review in September 2007, covering the Phase 3 and BP2 lands, were essentially identical to that observed during the summer field work for the original subwatershed study in July and August of 1998, with one significant exception. Watercourses that were within, or originated from, the Phase 1 lands, were dry to standing pools in 1998, but were flowing in 2007. As in 1998, drought conditions prevailed during the summer and autumn of 2007, so it is likely that watercourses that were flowing in September of 2007 are perennial streams. As a result, some of the watercourses draining the Phase I development area have been reclassified to permanent fish habitat.

The mechanism by which the period of flow has been extended is not known. Potential factors include the construction of stormwater management ponds that retain and then slowly release water within this portion of the watershed; discharges of imported water through the watering of gardens and lawns, washing of cars, etc., and the granular material typically backfilled around

infrastructure such as sewers and water mains acting as a conduit to deliver intercepted groundwater to local watercourses.

The watercourse reaches classified as seasonal fish habitat have been extended further upstream in some tributaries, based on the results of spring fish sampling conducted during this study and by LGL Limited in 2007 and 2008. These extensions are typically due to the capture of one or two individuals of brook stickleback or fathead minnow. There are no criteria that, if met, result in previous fish captures being disregarded in the determination of what is and what is not fish habitat. Therefore, when additional sampling leads to a change in what is considered fish habitat is will also be an increase.

As described previously, the interim guidelines for the evaluation, classification and management of headwater drainage features (CVC and TRCA, 2009) identify two classes of contributing fish habitat: complex contributing and simple contributing. These categories explicitly consist of watercourses where fish do not occur. The distinction between the two types (complex and simple) is based primarily on the amount of substrate sorting observed and the types of vegetation present in and adjacent to the drainage feature, and is somewhat subjective. The premise is that complex contributing habitat has a greater positive effect on water quality, sediment supply, organic matter, food supply (invertebrates) and nutrients than simple contributing habitat.

### **Educational Village**

Instream habitat conditions observed during the field component of the Educational Village investigation in 2008, were essentially the same to those observed during the field work for the Phase 2 Sherwood Survey study in 2001 and 2002. The primary difference was the identification of two watercourses classed as *Seasonal* fish habitat in 2008, that were not apparent in 2001 and 2002. One of these watercourses drains a wetland that may go dry under drought conditions, based upon the low fish abundance observed at this site (ref. Table 3.5.4: CP-4), however, in 2008, wetter than usual conditions maintained water within the wetland, and young-of-the-year white sucker were captured within the downstream portion of the watercourse (ref. Table 3.5.4: CP-3; Figure 3.5.5). The other watercourse classed as *Seasonal* fish habitat contains little habitat itself, but is important from a linkage perspective to downstream habitats for the permanent wetland at the southwest corner of the proposed Educational Village.

#### ***3.5.5 Assessment***

The Main Branch and East Branch of Sixteen Mile Creek in the Phase 3 and Business Park 2 lands, and the portion of Indian Creek within the Educational Village lands, are high quality fish habitat, with diverse fish communities, and the protection of these resources is a high priority. The main factor limiting the productivity of aquatic habitat in the headwater systems is flow. Most of the headwater drainage features are dry for most of the year, and thus cannot support fish or other aquatic organisms requiring water on a continuous basis, even when fish migrate into these drainage features, as observations in the spring of 2008 confirmed that they do,

When fish are captured in these intermittent watercourses, they are usually either fathead minnows or brook sticklebacks and their abundance is very low (ref. Tables 3.5.1, 3.5.2 and

3.5.4). The productive capacity is limited by the temporary nature of the habitats, and the fish must either move back downstream as conditions become dryer or perish. Also, because the habitat is often dry or limited to refuge pools for some distance downstream, the number of fish available to move into the headwaters when flow does occur is low.

In the intermittent tributaries, the absence of base flow is the most significant factor limiting fish productive capacity and the fish communities in the Phase 3, Business Park 2 and Educational Village development areas. Where base flow has been extended, as it has in the Centre Tributary, there are usually between two and five fish species present and fish abundance is higher. The fish productive capacity of these watercourses has increased following development, as was predicted in the Conceptual Fisheries Compensation Plan that was prepared for those developments.

### **3.6 Terrestrial Resource**

#### ***3.6.1 Scope/Purpose***

##### Study Area

The content in this terrestrial characterization reflects the Work Plan for the Sixteen Mile Creek Areas 2 & 7 Subwatershed Update Study which was finalized in November 2007 with input from the Technical Steering Committee. Detailed field studies were completed between fall 2007 and fall 2008 to characterize terrestrial resources in the Derry Green (Business Park 2) study area, and on the Boyne Survey (Phase 3) lands. These lands are primarily within the original Sixteen Mile Creek Subwatersheds 2 & 7 study area, however a significant portion of the Boyne Survey lands (i.e. lands located between Regional Road 25 and Tremaine Road, between Britannia Road and future Louis St. Laurent Blvd) are located within the Indian Creek Subwatershed, which is a tributary to Bronte Creek. Therefore the background review and field studies have addressed both areas to an equivalent level of detail.

In the spring of 2008, an additional area within the Indian Creek subwatershed was added for study; this is the site of the future Milton Education Village, consisting of the east half of the concession located just west of Tremaine Rd., extending northward from Britannia Rd. to a line approximately 0.5 km south of Derry Rd. Field studies were completed in this area in 2008, and along with available background information, are discussed in the current report. It should be noted that the management strategy for this area is not as advanced as that for the Derry Green and Boyne Survey study areas.

##### Importance of the Resources

Terrestrial ecosystems encompass upland and wetland vegetation of natural and/or cultural origin, providing habitat for wildlife which may utilize features on a transitory, seasonal or permanent basis. Terrestrial ecosystems provide intrinsic functions or services in terms of photosynthesis, storage and processing for carbon, minerals and nutrients as well as moisture. The above- and below-ground structure provided by vegetation interacts with air and water to promote conservative management and cycling of water and soil resources, manage a more stable microclimate, and in the process helps to sustain other reliant biota such as wildlife species, fish and invertebrates. The vertical and horizontal structure of vegetation systems, in

conjunction with physical attributes of soil and water, is potentially capable of sustaining many species and populations of plants and animals as habitat structure evolves in extent, age and complexity over decades and longer periods. At watershed and larger scales these services are integral to sustaining the fundamental hydrologic and chemical cycles.

### Purpose

The purpose of this terrestrial characterization is to further document and refine understanding of existing conditions in the Derry Green and Boyne Survey lands in terms of vegetative cover, flora and fauna, and ecosystem functions. The Study Area includes lands extending into the Indian Creek Subwatershed. The understanding of this system, in the context of the broader landscape beyond the urban boundary that is being assessed by the Region of Halton through the Sustainable Halton project, will help inform decisions on future development including configuration of a sustainable Natural Heritage System for the Study Area as required under Provincial, Regional and Town policies.

The terrestrial field studies undertaken in the Study Area were initiated in the late summer and fall of 2007 prior to finalization of the Work Plan (November 2007) to ensure the availability of current seasonal data. In the spring and summer of 2008, additional data collection was focused on key wildlife groups, as well as refinement of vegetation data. The 2008 fieldwork encompassed the Education Village lands as well as continued study of the Derry Green and Boyne Survey lands. All properties were accessed for a series of vegetation and wildlife surveys. The 2007–08 data supplements data collected between 1998 for the Sixteen Mile Creek Subwatershed Areas 2 & 7 area (Philips Planning and Engineering Ltd., 2000), and data collected in 2001–02 for the Indian Creek/Sixteen Mile Creek Sherwood Survey Subwatershed Management Study (Philips Engineering Ltd., 2003).

A related component of terrestrial study identified in the November 2007 Work Plan is a desktop review of the developed areas of the Sixteen Mile Creek 2 & 7 subwatersheds. This work has progressed through discussions in December 2008 with Town and Conservation Halton staff. In particular, Conservation Halton commented on deficiencies in the implementation of the Phase II Natural Heritage System, and has recommended that a more systems-based NHS approach be adopted in the Subwatershed Update Study. While subsequent work may include updated mapping of the NHS within the developed areas to a consistent ELC level of detail, the Town may integrate this task with upcoming monitoring studies for Phases 1 and 2.

### **3.6.2 Methods**

#### *3.6.2.1 Background Review*

Literature and background data pertaining to terrestrial resources in the three component study areas (Derry Green, Boyne Survey and Milton Education Village lands) was obtained from the Region of Halton, Conservation Halton, Ministry of Natural Resources, and the Natural Heritage Information Centre (Peterborough) and evaluated for relevant information on terrestrial resources. Additional background information was assembled including published documents, data from other consultant studies, and literature relevant to resources in the study area. A list of

primary source individuals and documents consulted for the purposes of this study is presented in the References.

### 3.6.2.2 Field Studies

#### Vegetation

All accessible natural and semi-natural vegetation communities within the Derry Green, Boyne Survey and Milton Education Village study areas were visited during the 2007 and 2008 field seasons. Vegetation communities were mapped as polygons onto orthogonally rectified digital base provided by the Town of Milton. The Boyne Survey lands and portions of the Derry Green lands were initially mapped onto 2005 photography, and subsequently on 2007 orthophotos which became available from the Town in the early fall of 2008. The remainder of the Derry Green and Milton Education Village lands located beyond the 2007 coverage were reliant on 2005 photography.

Vegetation and disturbance data were collected from natural and cultural communities; detailed data on community structure, composition and soils was collected from natural communities. This information was used to classify natural vegetation communities to the Vegetation Type level (where feasible) according to the ELC (Ecological Land Classification) methodology for Southern Ontario (Lee *et al.*, 1998).

#### Wildlife

Wildlife surveys were initiated and completed in 2008 to document breeding birds, calling amphibians, snakes and odonates (damselflies and dragonflies). Nocturnal amphibian call surveys were conducted in the vicinity of all wetland and aquatic features during the spring and summer of 2008. Calling levels were documented according to the Marsh Monitoring Program protocol (BSC, 2003). Breeding birds were documented from almost all natural and semi-natural communities during the late spring and summer of 2008 according to the Ontario Breeding Bird Atlas protocols (OBBA, 2001). The timing (June through early July) corresponded with the peak singing for most songbirds. Earlier visits in the spring also yielded additional breeding bird observations. All of the existing woodlots were surveyed, as were smaller successional areas. Given the predominance of agricultural lands within the survey area, careful attention was also paid to documenting open country species, a bird category showing significant declines across North America.

Searches for snakes were conducted during the fall of 2008 when they show increased activity prior to hibernation. Surveys for odonates were conducted during the summer and fall of 2008. Field guides prepared by Mead (2003), Nikula *et al.* (2003), Lam (2004), DuBois (2005) Jones *et al.* (2008) were all used to assist with odonate identification when necessary. All other wildlife species observed during vegetation and wildlife surveys were recorded incidentally. No winter surveys were conducted. Details of the various wildlife survey visits are summarized in Table 3.6.1.

TABLE 3.6.1 SUMMARY OF SURVEY DATES, TIMES AND WEATHER – WILDLIFE						
	Date	Observer	Time	Person Hrs	Weather Conditions	Purpose
1	April 25, 2008	K. Konze	2030 - 0100	4.250	Partly cloudy, 12–9 °C. Winds NE, 6 – 2 km/hr.	Roadside and walk-in amphibian call survey
2	April 26, 2008	K. Konze	2130 – 0030	3.000	Clear, 13–9 °C. Winds mostly calm (W, 5 – 0 km/hr.)	Roadside and walk-in amphibian call survey
3	April 27, 2008	K. Konze & H. Pankhurst	2000 – 2330	3.500	Cloudy, 12.5 –9.8 °C. Winds N @ 7 – 12 km/hr.	Roadside and walk-in amphibian call survey
4	May 23, 2008	K. Konze	2115– 0100	3.750	Mostly clear, 13.4–12.0 °C. Winds west, 0 – 10 km/hr.	Roadside and walk-in amphibian call survey
5	May 24, 2008	K. Konze	2105– 2355	2.833	Clear and calm, 13.4 –11°C.	Roadside and walk-in amphibian call survey
6	May 25, 2008	K. Konze	1915 – 0000	2.750	Mostly cloudy, 17.4 –12°C. Winds south, 5 km/hr.	Roadside and walk-in amphibian call survey
7	May 27, 2008	K. Konze	1700 – 1730	0.500	Mainly clear, 12 °C. Winds NW, 14 km/hr.	Breeding bird and daytime amphibian survey
8	June 5, 2008	H. Pankhurst	2230 – 2240	0.166	Partly cloudy/hazy, 17 °C. Calm.	Roadside amphibian call survey
9	June 21, 2005	K. Konze	0545 – 1045	5.000	Mostly to partly sunny, 15–20 °C. Mostly calm.	Breeding bird & miscellaneous wildlife survey
10	June 29, 2008	K. Konze	0530 – 1210	6.666	Mix of sun & cloud. Light showers @ 0945. 19–22°C. Winds SW, 4–8 km/hr.	Breeding bird, odonate and miscellaneous wildlife survey
11	June 30, 2008	K. Konze	0530 – 1300	7.500	Mostly clear – cloudy, 15–22 °C. Winds west, 4–13 km/hr.	Breeding bird & miscellaneous wildlife survey
12	July 1, 2008	K. Konze	0935 – 1145	2.166	Sunny & clear, 21–24 °C. Winds west, 11–13 km/hr.	Breeding bird & miscellaneous wildlife survey
13	July 3, 2008	K. Konze	0530 – 1215	6.750	Cloudy, overcast with occ. showers, becoming sunny, 20–21 °C. Winds NNW, 10–20 km/hr.	Breeding bird, odonate and miscellaneous wildlife survey
14	July 8, 2008	K. Konze	0545 – 1145	6.000	Cloudy, 23–31 °C. Very humid. SSW breeze, 6–13 km/hr.	Breeding bird, odonate and miscellaneous wildlife survey
15	July 10, 2008	K. Konze	0530 – 1210	6.666	Sunny & clear, 14–25 °C. Winds west, 2–15 km/hr.	Breeding bird, odonate and miscellaneous wildlife survey
16	August 14, 2008	K. Konze & H. Pankhurst	1045 – 1610	4.916	Mostly sunny, 22–23 °C. Winds SE, 8 km/hr.	Odonate & miscellaneous wildlife survey
17	August 19, 2008	K. Konze	1010 – 1810	7.750	Sunny, 15 –20 °C. Winds variable direction, 4–10 km/hr.	Odonate & miscellaneous wildlife survey
18	September 17, 2008	K. Konze	1100 – 1800	6.750	Mix of sun and cloud, 22–23 °C. Winds west, 10–18 km/hr.	Odonate & snake survey
19	September 24, 2008	K. Konze & I. Richards	1025 - 1725	6.333	Sunny-hazy all day, 20–25 °C. Winds south, 4–11 km/hr.	Odonate & snake survey
Total hours				<b>87.25 hrs</b>		

All wildlife species documented in the Subwatershed Update Study area in 2007 (*i.e.* incidental observations gathered during vegetations surveys) and 2008 were entered into a wildlife database created for this study. As of October 24, 2008 this represented 1665 records, including negative data where no species were detected (*e.g.* roadside amphibian call survey stop). The database was created primarily to facilitate analysis of results, but could also potentially serve as a foundation for additional observations to be added later in the planning process or in conjunction with future monitoring. Where available, the following information was entered into the database for each record:

- Wildlife Observation Number
- Polygon Number
- Fauna Code (which populates Common & Scientific Name)
- Observer
- Observation Date

- UTM coordinates
- Data Source
- Comments
- Amphibian Call Code
- Breeding Status
- Breeding Bird Evidence
- Local Breeding Status
- Number of Individuals

### Other Update Tasks

In late April 2008, members of the D&A team coordinated a site walk of natural areas within the Derry Green, Boyne Survey and Milton Education Village lands with Town and Conservation Halton staff in attendance. Many features including woodlands, wetlands and stream corridors were reviewed, and discussion occurred on the potential natural heritage strategies for the various areas. Data has subsequently been received from LGL Ltd. related to some portions of the Boyne Survey and Milton Education Village lands.

The terrestrial study team met with Conservation Halton and Town of Milton staff in March 2009 to consider the approaches to wetland evaluations and identified species at risk. The results of these discussions are reported in later sections.

### **3.6.3 Results**

#### *3.6.3.1 Background Review*

#### Existing Forest Cover and Significant Woodlands

The vegetation of the Sixteen Mile Creek Watershed is representative of the Deciduous Forest Region - Niagara Section and the Great Lakes – St. Lawrence Forest Region – Huron - Ontario Section (Rowe, 1972). The study area occupies a transition area between the two forest regions, with the south-north gradient accentuated by the Niagara Escarpment (Crins, 1986). Vegetative species richness as represented in designated Environmentally Sensitive Areas (ESA's) includes Escarpment, southern Carolinian and prairie-savanna habitats and species. In their study of Significant Woodlands in Halton, Riviere and McInnes (1999) determined that loss of forest cover continued between 1978 and 1995 in both urban and rural areas of Milton.

The Region of Halton has mapped all woodlands greater than 0.5 hectares within the Region as Significant Woodland candidates under Halton Region Official Plan policy (Halton Region, 2006). Any woodlands that were found to meet one or more of the three criteria set out by Halton Region (within 50 m of a major creek, greater than 2 ha in the urban area, greater than 4 ha of interior core area) have been mapped as Significant Woodlands (ref. Appendix 'G' Figure T5 – Significant Features). All other woodlands greater than 0.5 ha have been mapped as Candidate Significant Woodlands. Further site-specific assessment of the candidate woodlands will be necessary to determine whether they meet the fourth criteria (contain forest patches greater than 99 years old) that also triggers Significant Woodland status.

## Previous Watershed and Subwatershed Studies

The Sixteen Mile Creek Watershed Plan (Ecoplans Ltd., 1996) listed more than 100 additional plant species considered rare in Halton Region by various authorities. The distribution of these species within Subwatershed 2 & 7 was not defined in the Plan. The Watershed Plan documented woodlots located below the Niagara Escarpment using a woodlot polygon classification system developed by Geomatics International (1993) for the Oak Ridges Moraine within the boundaries of the Greater Toronto Area. Woodlot documentation was principally reliant on background data sources; limited field study of woodlots was conducted. Information for 171 discrete woodlots was summarized; this included 21 woodlots in Subwatershed 2, and 18 woodlots in Subwatershed 7.

The Sixteen Mile Creek Subwatershed Areas 2 & 7 Study (Philips Planning and Engineering Ltd., 2000) and the Indian Creek/Sixteen Mile Creek Sherwood Survey Subwatershed Management Study (Philips Engineering Ltd., 2003) provided site-specific terrestrial information for the entire detailed Study Area. Relevant data from these two studies has been incorporated into the current Subwatershed Update Study.

## Wetlands

There are three wetlands evaluated under the Ontario Wetland Evaluation System that are recognized in Ministry of Natural Resources (MNR) data in the vicinity of the study area. These include the Mill Pond Wetland Complex located in downtown Milton, the Milton Heights Wetland Complex located north of Highway 401, and the Indian Creek Wetland Complex which is located along the western periphery of the proposed Milton Education Village lands. The MNR data identifies several unevaluated wetlands, three located within the Phase 1 lands (of which two were evaluated as part of the Sixteen Mile Creek Areas 2 & 7 Study), three within the Sixteen Mile Creek ESA, two within the Derry Green lands, and three small features in the Boyne Survey lands (ref. Appendix 'G' Figure T5).

Conservation Halton staff provided hard copy mapping of potential wetlands for their database. These were subjected to field investigations within the Derry Green and Boyne Survey lands during the present study, and are discussed later in this report. Some of the identified wetlands were verified, while others were determined not to be wetlands. The Subwatershed Update Study also identified other wetlands that have not been previously mapped by either MNR or Conservation Halton.

Snell (1987) estimated that between the time of European settlement and 1982, there was a loss of 63.9% of original wetland cover in Halton Region, and nearly 3% loss occurred between 1967 and 1982 alone. Of the historic loss, she attributed 58.6% to agriculture, 24.1% to development, and 17.3% to extractive uses. Given the relative extent of remaining wetland cover above the Niagara Escarpment, it is clear that the preponderance of wetland loss occurred below the Escarpment. Coventry (1940) has documented residents' accounts of changes in streamflow for streams located between Dundas and Toronto; their comments suggest that there was substantial marsh cover present within the present agricultural landscape after the turn of the century.

## Environmentally Sensitive Areas and Areas of Natural and Scientific Interest

Four ESA's extend into Sixteen Mile Creek Subwatersheds 2 & 7, including the Sixteen Mile Creek ESA (#16), Milton Heights ESA (#17), Crawford Lake – Rattlesnake Point Escarpment Woods ESA (#18) and Hilton Halls Complex ESA (#25). The Sixteen Mile Creek ESA (#16) extends into the detailed Subwatershed Update Study Area, located within the Boyne Survey lands. The Sixteen Mile Creek Valley ESA (#16) is also designated as regionally significant Life Science Area of Natural and Scientific Interest (ANSI).

The Milton Education Village, which is in the Indian Creek Subwatershed, includes a small portion of Indian Creek Sub-watershed ESA (#11), which is a large ESA located adjacent to that study area.

In the Region of Halton's Environmentally Sensitive Area Study (Geomatics, 1993), vegetation communities in ESA's were originally classified according to *A Classification of the Natural Communities Occurring in Ontario* (Kavanagh and McKay-Kuja, 1992) which pre-dated the current Ecological Land Classification system. A total of 111 nationally, provincially or regionally significant plant species were on record within the four ESA's extending into Subwatersheds 2 & 7; however a substantial portion of these ESA's extend beyond the subwatershed 2 & 7 limit and therefore only a portion of the species can be expected to occur within the immediate study area.

As part of the recent *Halton Natural Areas Inventory* (Dwyer, 2006a), vegetation communities in ESA's were classified according to the Community Series level of Ecological Land Classification for Southern Ontario (Lee *et al.* 1998). A total of 38 nationally, provincially or regionally significant plant species are now on record within the Sixteen Mile Creek Valley ESA; however a substantial portion of the ESA extends beyond the study area limit and therefore only a portion of the species can be expected to occur within the immediate study area. The updated study has also recommended that this ESA be extended further northward, encompassing woodlands and valley associated features up to Derry Road. The FSEMS for the Boyne Survey will consider the opportunities for this extension as part of the Natural Heritage System planning for this study area.

### Consultant Studies

#### ***LGL Limited Assessments***

LGL Limited conducted natural heritage inventories and analysis of the Boyne Survey lands for the current landowners between 2007 and 2008. This work is independent of the comprehensive vegetation and wildlife fieldwork completed throughout this study area by Dougan & Associates in 2008. The purpose of the LGL assessment was to “describe, evaluate and map the natural heritage features” within the properties. Inventories were multi-season in nature and included terrestrial, wetland and aquatic features. Vegetation community polygons were mapped and classified according to the Ecological Land Classification system for southern Ontario (Lee *et al.*, 1998). Amphibian and breeding bird surveys were also carried out in 2007 and 2008.

Although all of the lands in Boyne Survey lands have been surveyed by LGL limited, only data on vegetation and wildlife (amphibians, breeding birds mammals, reptiles and fisheries) collected in 2007 for the lands owned by Mattamy Homes was provided to Dougan & Associates. Natural and semi-natural vegetation communities were identified within these lands including Deciduous Forest, Deciduous Swamp, Meadow, Meadow Marsh, Cultural Plantation, Woodland and Savannah. Nine plant species were identified within the Mattamy lands (in Boyne Survey) that are considered to be locally significant in Halton according to Crins *et al.*, 2006. This information has been considered in the current Subwatershed Update Study (ref. Appendix G).

Fifty-three (53) species of wildlife were documented by LGL from within or directly adjacent to the Boyne Survey lands in 2007; 2008 data was not provided for review. The 2007 records included 4 species of amphibians, 42 species of birds and 7 species of mammals. Western Chorus Frog was documented from within and immediately adjacent to the Boyne Survey lands. The Great Lakes - St. Lawrence population of the Western Chorus Frog, of which these belong, has been recently designated “Threatened” federally by COSEWIC (2008). Its status has not been evaluated provincially as yet but will likely occur within a year, at which time its provincial status may be elevated. At the regional level, eight (8) species of breeding birds are considered significant (OPIF, 2006). This includes Hairy Woodpecker (*Picoides villosus*), Eastern Wood-Pewee (*Contopus virens*), Eastern Kingbird (*Tyrannus tyrannus*), Wood Thrush (*Hylocichla mustelina*), Brown Thrasher (*Toxostoma rufum*), Field Sparrow (*Spizella pusilla*), Savannah Sparrow (*Passerculus sandwichensis*) and Bobolink (*Dolichonyx oryzivorus*). Only one locally significant species was recorded, Horned Lark (*Eremophila alpestris*). It is listed as an “uncommon summer resident” by Curry (2006).

Data and designations in the LGL studies which were provided to date have been considered in the present report, and incorporated where appropriate.

***Louis St. Laurent Crossing Terrestrial Resources Impact Analysis prepared by Dougan & Associates for Philips Engineering Limited Class EA for Louis St. Laurent Blvd. Crossing of Sixteen Mile Creek***

The vegetation communities in the vicinity of the Louis St. Laurent Avenue crossing of Sixteen Mile Creek were documented in 2007 as part of a Class EA for a bridge crossing of the creek. Some locally uncommon plant species were observed but no regionally or provincially rare species or species at risk were documented. Elements of a previously reported Fresh-Moist Black Walnut Lowland Deciduous Forest were encountered in the creek tributary and to some extent in the floodplain, however, based on the absence of some of the associated species with affinities for floodplains, and the presence of a patchy mixtures of common native and introduced upland species, it was determined that none of the identified communities should be considered S2S3 habitat.

Principal constraints identified in the project included a) steep slopes which are susceptible to erosion, b) pockets of mature canopy cover, c) a small wetland in the vicinity of the proposed bridge pier, and d) the presence of Giant Hogweed (*Heracleum mantegazzianum*), a highly noxious introduced species in the floodplain.

The Louis St. Laurent study area yielded a number of significant animal species. Most were of local or regional significance but a few others were also recognized as significant at the provincial and national scales. No Eastern Milksnakes were observed despite dedicated sampling and surveys which were requested by Conservation Halton staff. The significant species documented at this site in 2007 included River Bluet (*Enallagma anna*) and Painted Skimmer (*Libellula semifasciata*), which have a provincial rank of S2 or “Imperiled” (NHIC, 2008), and Monarch (*Danaus plexippus*), which is, designated “Special Concern” in Ontario (OMNR, 2008) and Canada (COSEWIC, 2008). Another species which we previously listed (Eastern Amberwing - *Perithemis tenera*) was subsequently lowered in status from S3 to S4.

Up to eight River Bluets were observed along Sixteen Mile Creek, suggesting that a local population is established. This species appears to be expanding its range eastward in Ontario, and its status may be upgraded eventually. A single male Painted Skimmer was observed along the edge of the field not far from Sixteen Mile Creek. However, it is not clear whether this species is resident in Halton Region or whether it’s a vagrant (Rothfels, 2006). Prior to the 2007 observation, it had only been reported twice before from Halton, and both records were from 2004, a year that featured a large incursion of this species into the province (Rothfels, 2006). Catling and Brownell (2000) list marshy bay, ponds and streams as its breeding habitat. Nikula *et al.* (2004) also includes slow streams. Based on these descriptions, it is at least possible that Sixteen Mile Creek could be considered potentially suitable breeding habitat. Monarch has a provincial conservation rank of S4. Although the three individuals documented in 2007 were only observed nectaring, one of its larval food plants, Common Milkweed (*Asclepias syriaca*), was observed nearby.

Data and designations from the Louis St. Laurent study have been incorporated into the present report.

#### Natural Heritage Information Centre (NHIC) Data Queries

A query of the Natural Heritage Information Centre (NHIC) database was initiated in 2008 to obtain rare species element occurrence data for the entire Sixteen Mile Creek Study Area (NHIC, 2008a). Approximately 12 tracked species have occurrence records within the Subwatershed Study Update area; we have been in communication with NHIC staff to further clarify the extent and relevance of the records. Several relevant species records that we are aware of are as follows:

- Redside Dace (*Clinostomus elongatus*) (Srank S3, MNR Threatened and COSEWIC Endangered) was reported in the main branch of Sixteen Mile Creek upstream of the Louis St. Laurent Blvd. crossing site in 1998. The other records for this species are from the 1980’s or earlier.
- Halloween Penant (*Celithemis eponina*), a dragonfly species, was reported near Britannia Road in 1974. Since June 2000, this species was ranked as S3; however, the status was recently changed to S4 and it is no longer provincially significant.
- Jefferson X Blue-spotted Salamander ‘hybrid’, with a Jefferson genome dominant (Srank S3) was reported in 1984 close to Britannia Road.
- Eastern Milksnake (*Lampropeltis triangulum triangulum*) a species currently designated “Special Concern” in Canada (COSEWIC, 2007) and Ontario (OMNR, 2008) was

documented from the vicinity of Regional Road 25 south of the future Louis St. Laurent Blvd in 1984. The Halton Natural Areas Inventory (Dwyer, 2006a) also listed this species for the area for the same year. We believe they are referring to the same observation. Two other records for this species on record at NHIC (they have the same Element Occurrence ID – 91083) were determined to be just northwest of the Derry Green study area, on the opposite side of Hwy. 401 (S. Brinker pers. comm., 2009).

#### Other Relevant Wildlife Background Information

Prior to the Subwatershed Areas 2 & 7 Study, the study area was relatively under-documented with respect to wildlife outside of the Environmentally Sensitive Areas. The Watershed Plan was reliant on breeding bird and herpetofaunal data summarized from the first (1981–1985) Ontario Breeding Bird Atlas (OBBA) and Ontario Herpetofaunal Survey (OHS) for the UTM grid squares that encompass the watershed. The Subwatershed Update Study area (comprised of Derry Green, Boyne Survey and Milton Education Village lands) is covered by two 10 x 10 km UTM grid squares: 17NJ91 and 17NJ92.

The total number of breeding bird species documented in these squares during the first atlas was 113, including 8 species of provincial or regional significance at the time (OMNR, 1993). A total of 29 reptile and amphibian species, including 1 species of provincial significance (OMNR, 1993), were documented on this basis. The grid squares extend beyond the subwatershed limits and therefore the data is not specific to Subwatersheds 2 & 7. As part of the Watershed Plan studies, bird surveys were conducted in one woodlot in Subwatershed 2 (part of the Sixteen Mile Creek Valley ESA) and two woodlots within Subwatershed 7 (SMCWP, 1996).

The second Ontario Breeding Bird Atlas was conducted over a five year period between 2001 and 2005. It culminated in the publication of the “Atlas of the Breeding Birds of Ontario 2001 – 2005” (Cadman *et al.*, 2007). All locations in Ontario, including the Sixteen Mile Creek Subwatershed Update Study (SUS) area, were included in the analysis. More specifically, the Sixteen Mile Creek SUS area falls entirely within 2 10 x 10 km atlas squares, 17NJ91 and 17NJ92. Coincidentally, the two atlas squares roughly divide Derry Green from the Boyne Survey and Milton Education Village lands. Eighty-eight species were documented between 2001 and 2005 during the breeding season in 17NJ91 and 76 species in 17NJ92. All but one of the species, the Merlin (*Falco columbarius*), exhibited breeding evidence. This accounts for a combined total of 95 bird species. Both of the atlas squares are also roughly similar to one another with respect to the type of land cover. Neither includes any portion of the Niagara Escarpment but 17NJ91 includes more of the Sixteen Mile Creek valley which is the most significant natural heritage feature within the area. Both atlas squares can be generally characterized as agricultural landscapes with scattered/isolated small woodlots and often narrow and sometimes discontinuous creek corridors. Atlas square 17NJ91 includes a higher percentage of developed lands (mostly residential) than does 17NJ92. Although encompassing significantly more land area than the study area, the atlas squares provide an excellent source of information by which to compare the findings of the breeding bird surveys conducted in 2008.

At the time of the Sixteen Mile Creek Subwatershed Areas 2 & 7 Study, the Hamilton Herpetofaunal Atlas (HHA) database represented the most recent and extensive source of background information on herpetofauna for the area. In 1998 it contained 186 records,

representing 17 species (Lamond, 1998). Species considered significant in Halton were defined according to Geomatics (1991), which included any species designated ‘uncommon’ or ‘rare’ in the MNR’s former ‘Central Region’ by Plourde *et al.*, (1989). However, with the preparation of the Halton Natural Areas Inventory, additional field studies were carried out and revised conservation status ranks were derived (Curry, 2006). However, it is not clear whether any of the field surveys were conducted in the Subwatershed Update Study area being considered as part of this study.

Ontario Mammal Atlas data records (Dobbyn 1998) were also reviewed at the time of the Sixteen Mile Creek Subwatershed Areas 2 & 7 Study. No species considered to be provincially significant were on file. Since then, the Ontario Mammal Atlas has not been updated and it is not believed that anyone, with the possible exception of Conservation Halton, is accepting new observations for Halton Region. A detailed mammal inventory was not undertaken for the Halton Natural Areas Inventory (Dwyer *et al.*, 2006) and it is therefore unlikely that any significant mammal records have been overlooked in the Subwatershed Update Study area.

No deer wintering areas or other significant wildlife habitats have been identified below the Escarpment or outside the Sixteen Mile Creek ESA in available background documents (OMNR 1989).

#### Sustainable Halton Plan

The Sustainable Halton Plan is a growth management planning project initiated in May 2006, intended to promote the concept of sustainable development, which is defined in the 2004 Regional Official Plan. Policy 25 of the Regional Official Plan as “*meeting the needs of the present without compromising the ability of future generations to meet their own need*”. The policy also states that “*planning decisions in Halton will be made based on a proper balance among the following factors: protecting the natural environment, enhancing its economic competitiveness, and fostering a healthy, equitable society*”. The overall goal is to enhance the quality of life for all people of Halton. The Growth Management Strategy and the supporting resource management strategies that make up the Sustainable Halton Plan are scheduled for completion by June 2009. Phase III technical documents were released by the Region in April 2009, in addition to a Draft ROPA 37 which would implement the Plan upon approval.

Although the Sustainable Halton NHS document does not apply directly to all of the detailed Study Areas for the Subwatershed Update Study (portions of which were included within the current urban boundaries of the Region in a previous growth study, the Halton Urban Structure Plan), it does provide valuable guidance on the principles currently considered important for natural heritage system planning in the Region of Halton. It represents a ‘high level’ systems approach; detailed NHS planning studies for new development such as those within Derry Green, Boyne Survey, and the Education Village will have regard for the Sustainable Halton NHS, and refine its application using more detailed site specific data and analysis through subwatershed studies and site-specific Environmental Impact Studies.