

DRAFT

**Environmental Input to the EA
for the Widening of York Road,
Victoria Road to the East City Limit,
Guelph, Ontario**

Prepared for:

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NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

EXISTING CONDITIONS

Aquatic Habitat – Clythe Creek

According to the Grand River Conservation Authority (GRCA), Clythe Creek is a coolwater stream (GRCA 2006). It originates in a lowland cedar swamp located approximately 6km upstream of its outlet to the Eramosa River, and the water is cold and clear in the upstream area near the swamp (Ecologistics et al 1998). The swamp is part of the Clythe Creek Provincially Significant Wetland (PSW) Complex. There are additional groundwater inputs to Clythe Creek between Watson Road and York Road (Ecologistics et al 1998). This section of the creek flows through another wetland in the Clythe Creek PSW Complex.

There are also 2 tributary streams that originate east of Clythe Creek (see Figure 2). One enters directly into Clythe Creek upstream of the ponds at the Guelph Correctional Centre (Unnamed Tributary 1), and the other flows into the south pond (Unnamed Tributary 2). Art Timmerman of the MNR indicated that both of these tributaries have cold water temperatures (MNR, 2006). The tributary that enters directly into Clythe Creek is currently providing a cooling influence. A survey by the MNR on August 30, 1994 found water temperatures at 2 locations in the tributary to be 11.6°C and 10.8°C while the air temperature was 19.7°C. In contrast, the other tributary flows into the south pond and does not have a meaningful cooling influence on Clythe Creek. Hadati Creek joins Clythe Creek from the north near Elizabeth Street, and is another coldwater tributary. It is described in detail in Section 3.3.

Within the study area, there are numerous weirs and dams on Clythe Creek that create barriers to fish movement (See Photo 1, Appendix I)

Clythe Creek – Reach 1

This short section of Clythe Creek is situated between the York Road crossing and a railway crossing (Figure 2). The vegetation on both sides of the creek is primarily long grasses along with other herbaceous plants and occasional shrubs. There are also several trees, including cedars, maples, and other deciduous species. The trees and shrubs create a canopy that provides approximately 70% shade to this reach.

The bank vegetation is composed of grasses, other herbaceous plants, and shrubs. The high vegetation density affords good bank stability. Bank-full width ranged from approximately 3.1 to 3.5m. The channel substrate is dominated by coarse materials, consisting of approximately 10% boulder, 60% cobble, 10% pebble, 10% gravel, and 10% sand. Cover for fish includes pools (at the York Road culvert), boulders, and cobble. Most of this section is considered riffle habitat (See Photo 2, Appendix I).

On June 5, 2006, the measured wetted widths varied between 2.4 and 3.0m. Water depths ranged from 9 to 19cm. Water quality parameters were measured at 1:55pm. The water temperature was 18.8°C, and the air temperature was 25°C. The dissolved oxygen was 9.3ppm, or 99.8% saturation (at 18.8°C). The pH was 7.96, and the conductivity was 716µs/cm.

Clythe Creek – Reach 2

This reach of Clythe Creek is between the York Road crossing and the Ponds at the Guelph Correctional Centre (Figure 2). The lands surrounding this reach have a gently rolling topography. The vegetation in the riparian zone is manicured grass with some open-grown trees, including coniferous trees and willow trees (see Photo 3, Appendix I). Although the grass was mowed right up to the top-of-bank, the bank vegetation also included some trees, shrubs, and longer grass creating a high vegetation density on the banks.

Channel substrate in this reach is approximately 30% boulder, 20% cobble, 20% silt, 10% sand, 10% gravel, and 10% muck. Aquatic habitat features and cover include pools, riffles, backwater, undercut banks, woody debris, several types of aquatic vegetation, boulders, and cobble.

During site visits on June 5 and June 8, 2006, the measured wetted widths of the channel were as narrow as 1.8m in narrow sections of the channel, and up to 3.5m in wider locations. Measured depths at various locations along the middle of the channel varied between 8 and 72cm. The macrohabitats consisted mostly of runs, occasional pools, and a few riffles. Maximum pool depth was 72cm, and many runs were deeper than 30cm. The water temperature taken in the middle of this reach was 19.7°C at 3:40pm while the air temperature was 26°C. At the same location, dissolved oxygen

was 9.5ppm (103.5% saturation at 26°C), pH was 7.99, and conductivity was 709µs/cm. Many small fish were observed.

Clythe Creek – Reach 3

This reach lies between the ponds at the Guelph Correctional Centre (Figure 2) and Hadati Creek. The lands surrounding this reach are relatively flat, and include baseball diamonds. The vegetation is dominated by manicured grass to the top-of-bank of Clythe Creek. Trees are distributed somewhat randomly in the vicinity of the creek. The vegetation density on the banks of Clythe Creek has been compromised due to feeding by the large numbers of geese that inhabit this area. This has contributed to bank instability, and boulders that were placed along the banks for aesthetic purposes are no longer integrated with the bank.

The bank height ranges from approximately 0.1 to 0.3m, and the bank-full channel width varies between 7 and 12m. This widened section of Clythe Creek has some meandering form, but intensive modifications have left it with a low gradient. As a result, the water becomes ponded during low flow (see Photo 4, Appendix I). The substrate reflects the depositional nature of the slow, diffused flows. It is approximately 50% silt, 30% boulder, and 20% muck.

On June 8, 2006, the water temperature in Clythe Creek immediately upstream of the Hadati Creek outlet was 23.5°C at 3:45pm while the air temperature was 24°C. The pH was 8.39, and the conductivity was 686µs/cm. Fish from the families Cyprinidae and Centrarchidae (*Lepomis* sp.) were observed in this reach.

Clythe Creek – Reach 4

This reach lies between the outlet of Hadati Creek and the downstream limit of two online ponds (Figure 2). The flow diverges downstream of the Hadati Creek outlet to flow into the two ponds, which are located side-by-side (see Photo 5, Appendix I). The east online pond is at a lower elevation and is the larger of the two. The land on the east side of this pond is wooded. The land in between the two ponds and west of the ponds is manicured grass with occasional trees. Boulders were used as a landscaping feature along the banks, and there is abundant aquatic vegetation throughout both ponds.

The portion of flow that enters directly into the east pond passes over a weir and into a plunge pool at the upstream end of the pond. The west pond receives flow directly and as a result the water is at a higher elevation than that of the east pond. The flow leaves the pond through a channel that connects to the downstream end of the east pond. There is a pedestrian crossing over this channel that uses a corrugated steel pipe (CSP) to convey flow. A weir situated in this outlet channel keeps the west pond at its higher elevation.

On June 8, 2006, the water was relatively shallow (approximately 0.3m deep) throughout most of the area of the ponds. Water temperature was measured where the flow from the upper (west) pond joins the lower (east) pond. At 2:45pm, the water temperature was 23.5°C and the air temperature was 24°C. The pH at this location was 7.80 and the conductivity was 812µs/cm. The dissolved oxygen level was 9.3ppm, indicating supersaturated conditions (approximately 110% at 23.5°C). This was likely a result of the prolific growth of aquatic plants (see Photo 6, Appendix I). Fish from the families Centrarchidae (*Lepomis* sp.) and Cyprinidae were observed in the ponds.

Aquatic Habitat – Ponds at the Guelph Correctional Centre

The ponds at the Guelph Correctional Centre consist of two large ponds to the south of York Road and Clythe Creek (Figure 2). The north pond is closer to Clythe Creek, and is connected via a short channel approximately 10m long and 3 to 4m wide (see Photo 7, Appendix I). The flow of water moves slowly out of the pond as it joins the slow-moving water of this widened section of Clythe Creek. The south pond is not directly connected to Clythe Creek.

These constructed ponds are known to provide habitat for a variety of game fish and are used as a popular urban fishery (see Photo 8, Appendix I). Manicured grass surrounds much of their shorelines, and various trees and shrubs line the banks in some locations. The two ponds are separated by a narrow strip of land, and the south pond has a higher water level than the north pond (see Photo 9, Appendix I). The south pond is contained by a berm between it and the Eramosa River along its south shoreline. A formal trail has been established along the top of the berm on the south side.

Some water from the south pond seeps into the north pond. One location in particular was observed where the surface of the water in the north pond was turbulent due to

flows entering from the south pond. Other less obvious seeps may also be present. As a result, this seepage flows through the north pond and subsequently into Clythe Creek. Therefore, there is a hydraulic connection between the south pond and Clythe Creek.

While this provides an input of flow, the potential for a cooling influence is lost as the water from the tributary entering the south pond is subject to warming while passing through the ponds. Furthermore, most of the flow leaves the south pond through a 45cm diameter CSP leading directly to the Eramosa River, which causes a large portion of the input from the tributary to be diverted directly to the Eramosa River instead of to Clythe Creek.

Aquatic Habitat – Hadati Creek

According to the GRCA, Hadati Creek is considered a coldwater stream (GRCA 2006). According to MNR, Guelph District file information, the gradient is higher upstream of Elizabeth Street, the substrate is primarily bedrock, and the stream is narrower than it is near the outlet to Clythe Creek (MNR 2001). A western tributary discharges to the main branch east of the Elizabeth Street/Industrial Street intersection. Upstream of Suburban Avenue, "...there is a bedrock shelf which probably prevents the upstream migration of fish (MNR 2001)."

Hadati Creek – Reach 1

Reach 1 of Hadati Creek is between Elizabeth Street and its outlet to Clythe Creek (Figure 2). Here, Hadati Creek passes between parking lots of the commercial lands that line York Road. The corridor is extremely narrow, with no more than one or two metres of vegetation on either side of the creek. The creek passes through a large box culvert under York Road. On the downstream side, grasses in the roadside ditch surround the short length of channel between the road and the outlet to Clythe Creek.

The channel in Reach 1 is approximately 3m wide, and is very entrenched. The bank height ranges from approximately 1.9 to 2.2m, and bank slopes are nearly vertical. Most of the banks are hardened with a concrete bag wall (see Photo 10, Appendix I). Elsewhere, vegetation consists of grasses and other herbaceous plants that provide a moderate vegetation density for bank stability. Some minor bank scour is occurring on the west bank immediately upstream of the York Road culvert, likely resulting from flow patterns at the culvert inlet. The varied channel substrate is the most important habitat

feature. It consists of approximately 30% cobble, 20% pebble, 10% gravel, 20% sand, and 20% silt. A 2001 MNR report shows that the substrate downstream of Elizabeth Street is "...composed on fractured bedrock and bedrock (MNR 2001)." The difference in observations occurred either because of different observation locations, or because material from upstream of the site has been deposited in this reach since 2001.

On June 8, 2006, the measured wetted widths in Reach 1 were approximately 2.7 to 2.9m between York Road and Elizabeth Street. Measured water depths ranged from 8 to 20cm. Several water quality parameters were measured at 3:05pm approximately 5m upstream of the York Road culvert. At this time the air temperature was 23°C, the water temperature was 21.9°C, the pH was 8.27, and the conductivity was 989µs/cm. Many small fish were observed on the upstream side of York Road.

FISH COMMUNITY

Rare Fish Species

Records of greenside darter in the vicinity of the study area were found on the Natural Heritage Information Centre (NHIC) website using the geographic query function (NHIC 2006). There was one “element occurrence” square (1km by 1km) that included part of the study area. Observations were made at that location in 1991. They were also found during sampling by the University of Guelph in the Guelph Correctional Facility Ponds in 2005 (see Section 3.4.4 of this report). The greenside darter (*Etheostoma blennioides*) has an S-rank (subnational rank) of S4, which means it is apparently secure. Nevertheless, at the present time it remains listed as a species of “special concern” by both the MNR for Ontario and COSEWIC for Canada (NHIC 2006; Pers. Comm. with Donald Kirk, MNR 2006b).

According to the *Ontario Freshwater Fishes Life History Database (OFFLHD)*, greenside darters prefer “algae-covered rocky riffles of creeks and small to medium rivers with clear water and moderate to fast current” (Eakins 2005). Their preferred water temperature is 25.4°C. As phytophils, greenside darters deposit their eggs on vegetation and woody debris (Eakins 2005).

Brook Trout and Brown Trout

According to a MNR map of brook trout distributions (MNR Unknown Date), brook trout were known to inhabit Clythe Creek in 1952 (Figure 3). According to Art Timmerman (MNR 2006a), there are currently no brook trout but there are mottled sculpin (*Cottus bairdi*) which also require cool water temperatures. However, the Speed Valley chapter of Trout Unlimited is conducting a monitoring program throughout the Clythe Creek watershed to determine the suitability of the habitat for brook trout. Temperature monitoring is ongoing in 2006 and electrofishing will be conducted throughout Clythe Creek to determine if any populations are present (D'Amelio, 2006). In addition, brook trout and brown trout are known to inhabit the Eramosa River (Ecologistics Ltd. et al 1998).

Urban Fishery at the Guelph Correctional Centre Ponds

A report by Art Timmerman indicates information from anglers that the ponds at the Guelph Correctional Centre "...contain excellent populations of pike, smallmouth bass, crappie, bullheads and sunfish. Yellow perch and largemouth bass have also been caught in these ponds (MNR 2001)."

Other Fish Records

Unnamed Tributary 1, which enters Clythe Creek upstream of the ponds at the Guelph Correctional Centre, is known to contain fish near the outlet (Figure 2). A survey by the MNR on August 30, 1994 indicated that unidentified minnows were observed in the lower 10m of the tributary (MNR 1994).

The sampling results for a number of fish collection records from the MNR Guelph District Office files are given in Table 1. Descriptions are given below for the various sources of information for this list of fish species. Available specific fish sampling locations are shown on Figure 3.

In 2005, the University of Guelph sampled several watercourses in southern Ontario, including the Eramosa River. Sampling in the Eramosa River watershed occurred in the ponds at the Guelph Correctional Centre (Record Location 1, Figure 3).

In 2001, Fisheries and Oceans Canada (DFO) conducted fish sampling at a variety of locations with the purpose of monitoring culvert installations. This included Clythe Creek upstream of the York Road corridor, between York Road and Watson Road (see Record Location 2, Figure 3).

In 1998, a subwatershed study was conducted for the Clythe Creek subwatershed (Ecological et al 1998). The report included a list of species for the entire subwatershed.

In 1990, the GRCA conducted exploratory electrofishing at 4 sites on Clythe Creek upstream of Watson Road (see Record Locations 3, 4, 5, and 6, Figure 3).

In 1981, Gregory Humphreys (affiliation not noted) conducted sampling under scientific permit at various locations in the Grand River and Thames River Drainage. One site was located on the Eramosa River at the "Guelph Correctional Centre (bridge)".

In 1972, the GRCA published a report called "Water Quality Survey of the Speed and Eramosa Rivers." The report includes results of fish sampling for 13 sites, 3 of which are on the Eramosa River in relatively close proximity to the outlet of Clythe Creek (see Record Locations 7, 8, and 9).

Table 1. Fish Species Known from the Clythe Creek Subwatershed, and the Eramosa River near the Clythe Creek Outlet

Common Name	Scientific Name	Provincial Rank (S-Rank)	University of Guelph, Correctional Centre Ponds (2005)	DFO, Clythe Cr. between York Rd. and Watson Rd. (2001)	Ecologistics et al, Clythe Creek Subwatershed (1998)	GRCA, Clythe Cr. Upstream of Watson Rd. (1990)	Gregory Humphreys Eramosa River at Correctional Centre (1981)	GRCA Water Quality Survey, Eramosa River (1972)
Cyprinidae								
creek chub	<i>Semotilus atromaculatus</i>	S5	X		X	X		X
homyhead chub	<i>Nocomis biguttatus</i>	S4						X
common shiner	<i>Luxilus cornutus</i>	S5			X	X		X
blacknose shiner	<i>Notropis heterolepis</i>	S5			X			
northern redbelly dace	<i>Phoxinus eos</i>	S5			X	X		
finescale dace	<i>Phoxinus neogaeus</i>	S5			X	X		
bluntnose minnow	<i>Pimephales notatus</i>	S5	X	X				X
fathead minnow	<i>Pimephales promelas</i>	S5			X	X		
blacknose dace	<i>Rhinichthys atratulus</i>	S5			X	X		
longnose dace	<i>Rhinichthys cataractae</i>	S5						X
Percidae								
greenside darter	<i>Etheostoma biennioides</i>	S4	X					
fantail darter	<i>Etheostoma flabellare</i>	S4	X	X	X			
barred fantail*								
rainbow darter	<i>Etheostoma caeruleum</i>	S4	X					X
johnny darter	<i>Etheostoma nigrum</i>	S5	X				X	X
blackside darter	<i>Percina maculata</i>	S4					X	X
Centrarchidae								
smallmouth bass	<i>Micropterus dolomieu</i>	S5						X
largemouth bass	<i>Micropterus salmoides</i>	S5						X
pumpkinseed	<i>Lepomis gibbosus</i>	S5						X
rock bass	<i>Ambloplites rupestris</i>	S5						X
Catostomidae								
white sucker	<i>Catostomus commersoni</i>	S5			X	X		X
northern hog sucker	<i>Hypentelium nigricans</i>	S4			X			X
Other Families								
brook stickleback	<i>Culaea inconstans</i>	S5		X	X	X	X	
brown bullhead	<i>Ameiurus nebulosus</i>	S5		X				
central mudminnow	<i>Umbra limi</i>	S5		X	X	X		
mottled sculpin	<i>Cottus bairdi</i>	S5			X	X		
brook trout	<i>Salvelinus fontinalis</i>	S5			X	X		X

*The "barred fantail" is most likely the fantail darter (*Etheostoma flabellare*)

Figure 1

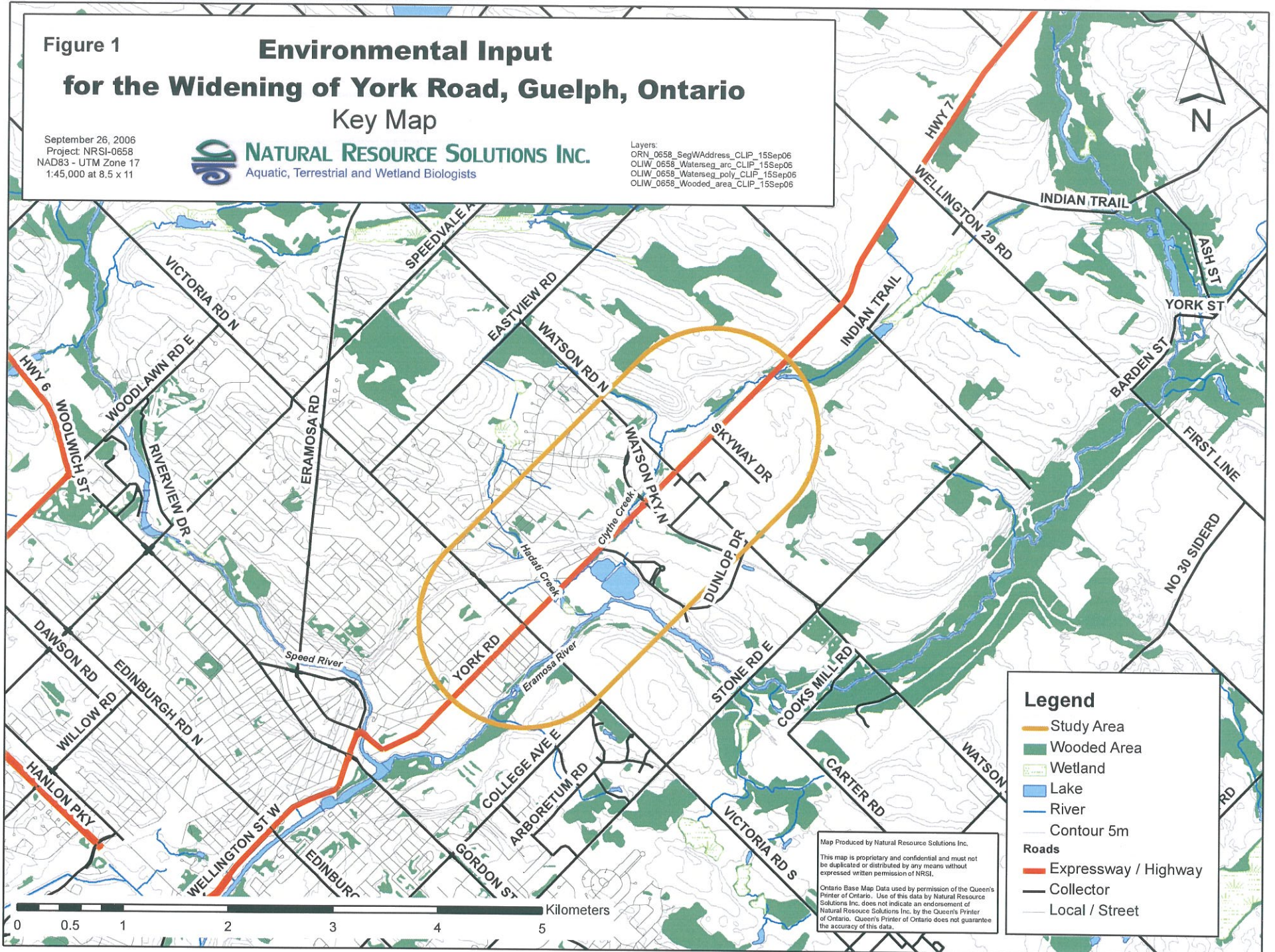
Environmental Input for the Widening of York Road, Guelph, Ontario Key Map

September 26, 2006
Project: NRSI-0658
NAD83 - UTM Zone 17
1:45,000 at 8.5 x 11



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Layers:
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OLIW_0658_Waterseg_arc_CLIP_15Sep06
OLIW_0658_Waterseg_poly_CLIP_15Sep06
OLIW_0658_Wooded_area_CLIP_15Sep06



Legend

- Study Area
- Wooded Area
- Wetland
- Lake
- River
- Contour 5m

Roads

- Expressway / Highway
- Collector
- Local / Street

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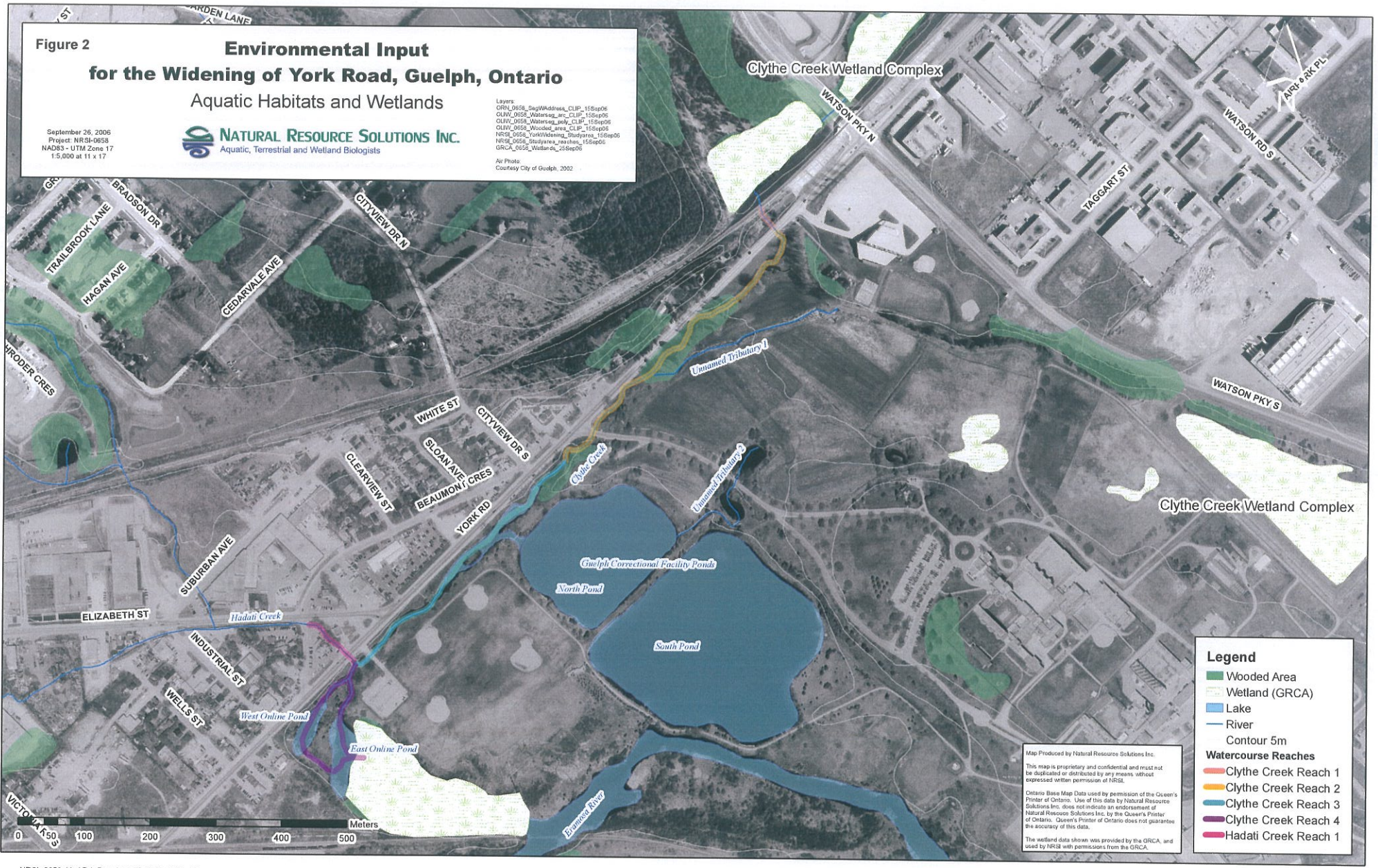
Figure 2
Environmental Input
for the Widening of York Road, Guelph, Ontario
Aquatic Habitats and Wetlands

September 26, 2006
 Project: NRSI-0658
 NAD83 - UTM Zone 17
 1:5,000 at 11 x 17

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 Aquatic, Terrestrial and Wetland Biologists

Layers:
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 OLWV_0658_Wooded_area_CLIP_15Sep06
 NRSI_0658_YorkWidening_StudyArea_15Sep06
 NRSI_0658_StudyArea_reaches_15Sep06
 GRCA_0658_Wetland_23Sep06

Air Photo
 Courtesy City of Guelph, 2002



Legend

- Wooded Area
- Wetland (GRCA)
- Lake
- River
- Contour 5m

Watercourse Reaches

- Clythe Creek Reach 1
- Clythe Creek Reach 2
- Clythe Creek Reach 3
- Clythe Creek Reach 4
- Hadati Creek Reach 1

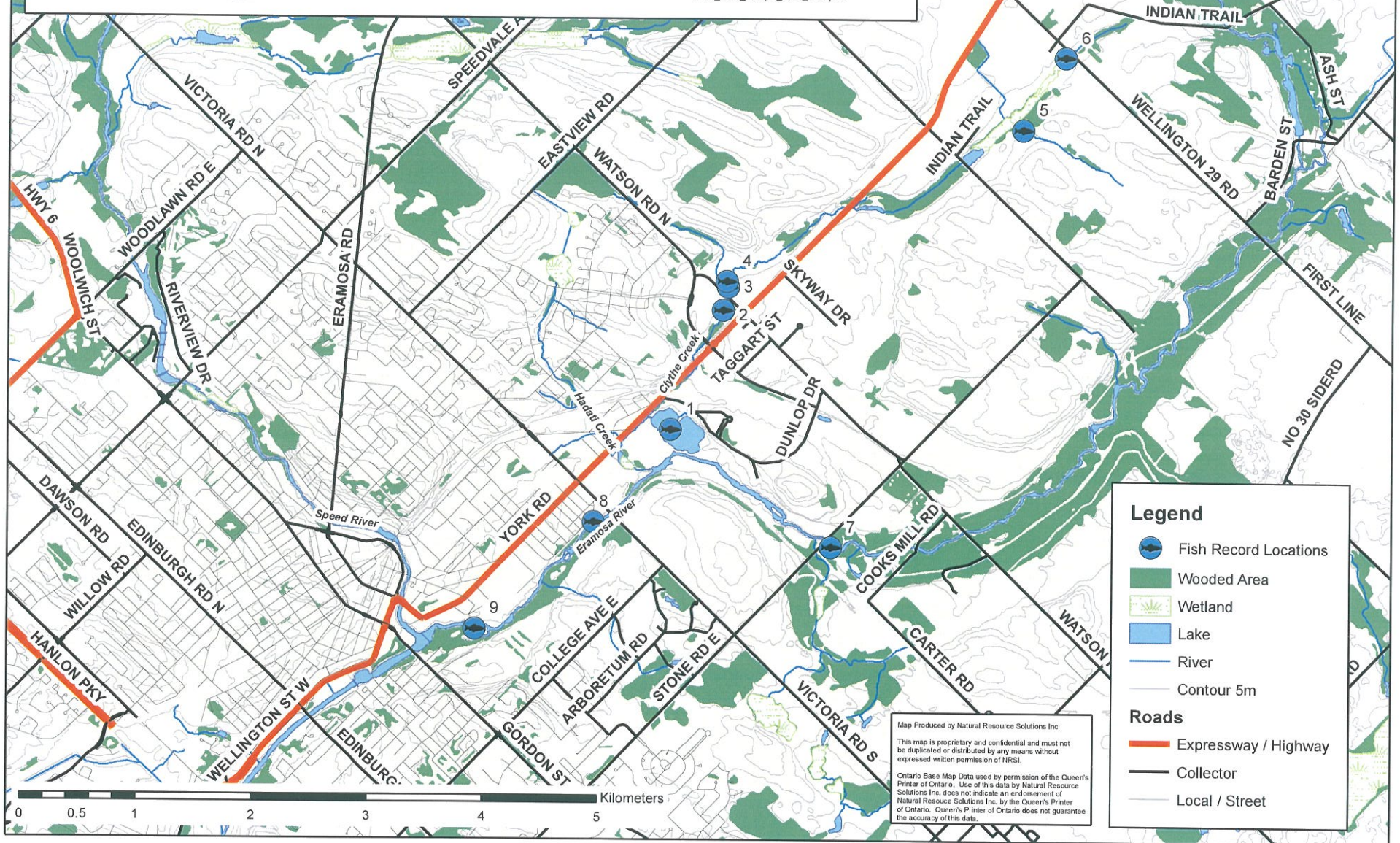
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Figure 3
Environmental Input
for the Widening of York Road, Guelph, Ontario
Fish Record Locations

September 26, 2006
 Project: NRSI-0658
 NAD83 - UTM Zone 17
 1:45,000 at 8.5 x 11



Layers:
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 OLIW_0658_Wooded_area_CLIP_15Sep06
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Photo 1 – Clythe Creek, example of the many weirs in the study area



Photo 2 – Clythe Creek, Reach 1, looking downstream



Photo 3 – Clythe Creek, Reach 2, looking upstream toward York Road crossing



Photo 4 – Clythe Creek, Reach 3, looking upstream



Photo 5 – Clythe Creek, Reach 4, looking downstream toward Hadati Cr. outlet and ponds



Photo 6 – Clythe Creek, Reach 4, abundant aquatic plants in the online ponds



Photo 7 – Connection between the north pond and Reach 3 of Clythe Creek



Photo 8 – Fisherman at Guelph Correctional Facility Ponds, looking south from Clythe Cr.



Photo 9 – South Pond, looking southwest



Photo 10 – Hadati Creek, Reach 1, looking upstream