

## **Appendix I:**

### **DRIC Detroit River Watercourses Reconnaissance Level Mussel Survey**



environmental research associates

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# Draft Memo

**To:** URS Canada Inc. and Ontario Ministry of Transportation  
**From:** Christa L. Rigney, B.Sc., Invertebrate Biologist & Environmental Planner  
**Date:** August 5, 2009  
**Re:** DRIC Detroit River Watercourses Reconnaissance Level Mussel Survey

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In July 2009 a survey for bivalves<sup>1</sup>, particularly bivalve species-at-risk, was conducted in the tributaries of the Detroit River located within The Windsor-Essex Parkway footprint for the Detroit River International Crossing (DRIC) study.

## Background Data and Methodology

Historical mollusc data was previously reviewed for this study area and indicated that there was a low likelihood of bivalve species-at-risk inhabiting the inland watercourses (LGL 2008). However, Fisheries and Oceans Canada (DFO) staff recommended that a reconnaissance level investigation for molluscs be conducted to document their presence/absence within watercourses which may be affected by the DRIC project. This survey was necessary to fulfil DFO's requirements under the *Canadian Environmental Assessment Act* (CEAA) review as bivalves are regulated as a fish under the federal *Fisheries Act*.

The bivalve survey was conducted from July 6 to 9, 2009 by Christa Rigney (Invertebrate Biologist, DFO Mussel Identification Course), Martin O'Halloran (Fish and Wildlife Technician, DFO Mussel Identification Course), Judson Venier (Fisheries Biologist) and Stephanie Lillie (Fish and Wildlife Technician). A *Licence to Collect Fish for Scientific Purposes* was secured from the Ontario Ministry of Natural Resources (MNR), Chatham Area Office. A decision was made that a *Species-At-Risk Act* permit and an Ontario *Endangered Species Act, 2007* permit were not required by DFO (Shawn Staton) and MNR (Melody Cairns), respectively, since the survey was a general reconnaissance level survey for bivalves and the likelihood of encountering species-at-risk was low. In accordance with the *Licence to Collect Fish for Scientific Purposes*, a Mandatory Report will be submitted to MNR.

The watercourses sampled were selected based on the potential presence of permanent flow, fish habitat and/or presence of host fish species, as identified in the Draft Practical Alternatives Evaluation Working Paper – Natural Heritage (LGL 2008) and the Natural Heritage Impact Assessment – Recommended Plan (LGL 2008). The following watercourses were sampled: McKee Drain, Basin Drain, Youngstown Drain North Branch, Grand Marais Drain/Turkey Creek, Lennon Drain, Cahill Drain, Wolf Drain and Collins Drain. The location of these watercourses and sampling sites are presented in **Figure 1**.

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<sup>1</sup> Bivales are mussels only (2 shells with a hinge). Molluscs include Bivalves and Gastropods (snails);

The reconnaissance level qualitative surveys were conducted using the time-searched technique detailed in Mackie *et al.* (2008) to locate live mussels, to the extent possible. The watercourse substrate was visually searched by the 4-person team using waders, polarized sunglasses and underwater viewers. Where potential suitable habitat was present a maximum total of 4.5 person hours (p-h) of sampling effort was invested. If the site exhibited indicators of unsuitable mussel habitat or was a very narrow (small) channel, then the site was searched for the duration required to sufficiently screen it. Indicators of unsuitable mussel habitat that were considered included:

- high or frequent turbidity;
- low flow;
- evidence of high chemical contamination;
- evidence of very high or low water temperature, pH, dissolved oxygen, or other water quality parameters;
- lack of natural or suitable substrate; and,
- lack of mussel host (vector) fish species present.

When the water clarity was reduced tactile searches were also periodically employed using the ‘raccooning’ method (hand search to feel mussels). The shoreline was also checked for middens (piles of dead shells left by wildlife feeding).

Sampling information for each site was recorded in a field sampling form, similar to the standard MTO fisheries sampling forms outlined in the Environmental Guide for Fish and Fish Habitat (MTO 2008). The physical attributes documented included:

- sample site dimensions;
- water temperature;
- pH;
- dissolved oxygen;
- conductivity;
- turbidity;
- total dissolved solids;
- water colour;
- watercourse type;
- watercourse velocity;
- morphology;
- substrate; and,
- general comments.

A full habitat inventory of each site was not conducted at this time as information has been previously documented as part of the study’s fisheries assessment. Had any mussels been found in the watercourses, their location would have been recorded by GPS and the specimen would be photographed from several angles. The specimen would be counted, identified to species, sexed (if possible) and the shell size (length, width and

height) measured. The mussel would have then been returned to the location found, oriented in the position found, or in a position suitable to allow it to re-burrow. Initial identification of species would have been made using the Photo Field Guide to the Freshwater Mussels of Ontario (Metcalf-Smith *et. al.* 2000) and the key provided in the Ontario Freshwater Mussel Identification Workshop – Workshop Exercises booklet (Canada Centre for Inland Waters 2006).

## **Results**

A brief description of the watercourses investigated is provided below. A representative photograph of the sampling sites is attached to this memo.

### McKee Drain

The McKee Drain crossing at the E.C. Row Expressway was investigated for a total of 2.0 person hours. The watercourse was not flowing at the time of the investigation and duckweed (*Lemna* sp.) was observed on the water surface. The channel was approximately 2.0 m wide and 0.25 m deep. The watercourse was searched for mussels approximately 10 m upstream and downstream of the crossing of E.C. Row Expressway. The substrates at this location were very soft and were approximately 10 cm to 30 cm thick. The substrates consisted of 40% muck, 35% detritus and 25% silt, and the morphology was 100% flats. The water temperature was 17.7°C, the pH 7.16, dissolved oxygen 11.0 mg/L, conductivity 1.657 µS/cm, turbidity 4.0 NTU and the total dissolved solids was 8.57 ppm. No mussels were observed. According to the fisheries field investigations (LGL 2008) there are no host fish species present at this crossing of this watercourse. Based on the lack of host fish present and the habitat conditions, it is highly unlikely that mussels occur at this location.

### Basin Drain

The Basin Drain crossing at the E.C. Row Expressway was investigated for a total of 3.3 person hours. Approximately 30 m of the watercourse was investigated. The watercourse had a low flow velocity at the time of field investigation. The channel was approximately 2.0 m wide and 0.25 m deep, and the morphology was 100% flats. The substrates were soft, and consisted of 40% silt, 40% muck and 20% detritus. The water temperature was 18.5°C, the pH 7.41, dissolved oxygen 6.9 mg/L, conductivity 1.35 µS/cm and the turbidity was 7.4 NTU. No mussels were observed. Host fish species may be present at this location, however the habitat present appears unsuitable for mussels.

### Youngstown Drain North Branch

The north branch of Youngstown Drain was investigated for a total of 1.25 person hours. At the time of the investigation the watercourse was almost dry and had no flow. Water had gathered in several small pools however, there was no connectivity between these pools. There was an oily sheen on the water surface near the culvert under the E.C. Row Expressway/Huron Church Road interchange. The habitat at this location was insufficient to support mussels and no mussels were observed.

### Grand Marais Drain/Turkey Creek

Grand Marais Drain/Turkey Creek from the Huron Church Road crossing to the end of the concrete channel (1,000 m downstream) was investigated, plus approximately 15 m of the “natural” channel area downstream of the concrete channel. A total of 4.3 person hours were devoted to investigating this site. Within the concrete lined portion of the watercourse, the channel is approximately 2 m wide and 0.3 m deep. The bottom of the channel is a poured concrete floor (90% substrate), with some gravel and sand in areas where cracks in the concrete have created small current breaks (remaining 10% of substrate). The watercourse velocity was low at the time of investigations. At the end of the concrete channel the watercourse banks and substrate became naturalized. Here the channel was approximately 18 m wide and the depth ranged from 0.05 m at the immediate outlet to 0.65 m further downstream. Here the channel morphology was 100 % flats and the

substrate was 70% gravel, 15% sand and 15% silt. The water temperature was 27.5°C, the pH 9.7, dissolved oxygen 14.8 mg/L, conductivity 1172 µS/cm, turbidity 2.6 NTU and the total dissolved solids was 513 ppm. No mussels were observed despite a thorough check of the concrete lined channel and concrete expansion joints (cracks), and the area immediately downstream of the concrete channel. Some mussel host fish species are present at this location; however the habitat conditions within the concrete lined channel are highly unsuitable for mussels. Downstream of the concrete channel the habitat conditions improve; however they are still marginal, and this area is not located in the footprint of The Windsor-Essex Parkway.

### Lennon Drain

Lennon Drain at the crossing of Talbot Road was investigated for a total of 2.0 person hours. Approximately 50 m upstream of the culvert and 20 m downstream were thoroughly searched for mussels. Upstream of the culvert the channel is approximately 1.75 m wide, 0.10 m deep and lined with mesh netting (likely the remnants of a geotextile) to stabilize the bottom of the channel. Downstream of the culvert the channel is 1.25 m wide, 0.15 m deep, lined with riprap and the entire water column is densely filled with submerged macrophytes. The flow was very low and the morphology was 80% flats and 20% runs. The substrate was 73% riprap, 15% silt, 5% detritus and 2% gravel. The water temperature was 17.4°C, the pH 7.72, dissolved oxygen 8.5 mg/L, conductivity 5.86 µS/cm, turbidity 7.4 NTU and the total dissolved solids was 3.09 ppm. No mussels were observed. Some of the fish species present are known to be hosts for mussels. The habitat upstream of the culvert also appears initially to be potentially suitable for mussels, however a closer investigation of the overall habitat conditions of the reach suggests that it is insufficient to support mussel species. Given the absence of mussels observed and the marginal habitat present, it is unlikely that mussel species occur at this location.

### Cahill Drain

Cahill Drain from immediately downstream of Talbot Road to the Talbot Road/Cousineau Road intersection was investigated in two segments: at the Talbot Road crossing, and from upstream of the Talbot Road crossing to the Talbot Road/Cousineau Road intersection. The Talbot Road crossing was searched for mussels for a total of 3.0 person hours. At the crossing of Talbot Road the reach is approximately 1.0 m wide and 0.1 m deep. The flow is low and the morphology is 35% runs, 35% riffles and 30% pools. The substrate is 45% gravel, 25% sand, 25% silt and 5% cobble, and much of the channel is littered with debris. The water temperature is 18.0°C, the pH 7.9, dissolved oxygen 7.5 mg/L, conductivity 1.2 µS/cm, turbidity 8.2 NTU and the total dissolved solids are 606 ppm.

The 815 m reach where Cahill Drain parallels Talbot Road was investigated for a total of 3.5 person hours. From Talbot Road to Cousineau Road the watercourse is approximately 2.0 m wide and ranges from 0.1 m to 0.4 m deep. The flow remained low and the morphology was 45% runs, 45% flats and 10% riffles. The substrate was 60% gravel, 25% sand, 10% silt and 5% detritus and again much of the channel was littered with debris. The water temperature was 19.27°C, the pH 7.67, dissolved oxygen 4.7 mg/L, conductivity 899 µS/cm, turbidity 35 NTU and the total dissolved solids was 453 ppm. While walking upstream the water became noticeably turbid downstream of Cousineau Road. No apparent source for this turbidity was evident.

No mussels were observed. The substrate in Cahill Drain appeared moderately suitable for mussels and host fish species, however the overall habitat conditions (water velocity, water quality and chemistry, specific substrate, etc.) appear unsuitable to support mussels.

### Wolfe Drain

The reach of Wolfe Drain along Talbot Road was investigated in three segments: from Cousineau Road to Howard Avenue; from Howard Avenue to the Highway 401 terminus; and, from the Highway 401 terminus to Outer Drive.

The 1,560 m of Wolfe Drain from Cousineau Road to Howard Avenue was investigated for a total of 4.24 person hours. The width of the channel here ranged from 0.5 m to 2.0 m and the depth from 0.1 m to 0.4 m. The flow was low with a morphology of 80% runs and 20% riffles. The substrate was 30% gravel, 30% sand, 20% silt, 5% cobble and 5% clay. The water was again turbid, and appeared to be from where the turbidity at Cahill Drain originated. The water temperature was 17.96°C, the pH 7.74, dissolved oxygen 3.63 mg/L, conductivity 1.12 µS/cm, turbidity 7.0 NTU and the total dissolved solids was 560 ppm. No apparent source for the turbidity was observed, although there was a significant amount of debris and yard waste within the watercourse throughout this reach, and the watercourse is relatively close to Talbot Road.

The 780 m of Wolfe Drain from Howard Avenue to the terminus of Highway 401 was investigated for a total of 1.25 person hours. The width of the channel here ranged from 0.5 m to 2.0 m and the depth from 0.1 m to 0.4 m. The flow was also low here, though the water clarity was improved. The morphology was 70% runs, 20% flats and 10% riffles. The substrate was 80% silt, 15% gravel and 5% sand. No water chemistry readings were taken given the proximity of other readings upstream and downstream.

The 160 m from the terminus of Highway 401 to Outer Driver was investigated for a total of 2.0 person hours. The channel was 2.0 m wide and 0.2 m deep and the flow was very low. The morphology was 50% flats, 40% pools and 10% riffles, and the substrate was 70% sand, 20% gravel and 10% silt. The water temperature was 21.7°C, the pH 8.3, dissolved oxygen 7.5 mg/L, conductivity 0.91 µS/cm and the turbidity was 7.3 NTU.

Upstream of the Talbot Road/Outer Driver intersection Wolfe Drain turns northward and is a riprap lined channel filled with cattails (*Typha* sp.). The watercourse had minimal flow and sampling was not conducted as the habitat appears unsuitable for mussels. No mussels were recorded in the reaches located downstream of this section.

No mussels were observed within or near the Wolfe Drain. The low flow conditions and turbidity, as well as the other habitat conditions suggest that the conditions present in the Wolfe Drain are not suitable to support mussels.

### Collins Drain

Collins Drain upstream of the junction with Wolfe Drain (at the Talbot Road/Outer Drive) intersection was investigated briefly, however no mussel review was conducted. The watercourse had virtually no flow, the channel was lined with riprap and full of cattails and, as a result, suitable mussel habitat was not present. In addition, no mussels were recorded in the reaches of Wolfe Drain located downstream of Collins Drain.

### Mussel Observations

No live bivalves or shells were found within or in close proximity to any of the watercourses surveyed. One old shell was found beneath a guide rail on the roadbed of Talbot Road, just east of the terminus of Highway 401. The shell was approximately 15 m from Wolfe Drain and exhibited indication that the mussel has been dead for several years (bleaching, erosion of the shell exterior and 1/3 of the shell edges had broken off).

Identification of the mussel species is difficult due to the shell deterioration described above (see **Figure 2**). However, based on the features visible (posterior ridge, hinge teeth and shape), it is likely an Eastern Elliptio (*Elliptio complanata*). This species is among the most common and widespread in Ontario, and it is not considered a species-at-risk. Given the location where this shell was found, there is a high probability that it did not recently originate from the Wolfe Drain. Suitable habitat for Eastern Elliptio is likely not present in this watercourse, and the shell could have easily been transported to this location by wildlife, an incidental vehicle passing or as a constituent of the granular materials used for roadbed construction or maintenance.

## **Conclusion**

No mussels were observed within or near the McKee Drain, Basin Drain, Youngstown Drain North Branch, Grand Marais Drain/Turkey Creek, Lennon Drain, Cahill Drain, Wolfe Drain and Collins Drain within The Windsor-Essex Parkway footprint. Furthermore the habitat conditions at these sites appear to be unsuitable to support mussels. Thus it is unlikely that bivalve species occur in The Windsor-Essex Parkway footprint or would be directly impacted by the works associated with the Detroit River International Crossing Study.

## **References**

- Canada Centre for Inland Waters. 2006. Ontario Freshwater Mussel Identification Workshop – Workshop Exercises booklet. Fisheries and Oceans Canada. Burlington, Ontario. June 13 to 14, 2006.
- Meridianwave Consultants Inc. November 2008. Distribution of Mussel Species at Risk – Essex Region Conservation Authority (Map 1). Fisheries and Oceans Canada. Burlington, Ontario.
- Metcalf-Smith, J., A. MacKenzie, I. Carmichael and D. McGoldrick. 2000. Photo Field Guide to the Freshwater Mussels of Ontario. St. Thomas Field Naturalist Club Incorporated. St. Thomas, Ontario.
- Mackie, G., T.J. Morris and D. Ming. 2008. Protocol for the Detection and Relocation of Freshwater Mussel Species at Risk in Ontario - Great Lakes Area (OGLA). Fisheries and Oceans Canada. Burlington, Ontario.
- Ontario Ministry of Transportation. 2008. Environmental Guide for Fish and Fish Habitat.
- Strayer, D.L. and D.R. Smith. 2003. A Guide to Sampling Freshwater Mussel Populations. American Fisheries Society Monograph 8. American Fisheries Society. Bethesda, Maryland.
- LGL Limited. 2008. Draft Practical Alternatives Evaluation Working Paper – Natural Heritage. Prepared for the Canada-United States-Ontario-Michigan Border Partnership.
- LGL Limited. 2008. Natural Heritage Impact Assessment – Recommended Plan. Prepared for the Canada-United States-Ontario-Michigan Border Partnership.

**Figure 1. Watercourses and Fish Habitat Located in the Area of Investigation**





**LEGEND**

- The Windsor-Essex Parkway ESA Footprint
- Area of Investigation
- Drainage
- Drainage - Moderate/High Sensitivity Fish Habitat
- Drainage - Low Sensitivity Fish Habitat
- Drainage - Not Fish Habitat
- Fish Habitat
- Seasonal Fish Habitat
- No Fish Habitat
- Bivalve Survey Area

Data Sources: LGL Limited field surveys, Essex Region Conservation Authority, Spring 2006 aerial photography.

**WATERCOURSES AND FISH HABITAT LOCATED IN THE AREA OF INVESTIGATION**



Project: TA4137	Figure: 1a
Date: July 2009	Prepared By: MWF
Scale: 1 : 10,000	Checked By: CLR



**LEGEND**

-  The Windsor-Essex Parkway ESA Footprint
-  Area of Investigation
-  Drainage
-  Drainage - Moderate/High Sensitivity Fish Habitat
-  Drainage - Low Sensitivity Fish Habitat
-  Drainage - Not Fish Habitat
-  Fish Habitat
-  Seasonal Fish Habitat
-  No Fish Habitat
-  Bivalve Survey Area

Data Sources: LGL Limited field surveys, Essex Region Conservation Authority, Spring 2006 aerial photography.

**WATERCOURSES AND FISH HABITAT LOCATED IN THE AREA OF INVESTIGATION**



Project: TA4137	Figure: 1b
Date: July 2009	Prepared By: MWF
Scale: 1 : 10,000	Checked By: CLR



**LEGEND**

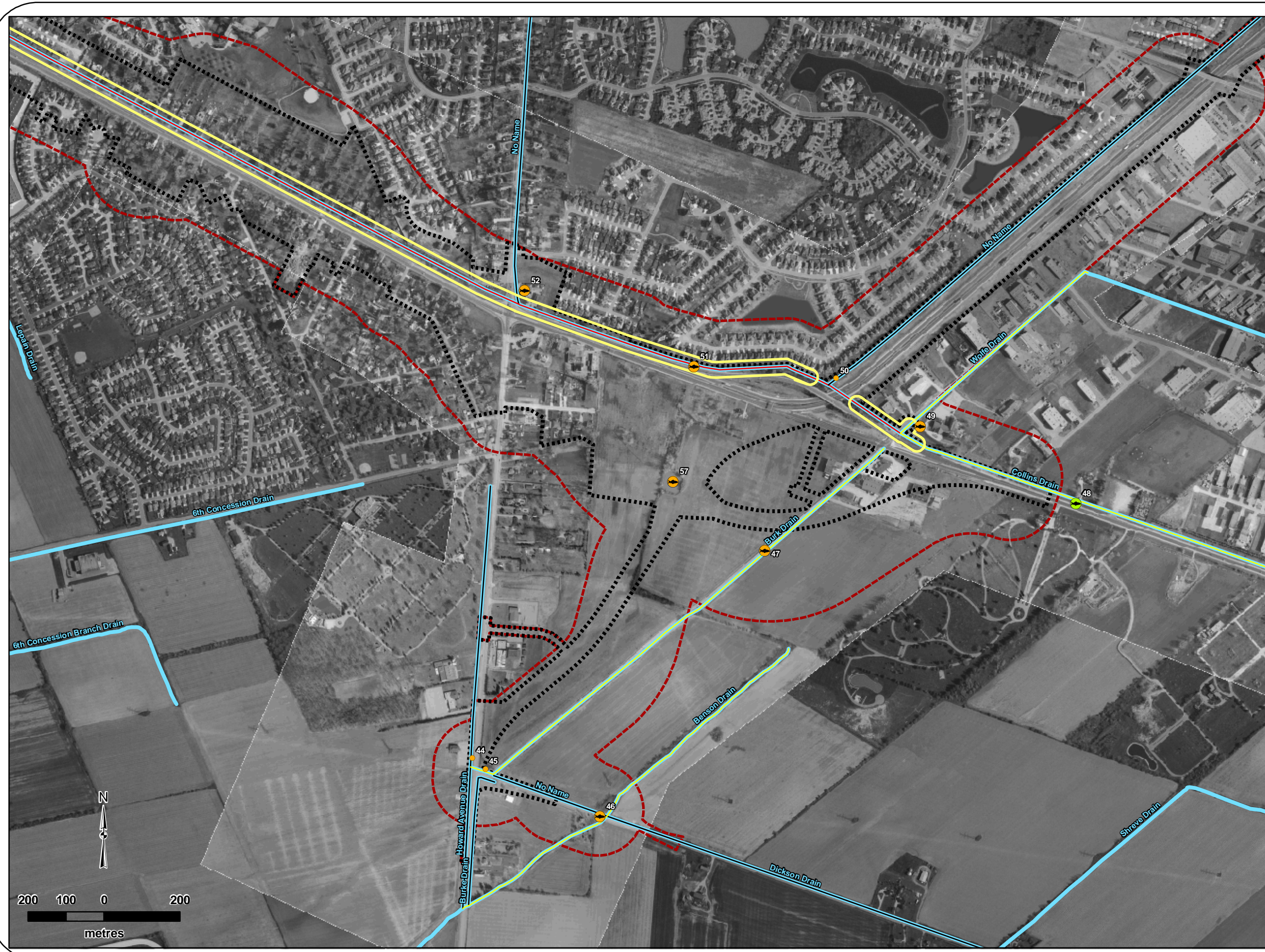
-  The Windsor-Essex Parkway ESA Footprint
-  Area of Investigation
-  Drainage
-  Drainage - Moderate/High Sensitivity Fish Habitat
-  Drainage - Low Sensitivity Fish Habitat
-  Drainage - Not Fish Habitat
-  Fish Habitat
-  Seasonal Fish Habitat
-  No Fish Habitat
-  Bivalve Survey Area

Data Sources: LGL Limited field surveys, Essex Region Conservation Authority, Spring 2006 aerial photography.

**WATERCOURSES AND FISH HABITAT LOCATED IN THE AREA OF INVESTIGATION**



<b>Project:</b> TA4137	<b>Figure:</b> 1c
<b>Date:</b> July 2009	<b>Prepared By:</b> MWF
<b>Scale:</b> 1 : 10,000	<b>Checked By:</b> CLR



**LEGEND**

-  The Windsor-Essex Parkway ESA Footprint
-  Area of Investigation
-  Drainage
-  Drainage - Moderate/High Sensitivity Fish Habitat
-  Drainage - Low Sensitivity Fish Habitat
-  Drainage - Not Fish Habitat
-  Fish Habitat
-  Seasonal Fish Habitat
-  No Fish Habitat
-  Bivalve Survey Area

Data Sources: LGL Limited field surveys, Essex Region Conservation Authority, Spring 2006 aerial photography.

**WATERCOURSES AND FISH HABITAT LOCATED IN THE AREA OF INVESTIGATION**



<b>Project:</b> TA4137	<b>Figure:</b> 1c
<b>Date:</b> July 2009	<b>Prepared By:</b> MWF
<b>Scale:</b> 1 : 10,000	<b>Checked By:</b> CLR

**Figure 2. Probable Eastern Elliptio shell found under a guide rail on Talbot Road, west of Highway 401.**



## PHOTO APPENDIX

### McKee Drain



**Photo 1:** McKee Drain, looking southeast (upstream) towards the E.C. Row Expressway culvert crossing.



**Photo 2:** McKee Drain, looking northwest (downstream) from the E.C. Row Expressway culvert crossing.

## PHOTO APPENDIX

### Basin Drain



**Photo 3:** Basin Drain, looking north (upstream) towards the E.C. Row Expressway crossing.



**Photo 4:** Basin Drain, looking south (downstream) from south of the E.C. Row Expressway crossing.

## PHOTO APPENDIX

### Youngstown Drain, North Branch



**Photo 5:** Youngstown Drain, looking northeast (upstream) towards E.C. Row to Huron Church Road eastbound to southbound off ramp culvert.



**Photo 6:** Youngstown Drain, looking southwest (downstream) from the E.C. Row Expressway to Huron Church Road eastbound to southbound off ramp culvert. Note the oily sheen on the surface.



## PHOTO APPENDIX

### Turkey Creek



**Photo 7:** Turkey Creek, looking northeast (upstream) towards Huron Church Road.



**Photo 8:** Turkey Creek, looking southwest (downstream) from south of Huron Church Road.

## PHOTO APPENDIX

### Turkey Creek



**Photo 9:** Turkey Creek, looking southwest (downstream) towards the end of the concrete section of stream.



**Photo 10:** Turkey Creek, looking northeast (upstream) at the end of the concrete section of stream.

## PHOTO APPENDIX

### Lennon Drain



**Photo 11:** Lennon Drain looking southwest (downstream) from Talbot Road.



**Photo 12:** Lennon Drain looking southwest (downstream) towards Talbot Road.

## PHOTO APPENDIX

### Cahill Drain



**Photo 13:** Cahill Drain looking southeast (upstream) from the Talbot Road crossing.



**Photo 14:** Cahill Drain looking southeast (upstream) facing towards the Cousineau Road crossing.

## PHOTO APPENDIX

### Wolfe Drain



**Photo 15:** Wolfe Drain looking southeast (upstream) from Cousineau Road.



**Photo 16:** Wolfe Drain looking southeast (upstream) towards a driveway between Cousineau Road and Howard Avenue.

## PHOTO APPENDIX

### Wolfe Drain



**Photo 17:** Wolfe Drain looking northwest (downstream) towards Howard Avenue.



**Photo 18:** Wolfe Drain looking southeast (upstream) from Howard Avenue.

## PHOTO APPENDIX

### Collins and Wolfe Drain



**Photo 19:** Wolfe Drain looking east (upstream) from the Talbot Road/Outer Road intersection.



**Photo 20:** Collins Drain looking south (upstream) from the Talbot Road/Outer Road intersection.