



**ECOLOGICAL SURVEY OF PONDS AT  
M74 JUNCTION 5, RAITH  
AQUATIC INVERTEBRATES  
2006**

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## **1. INTRODUCTION**

### **1.1 Project Background**

1.1.1 Mouchel Fairhurst Joint Venture (MFJV) are carrying out investigations as part of proposed junction improvements on the M74 (Junction 5) at Raith. As part of this work Young Associates (YA) carried out an invertebrate survey of six ponds within the vicinity of the junction improvement scheme.

1.1.2 This report details the results of the invertebrate survey undertaken on the 28<sup>th</sup> July 2006.

### **1.2 Site Description**

1.2.1 The ponds surveyed lie at various locations around the Raith Junction. Survey locations were selected based on those used in the Raith amphibian survey. The location of each pond is presented in Figure 1, with photographs of each pond presented at Annex 1 of this report.

1.2.2 Ponds 16, 17, and 18 are located in semi-improved grassland fields. Pond 16 was completely dry at the time of sampling. All ponds were subject to a degree of poaching by livestock and horses. Pond 19 is located on the banks of the River Clyde and in an area of riparian marsh, whilst Ponds 20 and 21 are located in an area dominated by scrub and tall ruderals.

## **2. METHODS**

2.1.1 Aquatic macro-invertebrate survey was undertaken by two experienced YA ecologists using an adapted methodology from the National Pond Survey (Pond Action 1994). All sites were sampled for three minutes (net in the water time), using sweep sampling methodology with a 1mm Freshwater Biological Associate pond net. All invertebrates retained in a single sample were transferred to a pre-labelled container, and fixed with 5% formaldehyde for later laboratory sorting and identification. The samples were washed and sieved in the field using 1cm and 500µm sieves in order to remove the coarsest and finest fractions. Identification was undertaken to species level with the exception of specialist taxa, such as oligochaetes and chironomids.

### **2.2 Limitations**

2.2.1 Access to most of the ponds was extremely difficult with steeply shelving banks and soft/deep silts evident at each pond location with the exception of Pond 16. The results are based on a single sampling event, undertaken during the month of July 2006. Whilst it is considered that the pond habitats are such that seasonal fluctuations in invertebrate assemblages are unlikely to vary significantly between seasons, it is considered that an assessment of the invertebrate taxa on single season data is limited and that a full assessment of the conservation value of the pond habitats would require a "through the seasons" assessment of the invertebrate community to account for the lifecycle stages and the seasonality of various invertebrate species. The data from this survey provide a baseline point in relation

to the proposed junction improvements, and an initial indication of the value of the ponds sampled to invertebrates.

### 3. RESULTS

#### 3.1 Pond Habitat

3.1.1 Habitat notes were taken using a standardised pond assessment proforma and an overview of the habitat at each pond is detailed below. Photographs of the pond habitat are presented at the end of this report (Annex 1).

##### Pond 16

3.1.2 The area covered by Pond 16 (Plate 1) is formed by a series of small pools, and lies to the west of the M74 at grid reference NS 7105 5835. The pools appear to form a single basin or pond at higher water levels, but at the time of sampling no water was apparent, suggesting the pool is a semi-permanent feature that drains down during the drier summer months. This is borne out by the whole Raith area lies within the floodplain of the River Clyde and is subject to flooding, particularly in the winter.

3.1.3 The approximate area covered by the ponds was approximately 750m<sup>2</sup> and largely comprised the following vegetation: branched bur-reed *Sparganium erectum* soft rush *Juncus effusus*, willowherb *Epilobium* spp., dock *Rumex obtusifolius*, ragwort *Senecio jacobaea*, compact rush *Juncus conglomeratus*, and meadowsweet *Filipendula ulmaria*. Dry remains of the duckweed *Lemna* sp. was apparent in the dried up pools, suggesting open water had existed prior to survey.

##### Pond 17

3.1.4 Pond 17 (Plate 2) occupies an area of approximately 1225m<sup>2</sup> to the west of the M74 at grid reference NS 7110 5880. The pond comprises 50% open water, with a 10m fringe of marginal vegetation around the perimeter of the pond. The vegetation largely comprised bulrush *Typha angustifolia*, soft rush, spike rush *Eleocharis palustris*, bottle sedge *Carex rostrata*, horsetail *Equisetum fluviatile*, meadowsweet. The water clarity was generally good at the time of survey with no oily sheen apparent. The clarity of the water enabled the depth to be estimated using a ranging pole. The margins of the pond appear to shelve sharply with a depth greater than 2m noted around the margins of the pond. Oxygen concentrations were low at the time of survey at 17% saturation at 19°C with a pH of 6.91 recorded. The substrate comprised mainly fine black silts. Frogs and toads were abundant around the margins of the pond, and several dragonflies and damselflies were recorded including an adult ruddy darter *Sympetrum sanguineum*, various adults of the genus *Coenagrion*, as well as, several adult horsefly and crane fly. Mammal paths were noted in the vegetation around the margins of the pond; however no definitive sign was noted during the survey.

##### Pond 18

3.1.5 Pond 18 (Plate 3) is relatively shallow and occupies an area of 400m<sup>2</sup>. The pond is connected to Pond 17 via a small, well vegetated, channel (Plate 7). The vegetation comprises grey club-rush *Schoenoplectus tabernaemontani*, bulrush, jointed rush

*Juncus articulatus*, spike rush *Eleocharis palustris*, reed canary grass *Phalaris arundinacea*, willow *Salix* sp., greater willowherb *Epilobium hirsutum*, compact rush, and branched bur-reed. Pond water clarity was good, with a pond depth of approximately 0.03m recorded. The substrate comprised mainly fine silts. Dissolved oxygen was recorded at 2% saturation, at a temperature of 22°C, with a pH of 7.6. In addition frogs and toads, a heron and mallard duck were also observed during the survey.

#### Pond 19

- 3.1.6 Pond 19 (Plate 4) comprised a large open waterbody approximately 2800m<sup>2</sup> located near Raith Haugh to the southern end of the junction. The surrounding habitat comprised marsh and a riparian strip adjacent to the River Clyde comprising woodland and tall ruderals. The waterbody was dominated by bulrush and reed canary grass around the margins of the pond to a width of approximately 10m. A water depth around the margins was recorded at 0.03m, however the depth of the pond increased sharply shelving off to in excess of 2m. Silt was recorded at a depth greater than 1m around the margins of the pond. No floating or submerged aquatic vegetation was noted as part of the survey. Frogs and toads were present.

#### Pond 20

- 3.1.7 It was difficult to determine the actual area occupied by Pond 20 (Plate 5) as the pond was well vegetated, and appeared to be undergoing succession to marshland. It is estimated that the area occupied by the pond was approximately 800m<sup>2</sup>. A water depth of approximately 0.05m was recorded. Vegetation was dominated by bulrush, and reed canary grass, with the remainder of the community comprising soft rush, meadowsweet, greater willowherb, and bottle sedge. In small pockets of open water the duckweed *Lemna minor* was present. Oxygen saturation was low at 18% at 22°C with a pH recorded at 7.2.

#### Pond 21

- 3.1.8 Pond 21 (Plate 6) occupied an area of approximately 1400m<sup>2</sup>, with a marginal fringe of vegetation comprising reed canary grass, bulrush, rosebay willowherb *Epilobium angustifolium*, cow parsley *Anthriscus sylvestris*, and the duckweed *Lemna minor*. The water depth was approximately 0.10m in the margins before increasing sharply to a depth of over 1m. Dissolved oxygen saturation was low at 21% at a temperature of 22°C, with a pH recorded at 7.

### **3.2 Invertebrate Survey**

- 3.2.1 A summary the species richness and relative abundances recorded at each site is presented at Table 1 below, with the invertebrate community assemblage data presented at the end of this report (Annex 2).

**Table 1: Summary of invertebrate data collected in July 2006**

	Pond 16 <sup>‡</sup>	Pond 17	Pond 18	Pond 19	Pond 20	Pond 21
Relative abundance	-	165	179	2	119	129
Total number of taxa	-	22	17	2	8	21
Number of species of significance	-	1	-	-	-	-

### 3.3 Incidental Observations

- 3.3.1 Semi-mature stages of amphibians (frogs and toads) were found at Ponds 16 to 19, being more abundant at Pond 17.
- 3.3.2 Several adult insect species were noted at Pond 17. These included ruddy darter *Sympetrum sanguineum*; as well as unidentified adult horsefly and crane fly. Mammal runs were also noted in the vegetation around Pond 17.
- 3.3.3 The density of wildfowl on the pond were low, with only three birds noted, i.e. a heron, a mallard and a coot.

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<sup>‡</sup> no sample obtained due to pond dry at the time of survey.

## 4. DISCUSSION AND CONCLUSIONS

### 4.1 Species Assessment

4.1.1 Based on the results of this survey the ponds sampled can be described as of poor quality with the majority of the species present being common and widespread. Although the absence of a species within a sample does not guarantee its lack of presence in the pond itself, as a whole, the ponds surveyed showed a low diversity, and low relative abundance, of invertebrate taxa. This data appears to support the poor water quality data for the ponds.

4.1.2 Of the taxa recorded only one species, *Holocentropus stagnalis* (a caddisfly), was identified as being of conservation significance. *Holocentropus stagnalis* is recorded throughout England and Wales, but is rarely noted in Scotland. It is therefore, in Scotland, deemed nationally scarce (Wallace 1991).

### 4.2 Conclusion

4.2.1 The presence of *Holocentropus stagnalis* indicates that Pond 17 has slightly greater conservation value in comparison to the other ponds surveyed; however in general all the ponds surveyed are considered to be of low conservation significance in terms of aquatic invertebrates, given the limitations detailed in Section 2.2.1 above.

4.2.2 It should be noted that this assessment has been based on a single sampling event, and as such does not provide a “through the seasons” assessment of the pond invertebrate community. Whilst it is considered that the invertebrate community assemblages within these ponds are unlikely to change significantly between seasons, it is considered that full assessment of the conservation value of these ponds would be provided by undertaking further monitoring to cover spring, summer, autumn and winter. A “through the seasons” assessment should account for those species that may not be currently present because of early emergence i.e. hatching to adult during spring, and therefore provide a robust assessment of the conservation significance of these ponds to aquatic invertebrates.

4.2.3 It is considered that the ponds do hold conservation potential, particularly if the issue of poor water quality can be addressed via improvements to water quality and drainage. The aforementioned improvements would provide further degree of protection from pollutants and may lead to the enhancement of the habitat potential for each pond and consequently lead to an improve diversity of the invertebrates throughout this series of ponds.



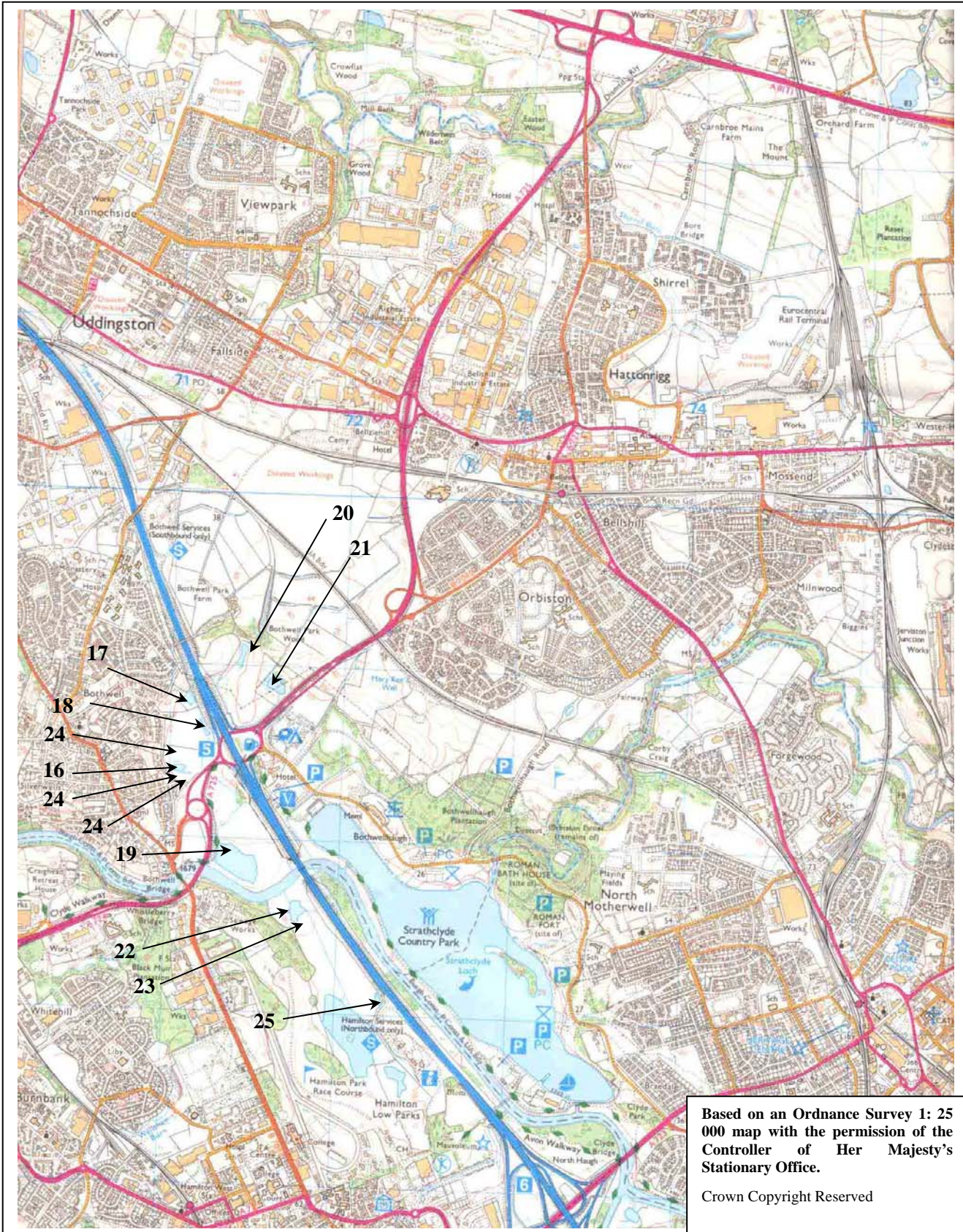


## REFERENCES

Pond Action (1994). *The Oxfordshire Pond Survey. 2 vols.* A report to the World Wide Fund for Nature. Pond Action, Oxford.

Wallace, I.D. (1991) *A review of the Trichoptera of Great Britain. Research and Survey in Nature Conservation No. 32.* Nature Conservation Council, Peterborough.

**Figure 1: Plan for the Ponds Surveyed**



Based on an Ordnance Survey 1: 25 000 map with the permission of the Controller of Her Majesty's Stationary Office.  
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**Figure 1**

Location of Ponds/wetlands in and around Raith Junction

**1.1 M74 - Junction 5 - Raith**

Young Associates  
The Long Barn  
Chester Road  
Tattenhall



**ANNEX 1**

**Photographs of Pond Habitat**





**Plate 1:** Pond 16



**Plate 2:** Pond 17



**Plate 3:** Pond 18



**Plate 4:** Pond 19





**Plate 5:** Pond 20



**Plate 6:** Pond 21



**Plate 7:** Ditch between Pond 17 &18



## **ANNEX 2**

### **Invertebrate Community Assemblage Data**

**Table 2: Invertebrate Community Assemblage Data July 2006**

<b>Taxon</b>	<b>Pond</b>				
	<b>17</b>	<b>18</b>	<b>19</b>	<b>20</b>	<b>21</b>
<b>PLECOPTERA</b>					
<b>Leuctridae</b>					
<i>Leuctra hippopus</i>					1
<b>EPHEMEROPTERA</b>					
<b>Baetidae</b>					
<i>Cloeon dipterum</i>	10	12			7
<b>TRICHOPTERA</b>					
<b>Polycentropodidae</b>					
<i>Holocentropus stagnalis</i>	9				
<b>Limnephilidae</b>					
<i>larvae/pupae indet</i>	1				
<i>Limnephilus lunatus</i>				2	
<b>HEMIPTERA</b>					
<b>Corixidae</b>					
<i>nymphs indet</i>	19				4
<i>Corixa punctata</i>		1			4
<i>Cymatea bonsdrffii</i>					3
<i>Sigara dorsalis</i>	8				
<i>Hesperocorixa sahlbergi</i>		5			12
<i>Sigara nigrolineata</i>					4
<b>Gerridae</b>					
<i>Gerris najas</i>	3				
<b>Notonectidae</b>					
<i>nymphs indet</i>		4			
<i>Notonecta glauca</i>	5	1			
<b>COLEOPTERA</b>					
<b>Haliplidae</b>					
<i>larvae indet</i>	3	3			
<b>Dytiscidae</b>					
<i>Hygrotus confluens</i>					1
<i>Agabus bipustulatus</i>				2	
<i>Ilybius ater</i>	1				1
<b>Noteridae</b>					
<i>Noterus clavicornis</i>					5
<b>Hydrophilidae</b>					
<i>Laccobius bipunctatus</i>					1
<b>MALACOSTRACA</b>					
<b>Crangonyctidae</b>					

<b>Taxon</b>	<b>Pond</b>				
	<b>17</b>	<b>18</b>	<b>19</b>	<b>20</b>	<b>21</b>
<i>Crangonyx pseudogracilis</i>	16	12		51	21
<b>Asellidae</b>					
<i>Asellus aquaticus</i>	19	11		53	17
<b>DIPTERA</b>					
<b>Ceratopogonidae</b>				1	
<b>Chironomidae</b>	22	73			14
<b>Syrphidae</b>					
<i>Eristalis sp</i>					4
<b>Tipulidae</b>					
<i>Tipula sp</i>	2				
<b>NEUROPTERA</b>					
<b>Sialidae</b>					
<i>Sialis lutaria</i>		1			
<b>TRICLADIDA</b>					
<b>Plannaridae</b>					
<i>Polycelis tenuis grp</i>	3	1			
<b>HIRUDINIDAE</b>					
<b>Erpobdellidae</b>					
<i>Erpobdella octoculata</i>	2	1			
<b>MOLLUSCA</b>					
<b>Sphaeriidae</b>	5	2		8	6
<i>Acroloxus lacustris</i>				1	
<b>Hydrobiidae</b>					
<i>Potamopyrgus antipodarum</i>	3	19	1		
<b>Bithynidae</b>					
<i>Bithynia tentaculata</i>			1		1
<b>Lymnaeidae</b>					
<i>Lymnaea peregra</i>	8	14			3
<i>Lymnaea stagnalis</i>					1
<b>Planorbiidae</b>					
<i>Hippeutis complanatus</i>	1				
<i>Gyraulus albus</i>					
<i>Planorbis carinatus</i>	3	17		1	9
<b>Physidae</b>					
<i>Physa fontinalis</i>	7				10
<b>OLIGOCHAETA</b>	15	2			
<b>Relative Abundance</b>	<b>165</b>	<b>179</b>	<b>2</b>	<b>119</b>	<b>129</b>

