SURVEY OF AQUATIC MACROINVERTEBRATES IN TWO DISUSED QUARRY LAKES ADJACENT TO DROGHEDA LANDFILL, COUNTY LOUTH

October 2021

REPORT PREPARED FOR LOUTH COUNTY COUNCIL

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1. INTRODUCTION

EPA Waste Licence W0033-01 specifies a range of environmental monitoring to be carried at Drogheda Landfill, Collon Road, Mell, Co Louth. Condition 9.11 of the licence specifies: "*An annual assessment of the ecology of the Quarry Lake and adjoining habitats shall be undertaken and submitted to the Agency*." As part of this ecological assessment Conservation Services, Ecological & Environmental Consultants have been commissioned by Louth County Council to carry out sampling and identification of aquatic macroinvertebrates at three sites in two disused quarry lakes adjacent to the Landfill. The most recent previous sampling at these locations was carried out in October 2020 (Conservation Services 2020).

Sampling was carried out on 12th October 2021.

2. METHODOLOGY

Macroinvertebrate sampling was carried out at the following sites specified by Louth County Council. Grid references were recorded at each site using a GPS.

SITE	GRID REFERENCE (GPS)
SW3	O 07486 75957
SW3A	O 07414 76048 to O7408 76018
SW2	O 07477 76527

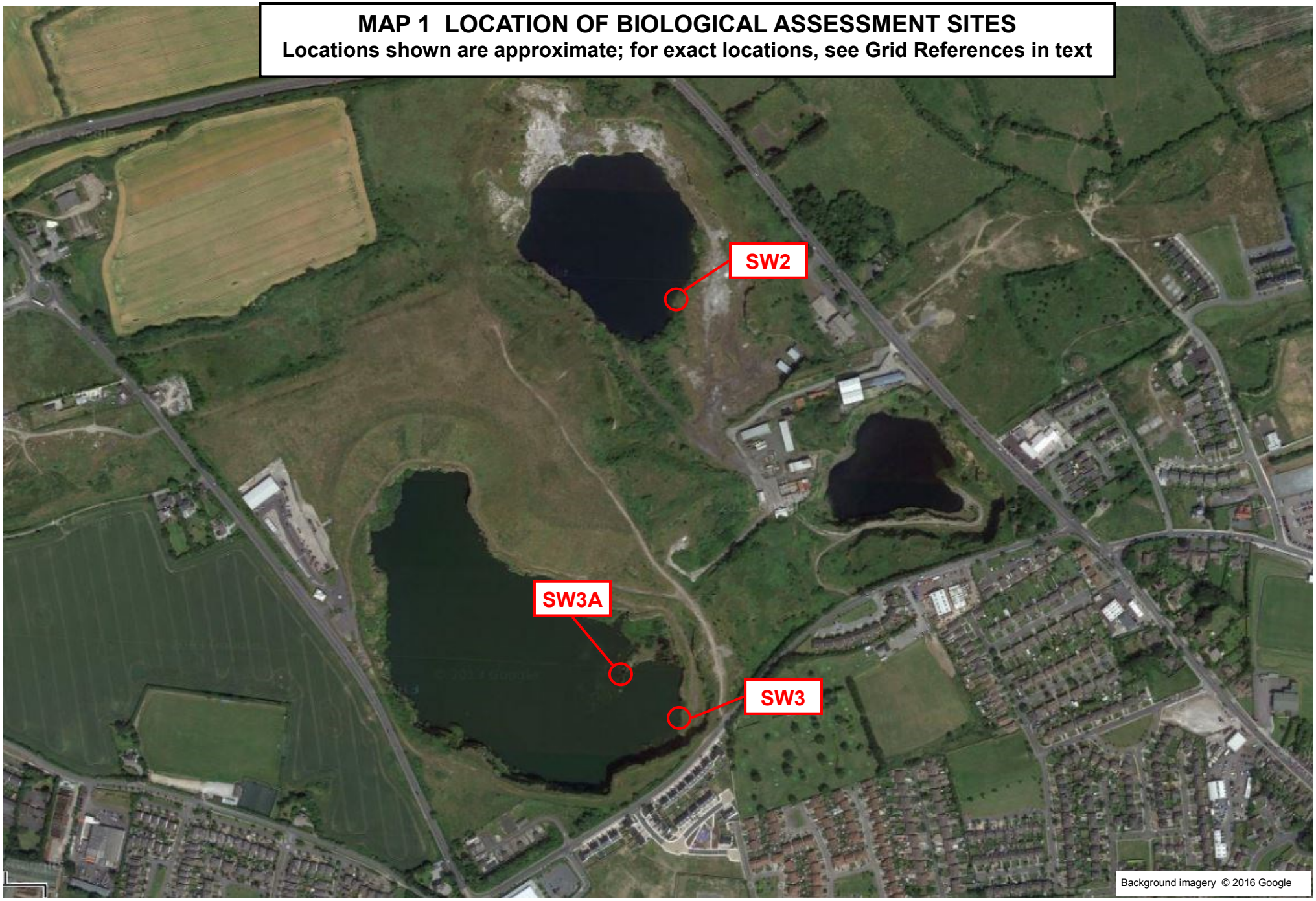
The location of the sites is shown on Map 1. To illustrate habitat quality, photographs were taken at each site.

Sampling consisted of sweep net and kick sampling of the shallow littoral habitat. Each of the three samples were sorted for at least 30 minutes under laboratory conditions; macroinvertebrates were preserved and identified to the lowest practicable taxonomic level using high and low power binocular microscopes.

Taxonomic keys used are listed at the end of the reference section of this report. Abundance ratings and ecological notes for each invertebrate taxon are presented. The invertebrate community in each sample is rated on the basis of water quality indicators, biodiversity, and presence of rare or unusual species. All samples have been preserved and archived for future examination or verification if required.

MAP 1 LOCATION OF BIOLOGICAL ASSESSMENT SITES

Locations shown are approximate; for exact locations, see Grid References in text



3. RESULTS

Invertebrate taxon lists for each site, including abundance ratings and ecological notes, are given in Appendix 1.

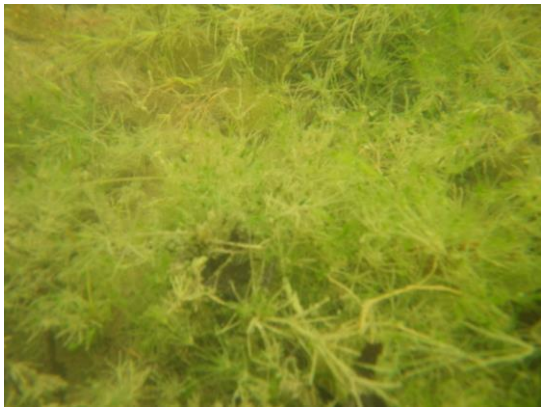
3.1. SITE SW3: LARGER QUARRY LAKE, SOUTH-EASTERN SHORELINE

Location O 07486 75957

Description Substrate of muddy cobble, gravel and some large rocks in exposed areas, mud in sheltered areas. Depth sampled 0-0.5m. Shoreline with sparse coppiced willow. Submerged plant cover was moderate, predominantly *Myriophyllum spicatum* (spiked water milfoil) and Charophyta (stoneworts), with a small amount of *Potamogeton crispus* (curled pondweed). A concentration of dense *Myriophyllum* was washed up.

Shoreline

Substrate



Sumbmerged Charophyta

Myriophyllum washed up against shore

A total of 24 invertebrate taxa were recorded at Site SW3 representing good species richness and invertebrate biodiversity. This is a similar species richness to 2019, when 23 taxa were recorded, and an increase compared with 2020 when 16 taxa were recorded. The low species richness in 2020 may have been a consequence of high water levels.

One segmented worm genus *Limnodrilus sp.* (immature) was recorded as a single specimen.

Three leech species were recorded, *Glossiphonia complanata* as a single specimen, and *Helobdella stagnalis* and *Theromyzon tessulatum* in small numbers.

One snail (Gastropoda) species *Valvata piscinalis* was recorded as a single specimen. One Freshwater Mussel (Bivalvia) genus *Sphaerium sp.* was recorded in small numbers.

The water slater (Isopoda) *Asellus aquaticus* was recorded in moderate numbers.

Two mayfly (Ephemeroptera) taxa were recorded: *Caenis luctuosa* was numerous, and a single damaged specimen of the family Baetidae was recorded.

The damselfly (Odonata, Zygoptera) species *Enallagma cyathigerum* was recorded in small numbers, as well as a moderate number of early instar specimens of the same family (Coenagriidae). Three water bug (Hemiptera) species were recorded, all lesser waterboatmen: *Sigara dorsalis* and *Sigara falleni* at moderate density, and female specimens of the genus *Corixa sp*. in smaller numbers.

Two Trichopteran (caddis fly) species, *Mystacides longicornis* and *Phryganea bipunctata*, were recorded in small numbers.

Single specimes of biting midge larvae (Ceratopogonidae) and horse fly larvae (Tabanidae) were recorded.

Six non-biting midge (Chironomidae) taxa were recorded: *Microtendipes sp*. and *Procladius* sp were numerous, *Clinotanypus sp*, and *Chironomus sp*. in small numbers, and *Cryptochironomus sp*. and *Dicrotendipes sp*. as single specimens.

A single specimen of the beetle (Coleoptera) species *Haliplus confinis* was recorded.

None of the species recorded is rare or protected.

3.2. SITE SW3A: LARGER QUARRY LAKE, PENINSULA AT SOUTH-EASTERN END

Location O 07414 76048 to 07408 76018

Description Muddy gravel and sand with small amounts of cobble and bedrock; depth sampled 0-50 cm. Scattered willows on shoreline. Moderate amounts of *Myriophyllum spicatum* and Charophyta were recorded.

Shoreline looking south-west

Shoreline looking north-east

Myriophyllum

Submerged Charophyta

A total of 24 invertebrate taxa were recorded at Site SW3A, representing good species richness and invertebrate biodiversity, and an increase compared with 2020 (when 18 invertebrate taxa were recorded at this site). Species richness in 2021 was greater than the previous maximum species richness at this site (20 taxa recorded in 2015).

Two segmented worm (Oligochaeta) species were recorded: *Limnodrilus sp*. (immature) in small numbers and *Tubifex tubifex/Potamothrix hammoniensis* group as a single specimen. One leech (Hirudinea) species, *Helobdella stagnalis*, was present in moderate numbers. The freshwater mussel (Bivalvia) genus *Sphaerium sp.* was present in moderate numbers.

The water slater (Isopoda) *Asellus aquaticus* was recorded in moderate numbers. The mayfly (Ephemeropera) species *Caenis luctuosa*, was abundant. The damselfly (Odonata, Zygoptera) species *Enallagma cyathigerum* was recorded as a single specimen, with one early instar specimen of the same family (Coenagriidae). Four water bug (Hemiptera) species of lesser waterboatman were recorded, *Arctocorisa germari*, *Sigara dorsalis* and *Sigara falleni* in moderate numbers, and *Callicorixa praeusta* in small numbers.

Four caddis fly (Trichoptera) taxa were recorded: *Mystacides longicornis* in moderate numbers, *Athripsodes cinereus* and *Phryganea bipunctata* in small numbers, and *Tinodes waeneri* as a single specimen.

Small numbers of horse fly larvae (Tabanidae) were recorded, and a single specimen of biting midge larvae (Ceratopogonidae). Five non-biting midge (Chironomidae) genera were recorded: *Microtendipes sp* was numerous*, Procladius* sp. in moderate numbers, *Dicrotendipes sp.* in small numbers, and *Clinotanypus* sp. and *Cryptochironomus sp*. as single specimens.

Two beetle (Coleoptera) species, *Haliplus confinis* and *Hygrotus nigrolineatus*, were recorded as single specimens.

None of the species recorded is rare or protected.

3.3. SITE SW2: SMALLER QUARRY LAKE, SOUTH-EASTERN SHORELINE

Location O 07477 76527

Description Steeply shelving shoreline with soft silt with some gravel and cobble. *Myriophyllum spicatum*, *Fontinalis antipyretica* and Charophytes were recorded. Shoreline with dense willow.

Shoreline looking south west

Gravel, silt & cobble substrate with *Myriophyllum* and Charophyta

A total of 27 invertebrate taxa were recorded at Site SW2 representing good species richness and invertebrate biodiversity, an increase compared with 14 taxa in 2020 (species richness in 2020 may have been affected by high water levels). Species richness in 2021 was greater than the maximum recorded at this site previously (21 taxa recorded in 2019).

One segmented worm (Oligochaeta) species, *Eiseniella tetraedra*, was recorded as a single specimen. One leech (Hirudinea) species, *Helobdella stagnalis*, was present in small numbers.

A single specimen of water mite (Hydrachnida) was recorded, as well as a single specimen of water spider (Araneae) *Argyroneta aquatica*. Two freshwater shrimp (Amphipoda) species were recorded; *Crangonyx pseudogracilis* was present in small numbers, while *Gammarus lacustris* was numerous. This native

species occurs sporadically in lakes in Ireland. The water slater (Isopoda) *Asellus aquaticus* was numerous.

The mayfly (Ephemeroptera) species *Caenis luctuosa* was recorded in moderate numbers. A single specimen of early instar damselfly larva of the family Coenagriidae was recorded.

Four species of water bug (Hemiptera), all lesser waterboatman were recorded: *Arctocorisa germari* in small numbers, and *Corixa sp*., *Sigara distincta* and *Sigara falleni* as single specimens. Six caddis fly (Trichoptera) species were recorded, *Athripsodes cinereus* and *Tinodes waeneri* in small numbers, and *Holocentropus picicornis*, *Leptocerus tineiformis*, *Mystacides longicornis* and *Polycentropus flavomaculatus* as single specimens.

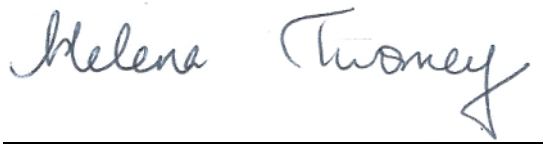
Six non-biting midge (Chironomidae) genera were recorded: *Microtendipes sp*. in moderate numbers, *Endochironomus sp.* and *Polypedilum sp*. in small numbers, and *Clinotanypus sp*., *Cryptochironomus sp*. and *Procladius sp*. as single specimens. Horse fly larvae (Tabanidae) and biting midge larvae (Ceratopogonidae) were recorded as single specimens.

Beetle larvae (Coleoptera) of the family Haliplidae were present in small numbers.

The caddis fly species *Leptocerus tineiformis*, which was recorded as a single specimen at this site, is local and rare in Ireland. The species is widespread in Europe; in Britain the larvae occur in canals, lakes and ponds. None of the other plant or invertebrate species recorded is rare or protected.

4. CONCLUSIONS

The macroinvertebrate data indicate moderately productive conditions at all three sites assessed, with no significant change in the trophic status of the two quarry lakes since 2020.



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15 November 2021

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APPENDIX 1

INVERTEBRATE SPECIES LIST AND NUMBERS RECORDED WITH NOTES ON ECOLOGY AND DISTRIBUTION

(Notes taken from keys and distribution guides given in References)

EPA Indicator Groups for River Water Quality (From McGarrigle et al, 2002)

Group A	Very pollution sensitive
Group B	Moderately pollution sensitive
Group C	Moderately pollution tolerant
Group D	Very Pollution tolerant
Group E	Most pollution tolerant
-	Not assigned to a group

	SW3 2021	SW3A 2021	SW2 2021	Group	Ecology and Distribution in Freshwater
Oligochaeta (Segmented worms)					
Eiseniella tetraedra			1	-	Common in a variety of habitats
Limnodrilus sp. (immature)	1	3		E	Common and abundant in many habitats.
Tubifex tubifex/Potamothrix hammoniensis group (immature)		1		E	Both species are common and abundant.
Hirudinea (Leeches)					
Glossiphonia complanata	1			D	Common in many habitats
Helobdella stagnalis	4	12	2	D	Common in many habitats
Theromyzon tessulatum	3			D	Parasite of waterfowl. Fairly common.
Gastropoda (Snails and limpets)					
Valvata piscinalis	1			C	Commonly found in still or slow-flowing waters, with a preference for muddy or silty substrates.
Bivalvia (Freshwater Mussels)					
Sphaerium sp.	4	16		D	Common in many habitats
Amphipoda (Freshwater shrimps)					
Crangonyx pseudogracilis			5	D	An introduced species, becoming widely distributed in Ireland. Found in standing and slow-flowing habitats

	SW3 2021	SW3A 2021	SW2 2021	Group	Ecology and Distribution in Freshwater
Gammarus lacustris			63	C	Widespread throughout northern Britain and Ireland, sporadically elsewhere; mainly in lakes and smaller waterbodies, rarely in flowing water.
Hydracarina (Water mites)			1	-	Common in many habitats
Araneae (Spiders)					
Argyroneta aquatica			1	-	Common in ponds and ditches where there is a dense growth of vegetation
Isopoda (Water slaters)					
Asellus aquaticus	7	14	56	D	Common in still or slow-flowing waters amongst bottom debris
Ephemeroptera (Mayflies)					
Baetidae (damaged)	1			B	
Caenis luctuosa	46	226	9	C	Common in rivers, lakes and ponds, especially amongst silt trapped between gravel and stones
Odonata (Dragonflies and damselflies)					
Coenagriidae (early instar)	7	1	1	B	
Enallagma cyathigerum	3	1		B	Widely distributed; an inhabitant of large open lakes, ponds, canals and streams where there is plenty of marginal vegetation
Hemiptera (Water Bugs)					
Arctocorisa germari		14	3	C	Widely distributed in lakes
Callicorixa praeusta		2		C	Widely distributed and frequently recorded; mostly in lakes

	SW3 2021	SW3A 2021	SW2 2021	Group	Ecology and Distribution in Freshwater
Corixa sp. (female)	5			C	
Sigara distincta			1	C	Common in Ireland in lakes and pools
Sigara dorsalis	15	24		C	Common in lakes; unusual in rivers
Sigara falleni	18	21	1	C	Common in still and slow flowing waters.
Trichoptera (Caddis flies)					
Athripsodes cinereus		4	3	B	Widespread and common in rivers, streams, lakes and canals on stony and sandy substrata
Holocentropus picicornis			1	C	Found in lakes, ponds and canals
Leptoceridae (early instar)	1			B	
Leptocerus tineiformis			1	B	Lakes, large weedy ponds and occasionally canals. Local and rare in Ireland.
Mystacides longicornis	4	9	1	B	Widespread and common in large ponds, lakes, canals and very slowly flowing large rivers; muddy sand substrata and among vegetation
Mystacides sp. (early instar)				B	
Polycentropus sp (early instar)			1	C	Common in slower-flowing or still waters.
Phryganea bipunctata	3	2		B	Common in ponds, lakes and canals.
Tinodes waeneri		1	6	C	Widely distributed on stony lake shores and in large streams and rivers.
Ceratopogoninae (Biting midges)	1	1	1	C	Common in a variety of habitats.

	SW3 2021	SW3A 2021	SW2 2021	Group	Ecology and Distribution in Freshwater
Chironomidae (Non-biting midges)					
Clinotanypus sp.	6	1	1	C	Found in soft sediments in ponds, lakes and slowly flowing streams and rivers.
Chironomus sp.	5				Common, preferring muddy substrata of standing or slow-flowing waters. Often abundant in organically polluted waters.
Cryptochironomus sp.	1	1	1		Found in various substrata in lakes, small streams and larger rivers.
Dicrotendipes sp.	1	6		C	Unusual in flowing water, normally associated with littoral sediments
Endochironomus sp.			5	C	Found in almost all types of still water, sometimes mining in aquatic plants.
Microtendipes sp.	49	44	11	C	Found in sediments and submerged mosses.
Pentaneurini				C	
Polypedilum sp.			4	C	Common in a variety of habitats.
Procladius sp.	29	10	1	C	Common in muddy substrata of standing or slow-flowing waters.
Prodiamesa sp.				C	Common in a variety of habitats.
Tabanini (Horseflies)	1	2	1	C	Typically occur amongst debris or vegetation at the margins of woodland pools, in bogs and marshes, or occasionally in streams
Coleoptera (Beetles)					
Haliplidae (larvae)			2	C	
Haliplus confinis	1	1		C	Found in pools, streams, fen ditches and dykes; larvae feed on charophytes.
Hygrotus nigrolineatus		1		C	Found in newly created and highly disturbed ponds.
Number of Taxa	**24**	**24**	**27**		