LAND NORTH-WEST OF SOUTHWATER, HORSHAM

ENVIRONMENTAL STATEMENT, VOLUME II, APPENDIX 8.15b AQUATIC INVERTEBRATE SURVEY REPORT

FEBRUARY 2026

LAND NORTH WEST OF SOUTHWATER, NEAR HORSHAM, WEST SUSSEX

AQUATIC MACROINVERTEBRATE SURVEY REPORT

Final Document (Revision 2)

September 2022

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ECOSA Quality Assurance Record

This report has been produced in accordance with the Chartered Institute of Ecology and Environmental Management (CIEEM) Guidelines for Ecological Report Writing 2017[1]. The report has been prepared in line with current best practice guidance and survey work has been undertaken in line with references within CIEEM's Source of Survey Guidance[2].

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[1] Chartered Institute of Ecology and Environmental Management (2017). *Guidelines for Ecological Report Writing.* Technical Guidance Series. http://www.cieem.net/publications/23/ecological-report-writing
[2] www.cieem.net

LAND NORTH WEST OF SOUTHWATER, NEAR HORSHAM, WEST SUSSEX

AQUATIC MACROINVERTEBRATE SURVEY REPORT

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EXECUTIVE SUMMARY

Macroinvertebrate surveys of the waterbodies at Southwater were carried out using standard sampling techniques. The purpose was to assess the species present and the potential conservation value of the site.

The species present were common and typical of shaded woodland streams or ponds. One local water beetle was found, the weevil *Notaris scripti*. The two streams had low species diversity and conservation value whereas the pond had low species diversity and moderate conservation value. The complete list of species found is presented together with diversity scores and conservation status.

1.0 INTRODUCTION

1.1 Background

Ecological Survey & Assessment Limited (ECOSA) have been contracted by Hankinson Duckett Associates to carry out terrestrial invertebrate surveys at land north west of Southwater, near Horsham during the summer of 2021 and spring of 2022.

1.2 The Site

The site is located to the west of Southwater, Horsham, West Sussex, centred on National Grid Reference (NGR) TQ 15398 27298. To the north lies the A24, to the east lies the town of Southwater, to the south is Bonfire Hill, and to the west the site is bounded by Two Mile Ash Road.

The site largely consists of improved pasture and arable land bounded by a network of mature hedgerows and scattered trees. Towards the centre of the site is located Courtland Wood, immediately north east of this is located Smith's Copse on the western site boundary, and to the south extends Two Mile Ash Gill, these areas of mixed woodland are designated as Ancient and Semi-Natural Woodland.

The site also contains waterbodies, these include two main streams to the north and south, and a number of ponds all situated in woodland or woodland strips adjacent to fields.

1.3 Aims and Scope of Report

The information within this report is based on a field survey carried out in June 2022. The objectives of the appraisal are:

- To provide baseline information on the aquatic macroinvertebrate communities present at the site and to identify any notable or rare species present;
- To identify the likely ecological constraints associated with the proposals;
- To identify any mitigation measures likely to be required, following the 'Mitigation Hierarchy'[3];
- To identify any additional surveys that may be required to inform an Ecological Impact Assessment (EcIA); and

[3] In accordance with CIEEM Ecological Impact Assessment guidance (CIEEM, 2018) a sequential process is adopted to address impacts on features of ecological interest, with 'Avoidance' prioritised at the top of the hierarchy and Compensation/Enhancement' at the bottom. This is often referred to as the 'mitigation hierarchy'.

- To identify the opportunities offered by the proposals to deliver ecological enhancement

1.4 Site Proposals

Development proposals for the site include an outline planning application with all matters reserved for a mixed use strategic development to include demolition of existing buildings and erection of up to 1,500 dwellings, up to 15,750 sqm (GIA) of flexible employment space (Use Classes E/B2/B8), up to 2,900 sqm (GIA) flexible community facilities (Use Classes E/F1/F2); education facilities; sports facilities; 5 gypsy and traveller pitches; public open space; landscaping and related infrastructure.

2.0 METHODS

2.1 Introduction

This section details the methods, and any associated limitations, used during the invertebrate survey work carried out by ECOSA at land north west of Southwater.

2.2 Aquatic Macroinvertebrate Survey

2.2.1 Survey Extent

The purpose of this survey was to assess the waterbodies within the Southwater site for any aquatic insects of conservation concern, in order to inform planning decisions on development proposals.

The site was visited by Robert Aquilina on Thursday 30th June 2022 and samples were collected for analysis in the laboratory using standard techniques. The weather conditions were sunny and suitable for the surveys.

Industry standard survey and extraction techniques for the waterbodies (Environment Agency, 2012) were used to assess the species present and their conservation value (Chadd, 2004).

2.2.2 Survey Details

Aquatic macroinvertebrates were collected using a standard size Freshwater Biological Association (FBA) D-frame pond net from the major habitats along the streams and pond (stands of different wetland plants, distinctive substrates, tree roots etc.). All the different habitats present were allocated a proportion of the overall sampling time (3 minutes) and different areas of the same mesohabitat were subsampled to ensure that as great a range as possible was sampled.

Each location was also searched for an additional minute looking for surface dwelling animals such as water skaters and whirligig beetles and inspecting submerged habitats such as logs and larger stones for attached animals.

The samples were preserved in 70% Industrial Methylated Spirit (IMS) and sorted in the laboratory, where all the invertebrates were extracted. The standard Biological Monitoring Working Party (BMWP) invertebrate groups were recorded : *Tricladida* (flatworms), *Gastropoda* (snails and bivalves), *Crustacea* (slaters, shrimps and crayfish), *Hirudinea* (leeches), *Megaloptera* (alderflies), *Plecoptera* (stoneflies), Ephemeroptera (mayflies), *Odonata* (dragonflies and damselflies), *Hemiptera* (water bugs), *Coleoptera* (water beetles), *Trichoptera* (caddisflies) and three families of *Diptera* (true flies). Additionally, other families of *Diptera* that do not score in the

Whalley, Hawkes, Paisley & Trigg (WHPT) Metric system were identified where possible as were Veliidae (water crickets). Voucher specimens were retained in order to check their identity.

Three waterbodies were surveyed at the site in total; the northern stream (Waterbody A), the southern stream (Waterbody D) and a pond (Waterbody E). The locations of the waterbodies surveyed are outlined in **Table 1** below, and shown on **Map 1**. All other waterbodies shown on Ordance Survey 1:10,000 map of the site were investigated in May 2022 but were found to be dry and therefore not sampled for aquatic invertebrates.

Two streams still held some water and were sampled together with a single pond which held almost normal water levels and was presumably ground water fed. Neither stream had any in-channel vegetation and appeared to dry down annually as no fish were present in the pools.

The pond is clearly man-made and was probably originally designed for fish as the sides are rather too steep for a good wildlife pond and an island has been incorporated which usually gets colonised by scrub and trees and ends up holding little conservation value for wetland species.

Table 1: Locations of waterbodies sampled.

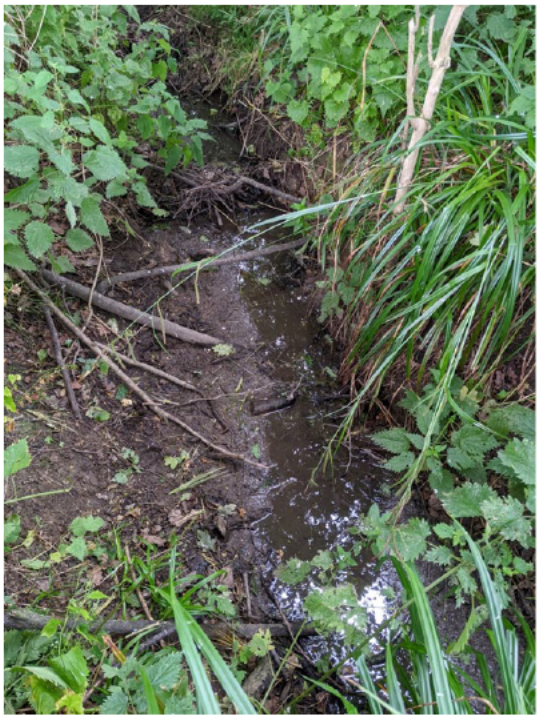
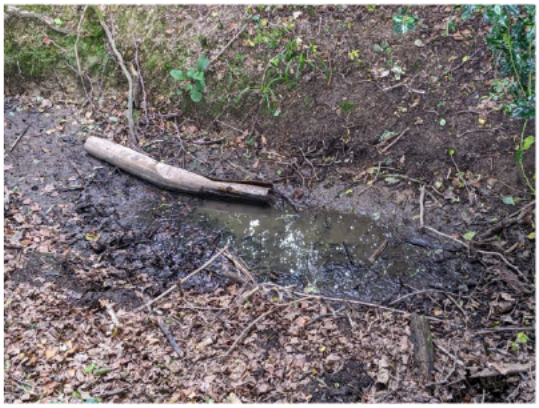
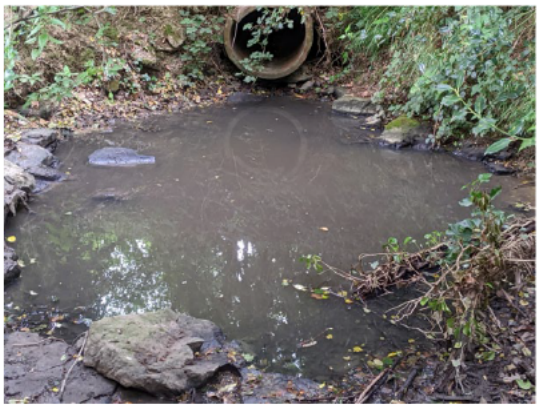
Waterbody	Photographs	Grid Reference
A – Northern Stream		TQ 1572 2849

Table 1: Locations of waterbodies sampled.

Waterbody	Photographs	Grid Reference
D – Southern Stream	 	TQ 1493 2713
E – Pond		TQ 1496 2674

2.2.3 Whalley, Hawkes, Paisley & Trigg (WHPT) Metric

Condition assessment of running waters is based on the WHPT score which replaces the BMWP score. These scores are industry standard and reflect the sensitivity of the families to pollution. The higher the family score, the more sensitive to oxygen depletion the family is and therefore their presence indicates a cleaner or less impacted site. The effects of pollution generally are to impose a Biological Oxygen Demand (BOD) upon the receiving waters and so sensitive families are progressively excluded as the BOD increases.

The score for each family present is totalled to give a site score. The family WHPT scores are influenced by the abundance of the family present, so an abundance score is also calculated. The abundance categories are outlined in **Table 2** below.

Table 2: Abundance categories for Community Conservation Index (CCI)

Abundance Category	Numerical Abundance
AB1	1-9
AB2	10-99
AB3	100-999
AB4	>1000

It is important to interpret the results in the context of the physical characteristics of the sample site, so river samples are comparable with river samples but not with pond samples. This is because the inherent physical chemistry of the waters (especially dissolved oxygen which is the primary driver of WHPT) will be different in flowing waters and still waters.

WHPT reflects the overall diversity of a site but does not take into account any scarce or rare species present which is assessed using CCI below.

2.2.4 Community Conservation Index (CCI)

An assessment of the conservation value of each site was made using the Community Conservation Index (Chadd and Extence, 2004). This takes a conservation score for each species from published authoritative sources based on their rarity. The Conservation Scores (CS) are summed and divided by the number of contributing species to give a mean. This is then multiplied by the Community Score (CoS) such that:

$$CCI = \frac{\sum CS}{n} \times CoS$$

The CoS is based on the highest individual Conservation Score. The higher the CCI score, the greater the conservation value of the site. A general guide to interpretation of scores is given in **Table 3** below.

Table 3: Community Conservation Index (CCI) Score interpretation

Score	Interpretation	Conservation value

Table 3: Community Conservation Index (CCI) Score interpretation

Score	Interpretation	Conservation value
0-5.0	Site supports only common species or a community of low taxon richness	Low
>5.0 – 10.0	Site supports at least one species of restricted distribution or a community of moderate taxon richness	Moderate
>10.0 – 15.0	Site supports at least one uncommon species or several species of restricted distribution or a community of high taxon richness	Fairly high
>15.0 – 20.0	Site supports several uncommon species, at least one of which may be nationally rare, or a community of high taxon richness	High
>20.0	Site supports several rare species, including species of national importance or at least one of extreme rarity (RDB), or a community of very high taxon richness	Very high

2.2.5 Limitations

The survey was carried out after an extended period of dry weather which is becoming more frequent in spring or summer in England. The effect of this was reduced water flow in the streams down to a series of small pools with barely a trickle of water between them.

This has two impacts:-

1. Collection of the samples is made much more difficult by the lack of water depth and flow upon which the kick sampling process relies. Therefore the sample itself is less representative of the diversity.

2. The effect of reduced water flow on the invertebrates themselves will be twofold –
    a. animals will temporarily leave or bury themselves in the wet substrate making their capture less likely and
    b. if the hydrology changes become regular then those animals requiring permanent flow will leave altogether.

Thus the diversity found in temporary streams is expected to be lower than that of permanent streams although often such perennial streams hold species of restricted distribution and therefore greater conservation interest.

A number of small ponds were present across the site but these had all dried down to such an extent that no sampling was possible with the exception of one.

3.0 RESULTS

3.1 Environmental Parameters

The environmental parameters; pH, conductivity and temperature for each waterbody sampled are outlined in **Table 4** below.

Table 4: Environmental Parameters associated with each waterbody sampled.

Parameter	A	D	E
pH	7.20	7.45	7.05
Conductivity (µS/cm)	960	653.5	918
Temp (ºC)	17	14	15

These environmental parameters are merely indicative of the overall conditions and status of the waterbody at the time of the visit, as they represent a single point in time.

The pH is neutral with slightly above average conductivity. Conductivity reflects the ions present but does not distinguish them chemically. The levels are typical of waterbodies in agricultural environments and indicate some but not significant chemical enhancement.

Conductivity is likely to be increased by the falling water levels but probably not by significant amounts.

3.2 Biological Results

The WHPT Metric scores are used to categorise water bodies according to the sensitivity of taxa to oxygen depletion (as such it is widely used in running waters to assess water quality – the premise being that pollution increases BOD (Biological Oxygen Demand) and therefore reduces available oxygen and so eliminates the more sensitive taxa progressively). The higher the score for each family the greater its sensitivity to oxygen depletion and so the higher the site score, the 'better' the water quality.

The Average Score Per Taxon (ASPT) score is calculated to overcome bias in sample size and generally reflects the water quality – the higher the score the more demanding the families present are of oxygen.

The WHPT and ASPT scores for each waterbody sampled are presented in **Table 5** below.

Table 5: Whalley, Hawkes, Paisley & Trigg (WHPT) Metric and Average Score Per Taxon (ASPT) scores for each waterbody sampled.

Index	Waterbody A	Waterbody D	Waterbody E
# contributing taxa	13	11	21
WHPT	48.8	44.7	82.7
ASPT	3.75	4.06	3.94
Status	Low	Low	Low

Furthermore, a CCI score was calculated for Waterbody E because unlike the other waterbodies, the pond yielded species other than those taxa which are common and widespread. A summary of the CCI score for Waterbody E is presented in **Table 6** below.

Table 6: Summary of CCI score result for Waterbody E.

Sum of conservation scores (CS)	38
Number of contributing taxa (n)	23
Σ CS/n	1.65
Community Score (highest CS)	5
CCI Score	**8.25**

The CCI score gives a conservation value of Moderate for the pond, with one local water beetle (*Notaris scripti* – a weevil living on lesser pond sedge *Carex acutiformis* and reedmace *Typha sp.*), although the community as a whole had low taxon richness.

3.3 Incidental Records

A number of observations were recorded in passing that were not part of the scheduled survey but may have impact on the development of the site. Common toad *Bufo bufo* were present in the pond as juveniles almost ready to leave the water together with one of the small newt species (not separable as larvae).

The pond surrounds had been planted with a number of ornamental non-native plants such as *Gunnera* and skunk cabbage *Lysichiton* species. This latter can become an invasive alien plant species spreading particularly along water courses although there were no signs of it spreading beyond the pond.

The dark-winged black soldierfly *Pachygaster atra* was found as three adults in the southern stream sample. It is a terrestrial species that is associated with woodland and possibly damp mud besides streams although not usually included in the aquatic and wetland fauna.

4.0 CONCLUSION

A low diversity of aquatic fauna was found in the streams, dominated by the common freshwater shrimp *Gammarus pulex*. Two factors have contributed to the low scores; difficulty sampling because of low water levels (both streams were almost dry) and the temporary hydrology of the streams which tends to cause low taxon richness but can include rare species (although not in this case).

The pond had Moderate diversity and conservation value, enhanced by the presence of a Local weevil *Notaris scripti*. The pond is otherwise of less conservation value due to the presence of ornamental, potentially invasive non-native plants and poor design, the lack of shallow margins and the presence of the island both contributing negatively.

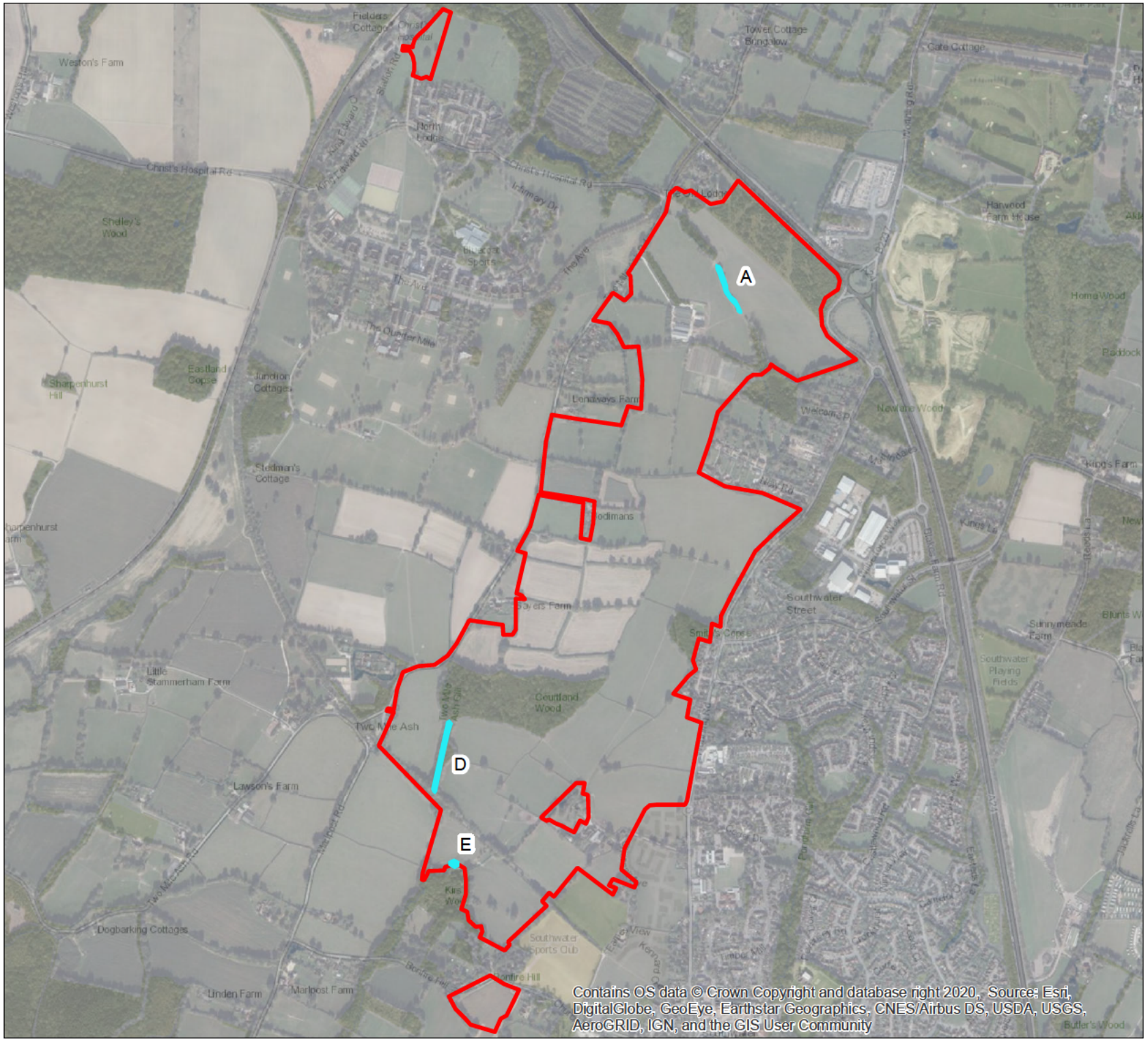
5.0 REFERENCES

Chadd, R. a. E. C., 2004. *The conservation of freshwater macroinvertebrate populations : a community-based classification scheme,* s.l.: Aquatic Conservation: Marine and Freshwater Ecosystems.

Environment Agency, 2012. *Freshwater macro-invertebrate analysis of riverine samples,* s.l.: Environment Agency.

Environment Agency, 2012. *Freshwater macro-invertebrate sampling in rivers. ,* s.l.: Environment Agency.

Map 1 Location of Surveyed Waterbodies



LAND AT SOUTHWATER, NEAR HORSHAM, WEST SUSSEX

AQUATIC MACROINVERTEBRATE SURVEY REPORT

Map 1 - Location of Surveyed Waterbodies

Client:	Hankinson Duckett Associates
Date:	September 2022
Status:	Final

KEY

Site Boundary

Waterbodies Surveyed

Scale at A4: 1:15,000

0 150 300 600 Metres

N

Prepared by: EV	Date: 080922
Last amended by:	Date:

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Appendix 1 Aquatic Macroinvertebrate Taxon List

Group	Biological Monitoring Working Party (BMWP) Family	Species	Common name	Status	WHPT			CCI
					A	D	E	E
Tricladida	Planariidae	*Polycelis tenuis gr.*	Flatworm				4.7	1
Crustacea	Asellidae	*Asellus aquaticus*	Water slater		2.3		2.3	1
Crustacea	Gammaridae	*Gammarus pulex*	Freshwater shrimp		4.6	4.5	4.5	1
Mollusca	Physidae	*Physella acuta type*	Bladder snail	alien			2.7	
Mollusca	Hydrobiidae	*Potamopyrgus antipodarum*	Jenkins spire snail			4.1	4.1	1
Mollusca	Planorbidae	*Planorbarius corneus*	Great ramshorn				3	4
Mollusca	Planorbidae	*Planorbis carinatus*	Keeled ramshorn				y[4]	1
Mollusca	Sphaeridae	*Musculium lacustre*	Lake orb mussel				3.5	3
Mollusca	Sphaeridae	*Pisidium casertanum*	Pea mussel			3.5		
Mollusca	Sphaeridae	*Pisidium milium*	Pea mussel		3.5		y	2
Hirudinea	Glossiphonidae	*Glossiphonia complanata*	Leech			3.4		
Hirudinea	Glossiphonidae	*Helobdella stagnalis*	Leech				3.4	1
Odonata	Coenagrionidae	*Pyrrhosoma nymphula*	Large red damselfly				3.4	3
Hemiptera	Hydrometridae	*Hydrometra stagnorum*	Water measurer		4.3		4.3	2
Hemiptera	Notonectidae	*Notonecta sp*	Water boatman	nymphs			3.4	
Hemiptera	Veliidae	*Velia caprai*	Water cricket		3.9	3.9		
Coleoptera	Gyrinidae	*Gyrinus substriatus*	Whirligig beetle				8.1	1
Coleoptera	Dytiscidae	*Agabus bipustulatus*	Diving beetle				4.8	1
Coleoptera	Dytiscidae	*Dytiscus sp.*	Great diving beetle	larvae			y	
Coleoptera	Dytiscidae	*Hyphydrus ovatus*	Cherry pip				y	2

[4] 'y' indicates that the species was present but that it did not count towards the score, usually because another species in the same family had already contributed to the score.

			beetle					
Coleoptera	Dytiscidae	*Hydroporus discretus*	Diving beetle		4.5			
Coleoptera	Dytiscidae	*Hydroporus palustris*	Diving beetle				y	1
Coleoptera	Dytiscidae	*Hydroporus tessellatus*	Diving beetle		y		y	2
Coleoptera	Elmidae	*Elmis aenea*	Riffle beetle		7.4			
Coleoptera	Hydrophilidae	*Anacaena globulus*	Scavenger beetle				8.8	1
Coleoptera	Hydrophilidae	*Anacaena limbata*	Scavenger beetle				y	1
Coleoptera	Hydrophilidae	*Helophorus aequalis*	Scavenger beetle				y	1
Coleoptera	Hydrophilidae	*Helophorus brevipalpis*	Scavenger beetle		5.8	5.8	y	1
Coleoptera	Hydrophilidae	*Helophorus minutus*	Scavenger beetle		y		y	2
Coleoptera	Scirtidae	*Elodes sp.*	Marsh beetle		6.9			
Coleoptera	Scirtidae	*Scirtes sp.*	Marsh beetle				6.9	
Coleoptera	Curculionidae	*Notaris scirpi*	Weevil	Local				5
Trichoptera	Limnephilidae	*Limnephilus lunatus*	Cased caddis			5.9	5.9	1
Diptera	Chaoboridae	*Chaoborus crystallinus*	Phantom midge	larvae			3	
Diptera	Chironomidae		Non-biting midge	larvae	1.3	1.3	1.3	
Diptera	Culicidae	*Culex sp.*	Mosquito	larvae	2.0			
Diptera	Sciomyzidae		Snail-killing flies	larvae			3.4	
Diptera	Stratiomyidae	*Oplodontha viridula*	Common green colonel soldierfly	larvae			3.6	
Diptera	Stratiomyidae	*Pachygaster atra*	Dark-winged black soldierfly	adult		3.6		
Diptera	Ptychopteridae	*Ptychoptera lacustris*	Fold-wing crane-flies	larvae		6.4		
Oligochaeta			True worms		2.3	2.3	2.3	
Lepidoptera	Pyralidae	*Cataclysta lemnata*	Small china mark moth	larvae				
				Total	48.8	44.7	82.7	38
				# taxa	15	11	27	23
				Score	3.25	4.06	3.06	1.65